



Project update - March 2017



## Beatrice explained

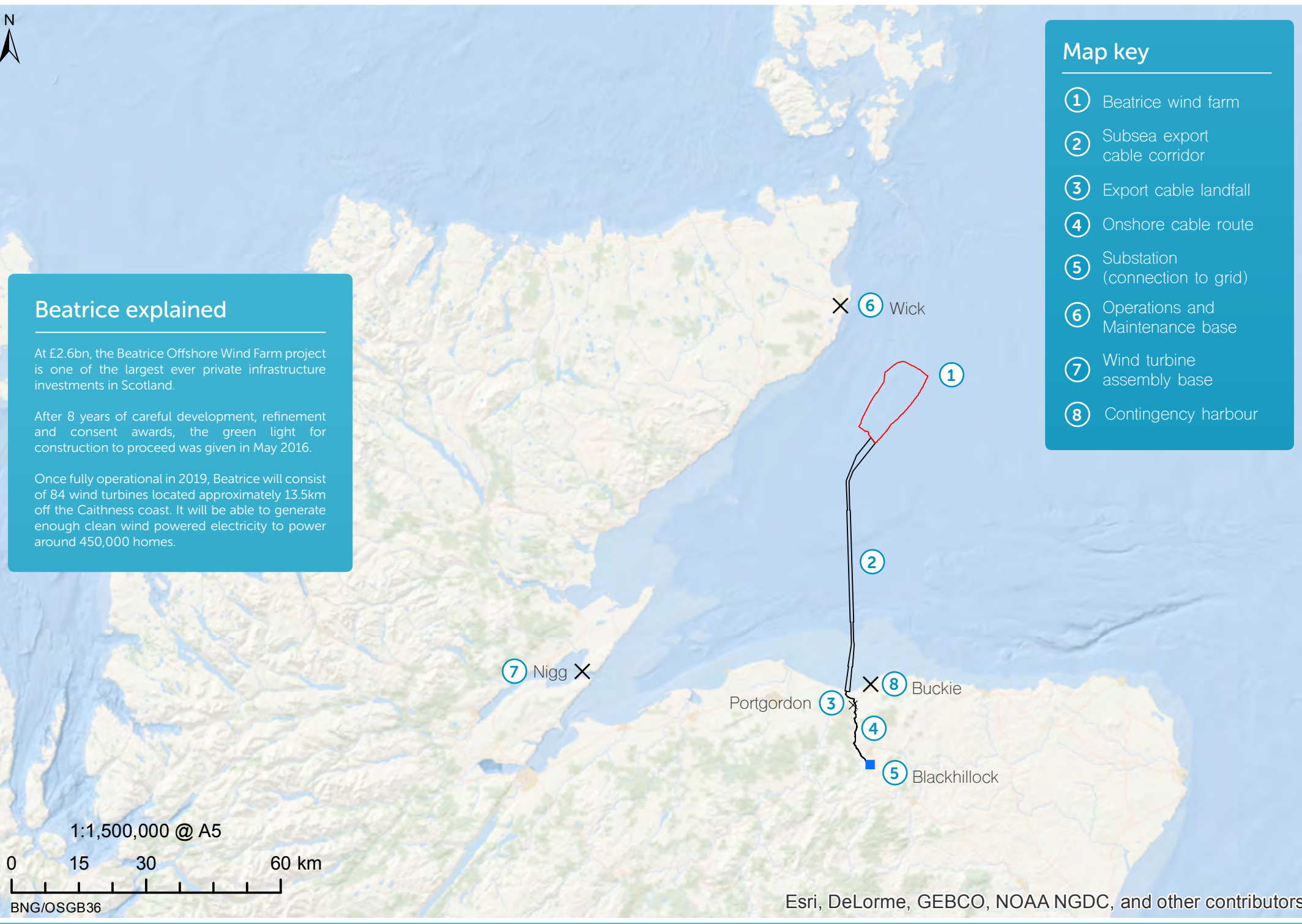
At £2.6bn, the Beatrice Offshore Wind Farm project is one of the largest ever private infrastructure investments in Scotland.

After 8 years of careful development, refinement and consent awards, the green light for construction to proceed was given in May 2016.

Once fully operational in 2019, Beatrice will consist of 84 wind turbines located approximately 13.5km off the Caithness coast. It will be able to generate enough clean wind powered electricity to power around 450,000 homes.

## Map key

- ① Beatrice wind farm
- ② Subsea export cable corridor
- ③ Export cable landfall
- ④ Onshore cable route
- ⑤ Substation (connection to grid)
- ⑥ Operations and Maintenance base
- ⑦ Wind turbine assembly base
- ⑧ Contingency harbour



1:1,500,000 @ A5

0 15 30 60 km

BNG/OSGB36

Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors

## Project overview

Beatrice Offshore Windfarm Limited (BOWL) is a joint venture partnership between SSE Renewables (40%), Copenhagen Infrastructure Partners (35%) and Red Rock Power Limited (25%).

## Partners



SSE is one of the UK's leading energy companies, involved in the generation, distribution and supply of electricity and the extraction, storage, distribution and supply of gas. Its core purpose is to provide the energy people need in a reliable and sustainable way. It supplies energy to around 8.2million customers throughout Great Britain and Ireland and is one of the UK's leading generators of electricity from renewable sources.



Copenhagen Infrastructure Partners (CIP) is a fund management company founded in 2012 by 5 partners with extensive experience from energy projects, including offshore wind projects. Copenhagen Infrastructure Partners currently manages three funds of approx. 3.5 billion Euros in total. Copenhagen Infrastructure Partners focuses on long term investments in energy and infrastructure assets, primarily in Northern and Western Europe and North America.



Red Rock Power Limited is the UK subsidiary of SDIC Power Holdings Co. a power generation company listed on the Shanghai Stock Exchange. SDIC Power is primarily engaged in the investment, development, construction, operation and management of power projects. The company owns a total installed capacity of 32.5GW, more than 60% of which is generated from renewable energy installations, including hydro power stations and wind farms.

## Development timeline



## Benefits

Beatrice brings with it a number of benefits including significant investment, supply chain and employment opportunities during the development, construction and operational phases. Significant investment has already taken place during the development phase.

We are investing approximately £10m in Wick Harbour beginning with the renovation of two Thomas Telford buildings which will become our long term Operations and Maintenance base. In December 2016, we launched the first element of our £6m Community Investment Fund\* package.

### Keeping the lights on



Beatrice will be capable of generating enough electricity to power around 450,000 homes.

That's around three times the number of homes in the Moray and Highland regions.

### Employing people



There will be a gross average of 890 people employed during the construction phase.

Once operational Beatrice will require around 90 operatives to safely maintain and operate the wind farm during its 25 year lifespan.

### Helping communities



The Beatrice Community Investment Fund is worth a total of £6m and is intended to benefit communities in the Highlands and Moray.

The Beatrice Partnership Fund launched in December 2016 and the Community Fund will launch in spring 2017

### Providing opportunity



During construction Beatrice is expected to deliver around £680m into the Scottish and UK economy through employment and supply chain opportunities. During its 25 year operational phase, Beatrice is expected to deliver a further £400m - £525m through procurement of services and materials.

Many key components are being manufactured in the UK including the turbine blades, a number of jacket substructures (on which the wind turbines stand) and inter-array cables.

### Developing responsibly



During development and construction we are undertaking a significant number of environmental surveys and monitoring programmes.

This includes part funding a regional marine mammal monitoring programme in the Moray Firth which is managed by experts from the University of Aberdeen.

\*Please see the back page for more information

## Operations and Maintenance base

With its proximity to the wind farm and with the availability of suitable quayside facilities, Wick Harbour has been chosen as the location for our Operations and Maintenance (O&M) base. The base will be required for the wind farm's 25 year lifespan to facilitate marine co-ordination, commissioning, operation and maintenance of the turbines.

Artist's impression



In August 2016, having assessed a number of options for the O&M base, we decided to take the option to renovate and utilise two currently dis-used industrial buildings located in the historic conservation area of Lower Pulteneytown.

Our proposals for the re-use of these historic buildings is appropriate as Lower Pulteneytown was conceived, planned and built as an industrial marine related development.

Our development will regenerate a significant proportion of Wick's Harbour Quay in to long term marine use.

For 150 years, Wick harbour has provided a safe haven for fishing, commercial and leisure vessels. We plan to utilise a currently unused corner of the harbour to provide berthing for up to six Crew Transfer Vessels.



Lower Pulteneytown has a particular and strong visual identity and, as an example of a very early planned industrial/residential settlement, has national and international conservation and historic importance.

To ensure that the Listed Building Conservation requirements for the area are fully met, the development of the scheme has progressed in close liaison with the Local Authority Conservation and Planning departments. Planning consent was granted in January 2017 and work begins in February 2017.

Construction will begin with some demolition, focusing on the removal of the steel and asbestos industrial roof and columns, slated roofs, and all doors & windows and internal timberwork. Parts of the walls will be demolished to allow the formation of new doors and windows where required. Whilst thorough refurbishment is required throughout, the renovation will retain as many original features that are salvageable across both buildings. Principally these are the masonry walls.

The key marine construction activities will begin with the removal of the disused slipway structure located within the north west corner of the Inner Harbour. The removal of the slipway will enable the existing number of marina berths to be maintained and enable the available space within the Inner Harbour to be used effectively.

The height of the existing quay wall will be increased to the height of the adjoining quay walls and infilling and re-leveling of the quayside will be carried out.

The pontoons for the Crew Transfer Vessels will be installed and connected to the refurbished quayside by a linkspan. The final layout of the pontoons is yet to be determined.

## Onshore construction in Moray

There are a number of key onshore construction activities required as part of the Beatrice project. Work is underway in Moray along the cable route, at cable landfall near Portgordon and at the substation at Blackhillock near Keith.



### Cable landfall, Portgordon

The electricity generated by Beatrice will come ashore via subsea cables to the west of Portgordon.

The electricity is then sent via underground cables to the substation at Blackhillock.



### Cable route

The route from landfall to the substation is approximately 20km using underground cables.

Steerable drilling techniques will be used to direct the power cables under obstacles, avoiding disruption to roads, water courses, and sensitive habitats.



### Blackhillock substation, Keith

The substation construction began in May 2016. Much of the initial infrastructure is now complete ahead of deliveries of key components which will take place in the first half of 2017. The electricity from Beatrice will pass through the substation for onward transmission on to the National Grid.

## Offshore construction

One of the most challenging aspects is the installation of the turbines and associated infrastructure in the North Sea. Beatrice will be one of the deepest offshore wind farms in the world, with water depths of up to 55m. Over the next two years some sizeable vessels will be able to be seen offshore undertaking various installation tasks.

### Piling operations

One of the first construction activities will be to install steel tubular structures (piles) in the seabed on to which the subsea structures (jackets) are attached. The piles are installed into the seabed using a piling hammer or drill. Piling operations will be undertaken by the Stanislav Yudin vessel, operated by our contractor Seaway Heavy Lifting (SHL).



### Jacket substructure installation

Once the piles are installed another SHL vessel, The Oleg Strashnov, will begin installing the jacket substructures in readiness for the installation of the turbines. Each turbine requires a single jacket and there will be a further jacket installed for each of the two Offshore Transformer Modules.



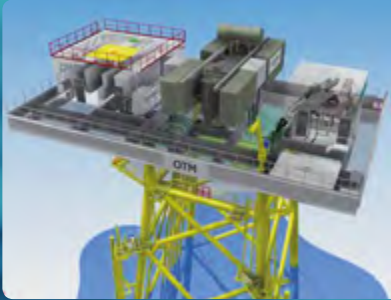
### Wind turbine installation

Wind turbine installation will be carried out by the Pacific Orca vessel. The vessel 'jacks up' ahead of installation, which means that it extends legs to the seabed and lifts itself clear of the water. This provides a stable platform for the lifting and installation work. Siemens Wind Power manufacture and install the wind turbines.



## Subsea cable construction

To get the electricity from the wind farm we will be installing a network of subsea cables which connect the wind turbines to the two offshore transformer modules (OTMs). Further subsea cables will connect the OTMs to the landfall point near Portgordon.



### Inter-array cables and OTMs

The network of cables within the wind farm is called the 'inter-array' and consists of around 140km of subsea cable. The turbines will be connected in strings which, in turn, connect to the two centrally located OTMs (pictured left). SHL has contracted Siem to design and install the inter-array. The cables are being manufactured by JDR in Hartlepool.



### Export cables

We will be laying approximately 140km of buried subsea export cables from the wind farm due south to the landfall point west of Portgordon. The cables will be laid by the 'Skaggerak' vessel.

As the seabed sediments are mainly sands and gravels the cables will be laid then water jetted into the seabed to the desired burial depth. Guard vessels will be employed to protect exposed cables on the seabed prior to burial.

The installation of the export cable will begin at the landfall point utilising a form of horizontal drilling technology to install ducts beneath the shoreline. The offshore cable will be pulled through the ducts and joined with the onshore cable.

Spring 2017 will see work beginning on excavating the cable trench (within approximately 4.5km of the shore).

## More information

### Community funds

The Beatrice fund will be worth a total of £6m, split between Highland (£4m) and Moray (£2m). These will be split equally between a Partnership fund in each area and a local fund.

The Partnership fund for Highland will cover the communities on the east coast of Caithness and Sutherland. In Moray, it will include all coastal communities and the four local communities, namely Buckie and District, Strathisla, Lennox and Keith.

For more information please visit: [www.sse.com/BeatricePartnershipFund](http://www.sse.com/BeatricePartnershipFund)

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### Supply Chain

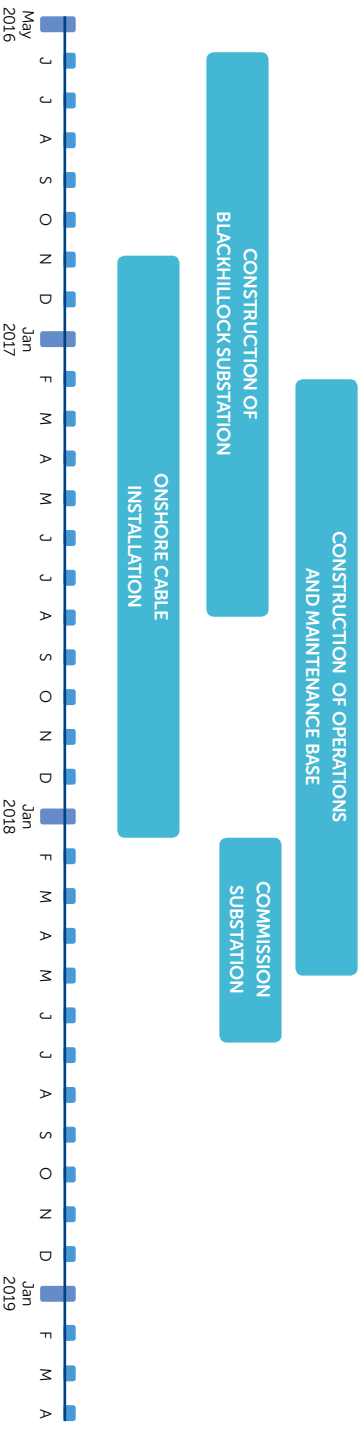
If you would like to become a supplier to Beatrice, please send your company details and a brief summary of the services you offer to: [offshoreprocurement@sse.com](mailto:offshoreprocurement@sse.com)

A member of the team will be in touch with you if they wish to discuss your services further.

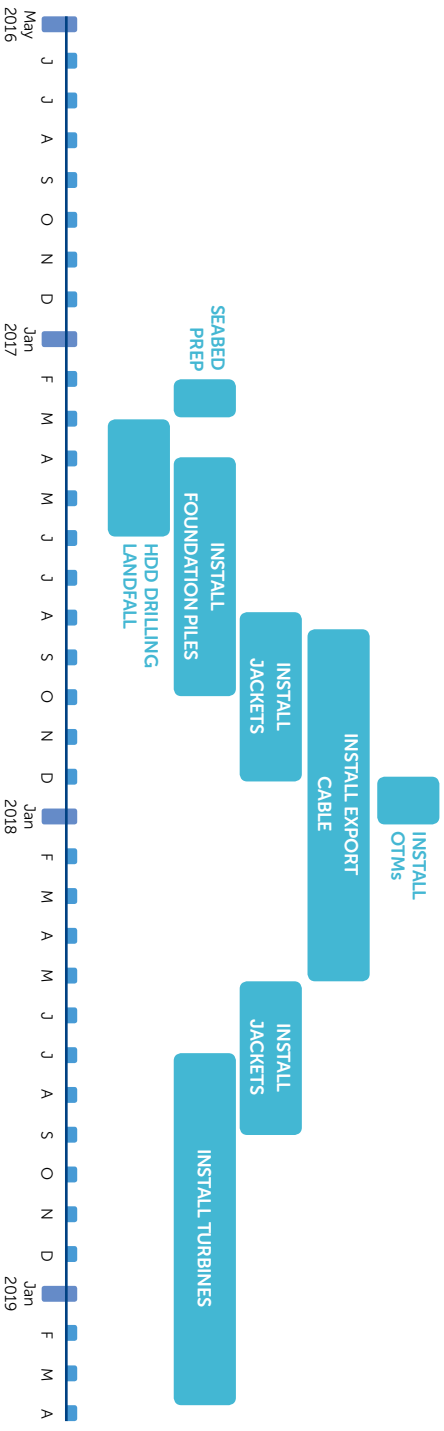
You might also wish to visit the SSE Open4Business portal and register your business. Once registered you will have visibility of all of the supply chain opportunities across SSE.

[www.sseopen4business-highlands.com](http://www.sseopen4business-highlands.com)

# Onshore construction timeline\*



# Offshore construction timeline\*



\*Subject to variation