



# Fifteen years of offshore wind



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Renewable energy has always been at the core of SSE's strategy and for the past 15 years SSE has been a leading player in the UK's offshore wind industry.

In that time, SSE has proven its ability to deliver industry leading offshore wind projects including the development, construction and operation of Greater Gabbard Offshore Wind Farm and, come spring 2019, the Beatrice Offshore Wind Farm.

Now, with a consented offshore wind development pipeline in waters around Great Britain and Ireland totalling 3.3GW and potential new lease opportunities, we are well on our way to cementing ourselves as one of the leading offshore wind developers. This consented pipeline is the largest of any company in the UK, the largest offshore wind market in the world.









**Alistair Phillips-Davies**  
Chief Executive, SSE

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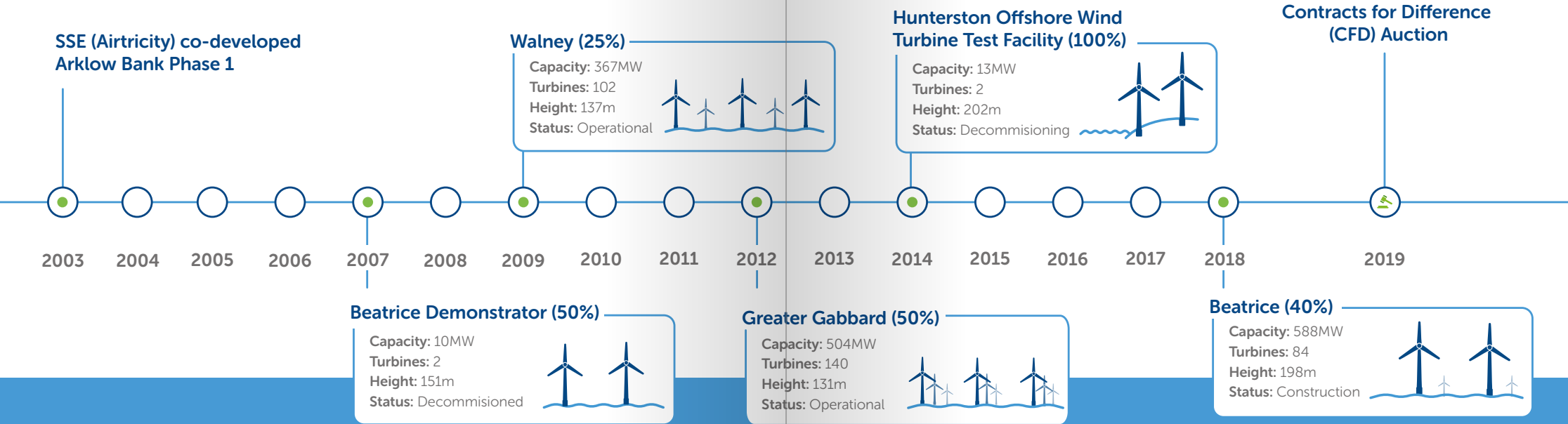
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# SSE's offshore wind map

 <b>Greater Gabbard</b> Ownership: 50% 504MW capacity 140 turbines	 <b>Walney</b> Ownership: 25.1% 367MW capacity 102 turbines
 <b>Arklow Bank Wind Park</b> Ownership: 100% Minimum 520MW capacity	 <b>Beatrice</b> Ownership: 40% 588MW capacity 84 turbines
 <b>Dogger Bank</b> Ownership: 50% 3.6GW capacity	 <b>Seagreen</b> Ownership: 100% 2.9GW capacity

-  Operational
-  In construction
-  In development





**The Future**

**Seagreen Phase 1**

**Capacity:** Up to 1.5GW  
**Ownership:** 100%  
**Status:** Consented and in development

**Dogger Bank**

**Capacity:** Up to 3.6GW  
**Ownership:** 50%  
**Status:** Consented and in development

**Arklow Bank Wind Park**

**Capacity:** Minimum of 520MW  
**Ownership:** 100%  
**Status:** In development

**Beyond**

**Seagreen Phase 2**

**Capacity:** Up to 1.4GW  
**Ownership:** 100%  
**Status:** In development

**Greater Gabbard Extension**

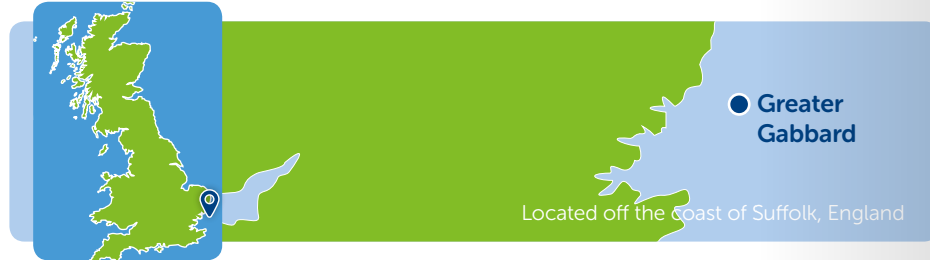
**Capacity:** Up to 500MW  
**Ownership:** 50%  
**Status:** Early stages

**Work underway to secure new seabed leases**



## Greater Gabbard Offshore Wind Farm

Greater Gabbard Wind Offshore Wind Farm, is a joint venture between SSE (50%) and innogy (50%)



Greater Gabbard Offshore Wind Farm is a 504MW, 140 turbine project that was completed in 2012.

The site can provide enough electricity to power around 360,000 homes in the UK. The project saw a £1.6 billion investment and over 8 million hours were worked on the project during construction.

Since completion in 2012, the site has been operated and maintained by SSE. Several major component replacements have taken place including gearboxes, generators, transformers and main bearings. Blade inspections and repairs have been carried out making use of innovative solutions, such as UV light blade repairs and transition piece based camera inspections, along with traditional rope access methods.

The local area has seen huge benefits from the project. Around 95% of employees at the operations and maintenance base are from the local area and supply chain and economic spend sits around 50% in the region.

Six apprentices from the local area have been employed to date with plans for more to join the team. The Greater Gabbard team are keen advocates of offshore wind and have links with local schools and colleges. They have supported the East Coast College by providing wind turbines components to support their apprenticeship programs.

## Case Study From apprentice to engineer



Kyle Pickering, former apprentice at Greater Gabbard and recipient of Humberside Engineering Training Association's "Apprentice of the Year 2015", said: "My experience of working at Greater Gabbard has been great. The training I received throughout my apprenticeship was fantastic, allowing me to attend a number of courses ranging from turbine maintenance to electrical engineering.

"I've been a full-time member of the team since September 2017 and now work as an Electrical Operations Engineer at the site. Since I was young I've been interested in offshore wind and it's great to have the opportunity to develop my career in this growing industry and I'm really looking forward to seeing the opportunities the potential extension to the site brings."

## Greater Gabbard Extension

In October 2018, an application by Greater Gabbard Offshore Wind Farm to The Crown Estate for an extension to the existing wind farm site successfully progressed to the next phase of the process. This will involve The Crown Estate undertaking a plan level Habitats Regulations Assessment (HRA), the results of which are expected during summer 2019.

Given the positive benefits the local area has already seen from the project, a potential extension is an exciting development in the life of the project.



## Beatrice Offshore Wind Farm

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

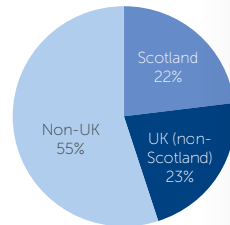
With 84, 7MW Siemens Games turbines, Beatrice will be capable of providing power for up to 450,000 homes.

Construction of Beatrice has been led by SSE and, once operational, Beatrice will be operated by SSE from the operations and maintenance base located at Wick harbour.

### Contributing to the UK and Scottish economies

The total expenditure on Beatrice will be approximately £2.6bn, with around 45% of this investment expected to be within the UK. Much of the non-UK expenditure will be spent on the procurement of goods that the UK does not currently manufacture.

**Total BOWL investment = £2.6bn**



### Adding value to GDP

It has been estimated that the construction of the project could add approximately £1.13bn of value to UK GDP, of which around £530m would be contributed to the Scottish economy.



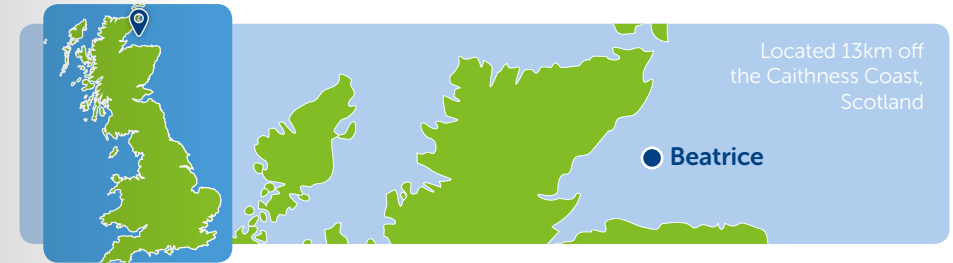
Each £ sign represents £100m of value added to the UK economy, with the symbols in dark blue representing the contribution to the Scottish economy.

### Supporting jobs

The impact on UK and Scottish jobs is also substantial, with BOWL construction investment supporting more than 18,100 years of full-time employment in the UK, of which around 5,800 are in Scotland.



Each person represents 1,000 years of full-time employment in the UK, with the dark blue people representing the years of employment supported in Scotland.



## Breaking new ground while building Beatrice

At £2.6bn, one of the largest private investments in Scottish infrastructure, Beatrice has been breaking new ground in the offshore wind industry not just nationally, but globally.

Of all offshore wind farms in construction or in operation across the world, Beatrice:

- Is the largest to be built using jacket foundations;
- Has the deepest water fixed foundations, in water depths of up to 56m; and
- Has led the way for future offshore wind farm construction with its pioneering piling mitigation strategy

Once complete, Beatrice will be the fourth largest offshore wind farm in the world.

### Case Study Wick Harbour

Wick harbour has been chosen as the operational base for Beatrice. Two historic derelict Thomas Telford buildings on Wick's harbour front have been purchased by BOWL for restoration and development into the operational headquarters.



The approximate £20m investment will transform the buildings and see them returned to maritime use. Around 90 employees will be based in the buildings once complete in spring 2019.

## Seagreen Wind Energy

**Seagreen Wind Energy is currently working to develop a competitive bid for the next Contracts for Difference auction, scheduled for May 2019, for Seagreen Phase 1, consisting of the 'Alpha' and 'Bravo' projects.**

Seagreen Phase 1 is currently seeking amendments to the existing consent to take advantage of the advances in offshore wind turbine technology since the original consent was granted back in 2014.

The new proposal would see fewer, larger, higher capacity wind turbines and the inclusion of monopiles as a foundation option. A maximum of 120 turbines would be developed across the Alpha and Bravo areas with a potential capacity of approximately 1.5GW.

Seagreen has the potential to provide a significant contribution to Scotland's renewable energy generation capacity and help to meet Scotland and the UK's ambitious renewable energy targets.

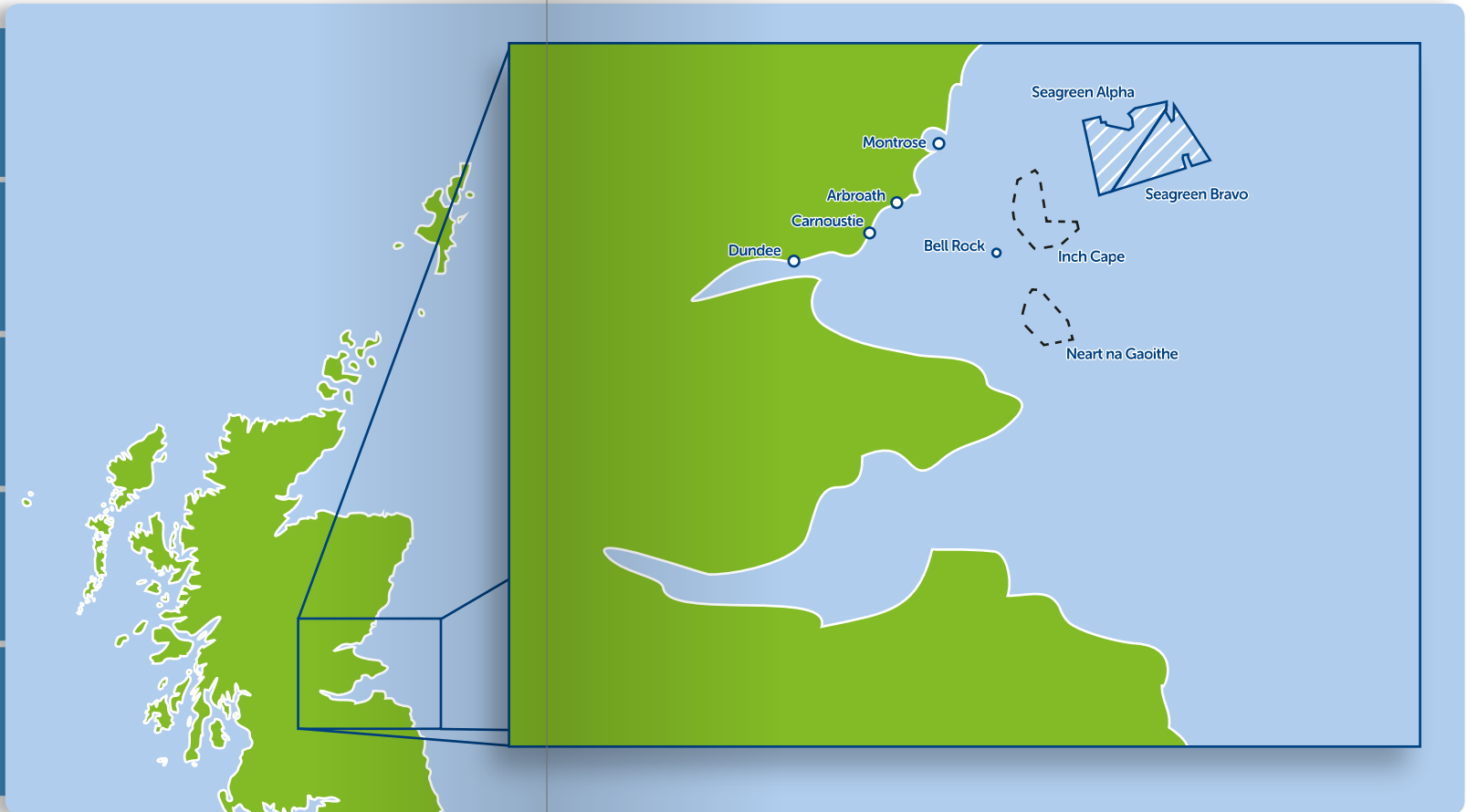
**£1,966m**  
expected contribution to the UK economy

**18,770**  
estimated years of employment supported in the UK during development and construction

**410**  
estimated jobs supported annually in the UK throughout operational lifetime

**1.2m**  
potential homes powered by Seagreen

**25km**  
off the Angus coastline at its closest point



## Dogger Bank Offshore Wind Farms

**Dogger Bank Offshore Wind Farms are a joint venture between SSE and Equinor consisting of three projects: Dogger Bank Creyke Beck A and B and Teesside A. In total, these three projects have a combined capacity of up to 3.6GW.**

Dogger Bank Wind Farms are preparing for the next Contracts for Difference auction, expected in May 2019.

The project will play a significant role in the UK and international offshore wind industry and the Dogger Bank joint venture is keen to engage with the UK supply chain to enhance competition and maximise UK content.

### Creyke Beck A and B

- 2.4GW wind farms
- Covers an area of 515km<sup>2</sup> and 599 km<sup>2</sup> at sea
- 131km from shore
- Cable landfall to the north of Ulrome
- 30km onshore cable
- Connection to existing Creyke Beck Substation.

### Teesside A

- 1.2GW wind farm
- Covers an area of 560km<sup>2</sup> at sea
- 196km from shore
- Connection to existing Lackenby Substation.





## Arklow Bank Wind Park

**SSE is progressing the development of the Arklow Bank Wind Park project, situated in the Irish Sea off the southern coastline of County Wicklow, Ireland. Arklow Bank Wind Park has a consented capacity of at least 520MW.**

The project represents the second phase of development at Arklow Bank. The existing 25.2MW Arklow Bank Phase 1, which is owned and operated by GE Energy, was co-developed in 2003 by renewable energy developer Airtricity (now SSE) and GE Energy as a demonstrator project. It remains the first and only operational offshore wind farm in Ireland.

The Arklow Bank project will be capable of generating at least around 1.75TWh of renewable electricity annually – enough green energy to power almost half a million homes and offset 640,000t/CO<sub>2</sub> annually.

In Ireland, offshore wind technology is emerging as being best-placed to deliver the large-scale renewable generation the country rapidly needs to meet its 2030 renewable energy targets. Additionally, the development of an emerging offshore wind energy industry in Ireland presents oceans of opportunity, including multi-billion-euro investments in low carbon generation, the creation of skilled regional jobs and supply-chain development, and the regeneration of local ports around the island.

SSE plans to bring the Arklow Bank Wind Park project from construction, commencing in 2021, through to first energy by 2023. This is subject to achieving key regulatory steps including securing a grid connection offer and a government-backed energy contract under the new Renewable Electricity Support Scheme.



## The future

**The UK is the global leader in offshore wind, and SSE has been a leading player in the UK's offshore wind sector for fifteen years.**

Now, with a consented offshore wind development pipeline in waters around Great Britain and Ireland totalling 3.3GW and potential new lease opportunities, SSE looks set to continue its offshore wind legacy into the future.

SSE is part of the Offshore Wind Industry Council, working with the Government on a Sector deal which aims to deliver at least a third of the UK's electricity from offshore wind by 2030.

By that time, an ambitious sector deal could mean:

- The offshore wind industry will employ around 27,000 people.
- The domestic export market for offshore wind products and services provided by UK-based firms is expected to be worth £4.9bn.
- Around 60% of the content of UK offshore wind farms could be provided by UK companies, up from 48% today.

Offshore wind is one of the key technologies the UK needs to help the transition to a low carbon economy, driving new economic growth, creating businesses and jobs.

SSE's offshore wind operations and pipeline show a commitment to the UK,

playing its part in delivering the transition to a greener economy and ensuring the economic benefits of doing so stay here.

In July 2018, SSE welcomed the announcement from BEIS confirming that the next Contracts for Difference auction will take place in May 2019.

As a British headquartered company, SSE is committed to ensuring the most favourable outcomes for UK plc from its investment in the offshore wind supply chain.

As demonstrated on the Beatrice project, SSE's offshore wind projects are bringing jobs and economic development to parts of the UK that need it, whether that be at Wick Harbour for the operations and maintenance base, the delivery of turbine

towers from CS Wind's Machrihanish factory or at Siemens Gamesa in Hull for turbine blade manufacturing.

By setting out the timetable of future CfD auctions, the UK government has provided the much-needed commitment to the offshore wind sector that developers and supply chain needed. Whilst the Energy Minister, Claire Perry, has talked about 1-2GW of new offshore wind per year throughout the 2020s, SSE believes that it could be a higher still.

The large volume of viable projects means total installed offshore wind could reach more than 30GW by 2030, firmly placing it as the leading source of low carbon power in the UK, and SSE has a key role to play in helping the UK get there.





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