

A Decade of Clean Growth

SSE's contribution to the
onshore wind revolution



About SSE

SSE plc is one of the UK and Ireland's leading energy companies, involved in the generation, transportation and supply of electricity and in the extraction, storage, transportation and supply of gas. Its purpose is to responsibly provide the energy and related services needed now and in the future. Its vision is to be a leading provider of energy and related services in a low-carbon world. Its strategy is to create value for shareholders and society from developing, owning and operating energy and related infrastructure and services in a sustainable way. SSE has the largest renewable energy capacity across the UK and Ireland at around 3.8GW (inc. pumped storage).

About this report

In the ten years between March 2008 and March 2018 SSE's onshore wind capacity increased three-fold. SSE's expansion of its onshore wind portfolio in the UK and Ireland has delivered clean, low-carbon electricity, important investment in the UK, Scottish and Irish economies, and good quality jobs, many of which are located in areas where economic activity tends to be low. This report explores the contributions SSE's decade of clean growth has made, and continues to make, in the UK and Ireland.

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Foreword

SSE's heritage is rooted in renewable energy. The hydro-electric revolution in the north of Scotland, which began in the 1940s, is the foundation on which our company is built. In recent years, SSE has taken inspiration from those hydro pioneers and has taken a leading role in the onshore wind revolution in the UK and Ireland, leading to countless record breaking days for renewable energy.

In the last decade, SSE has increased its renewable generation capacity significantly, with its onshore wind capacity increasing three-fold. SSE has a total renewable energy portfolio of around 3.8GW – and with more to come too.

Since 2008, our strategy has been to reshape SSE's generation portfolio, moving away from coal towards lower carbon generation like renewables supported by flexible gas generation. The UK's Climate Change Act 2008 was pivotal in this decision and, as it celebrates its tenth birthday, we welcome the consensus that tackling climate change remains a priority for the UK, Scottish and Irish Governments, with all endorsing the aims of the Paris Agreement.

A decade on, this is a perfect moment to reflect on and celebrate the enormous contribution onshore wind is making to both meeting crucial climate change targets and building successful, inclusive economies throughout the UK and Ireland.

It's important to recognise the political leadership of Ministers from all of the main parties who had the vision to establish and maintain mechanisms to attract the private investment that's grown the industry into what it is today.

Developing, constructing, owning and operating onshore wind isn't just about reducing carbon emissions and protecting the environment, as vital as that is. At SSE we believe that maximising the social and economic impact of our wind farms is hugely important too, especially in rural areas, where long-term skilled jobs and investment can support the long-term viability of remote communities.

While recognising the significant progress of the past ten years, progress towards a low-carbon world matters even more in the decade to come. SSE firmly believes it is critical that governments recognise the public support for responsibly-sited onshore wind. Polling shows that support for onshore wind remains high across the UK, at over 75%. As a mature renewable technology, onshore wind can and should play a role in achieving the UK's Clean Growth ambitions, while helping to keep electricity affordable for consumers.

With a supportive framework, the next ten years could prove at least as fruitful for the industry as the last. There remain sites, particularly in Scotland, with excellent wind resource and opportunities for repowering existing sites will fast approach. Without positive support from governments to unlock planning barriers and ensure an investment market framework, the industry could falter instead of reaching its potential. At SSE, we see a bright future for onshore wind as a key tool in reducing carbon emissions and bringing down electricity costs – providing we get the policy frameworks right.



Alistair Phillips-Davies
Chief Executive



A decade of clean growth

2018 marks the tenth anniversary of SSE's acquisition of Airtricity; a defining point in the SSE Group's journey to becoming a leading developer and generator of renewable energy across the UK and Ireland.

Investing in Airtricity enabled SSE to access a hugely important pipeline of onshore wind farms and, just as importantly, to bring on board Airtricity's development expertise. In 2008 SSE's total onshore wind capacity was 600MW. In the subsequent years, this has more than tripled. As of the end of March 2018, SSE's onshore wind capacity across the UK and Ireland totalled 1,993MW, about 18% of its total installed generation capacity.

As the windiest country in Europe, Scotland is an ideal location for onshore wind farms. Almost 60% of SSE's current portfolio is located here, alongside 1,450MW of hydroelectric schemes (including pumped storage).

Just as the acquisition of Airtricity stimulated the growth of SSE's onshore wind portfolio, the hydroelectric revolution of the 1940s and 1950s brought power to many people in the north for the first time by harnessing the readily available water supplies. SSE played a proud role in Scotland's hydro revolution, and still operates and invests in many of these hydroelectric schemes today, serving customers across Great Britain.

SSE has built on this heritage, fostering the skills and knowledge needed to develop an unrivalled onshore wind portfolio in Scotland as part of today's renewable energy revolution. SSE Ireland has also expanded and invested in sustainable and low-carbon energy, making it a leading developer and generator of renewables in the All-Island energy market, across Ireland and Northern Ireland.

The growth of SSE's onshore wind portfolio mirrors the trend seen across the industry, not only in the UK and Ireland, but worldwide. Since 2008, onshore wind installed capacity has increased in both jurisdictions in which SSE operates, and the cost of this technology has fallen across the globe.

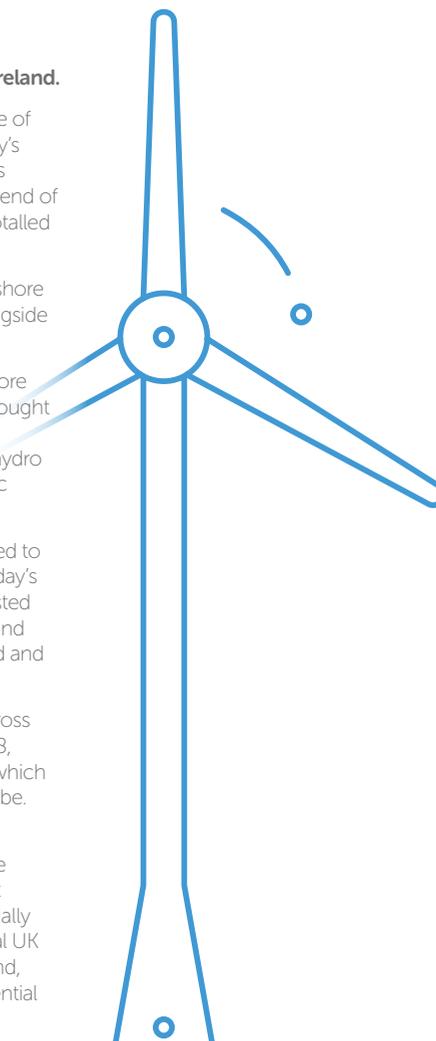
Onshore wind is the cheapest form of low-carbon generation.¹ It can be deployed quickly and supports an indigenous supply chain. Despite its variable output, onshore wind can be integrated onto the system at minimal cost, and can complement other forms of generation, especially as we move to a more dynamic electricity system.² At over 10% of total UK generation capacity and over 30% of total generation capacity in Ireland, onshore wind is an important part of the energy mix, and has the potential for further growth.^{3,4}

¹ Department of Energy & Climate Change, Review of the generation costs and deployment potential of renewable electricity technologies in the UK, October 2011; Electricity Generation Costs, October 2012; Electricity Generation Costs 2013, July 2013; Review of Renewable Electricity Generation Cost and Technical Assumptions, March 2016

² The costs and impacts of intermittency – 2016 update, UK Energy Research Centre, February 2017 and Whole-system cost of variable renewables in future GB electricity systems, Imperial College London, October 2016.

³ BEIS DUKES 2017

⁴ ESB Networks May 2018; EirGrid May 2017



Installed capacity

As at 31 March 2018*

Scotland

1,190MW

Northern Ireland

141MW

Ireland

594MW

England

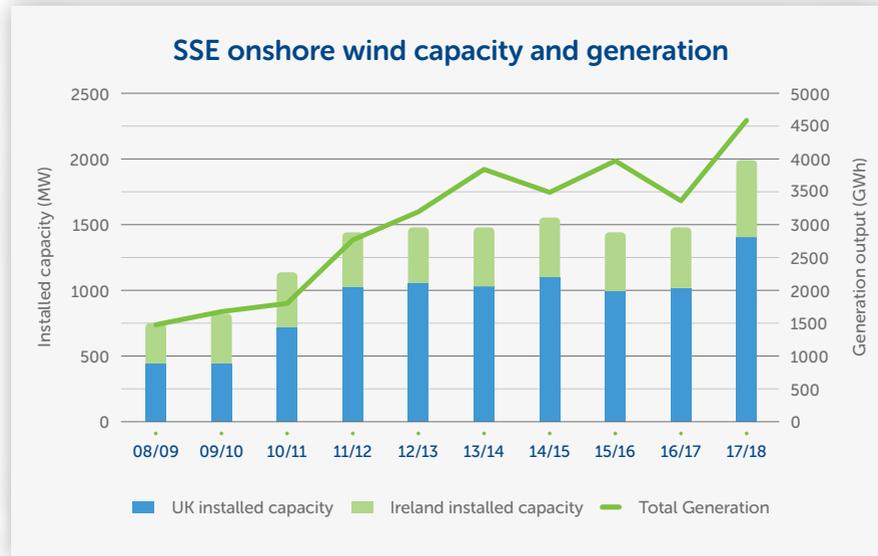
68MW



SSE's decade of tremendous expansion in wind energy makes three important contributions to the UK and Ireland:

1. Clean, low-carbon electricity, which in 2017/18 generated enough electricity to supply more than 1.35m homes across the UK and Ireland;
2. Important investment to the UK, Scottish and Irish economies; and
3. Good quality jobs, not just during construction but for the lifetime of the projects – with many of these jobs located in places where economic activity tends to be low.

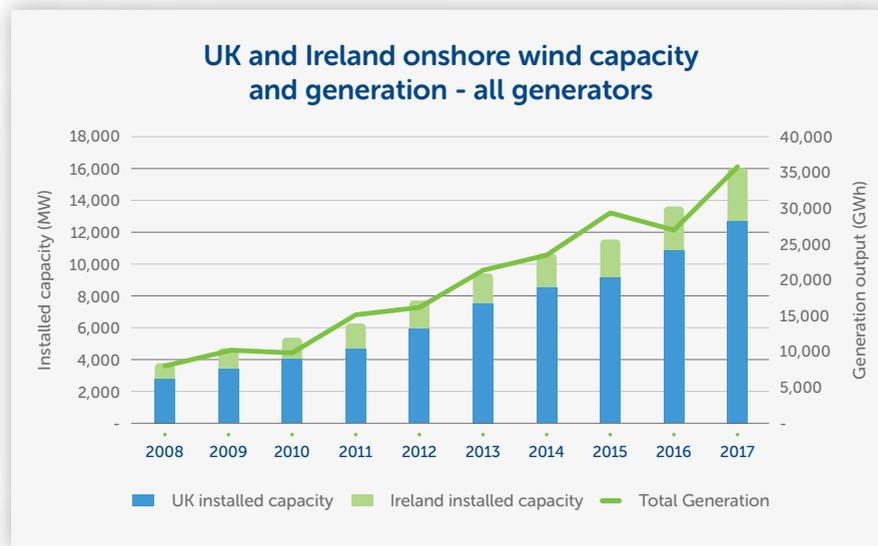
* list of projects included in analysis can be found on pp. 28-29



Overall, the growth in onshore wind capacity has been matched by increased output for SSE, and across the UK and Ireland more broadly. Installed capacity is not the only factor dictating the level of output. There is a clear reliance on weather conditions to enable electricity generation. Wind speeds were down in 2016/17, resulting in a decrease in output of wind generated electricity. A similar dip in output can be seen for SSE in 2014/15, when wind speeds in Scotland and Northern Ireland specifically were lower than they had been in the previous year. The dip in installed capacity for SSE in 2015/16 represents a sale in the stake of Clyde Windfarm (Scotland) Limited, with further stakes also sold in 2017 and 2018.⁵

In the ten years from April 2008 to the end of March 2018, SSE built and/or operated a portfolio of over 60 wind farms. Around 430MW have been sold on to other investors as part of a capital recycling programme, with SSE continuing to operate and maintain a number of these sites.⁶ A further small proportion of early capacity has already been decommissioned.

As of June 2018, SSE owns 1,917MW of onshore wind with an additional 228MW at Stronelaig due to be completed during 2018/19.⁷ SSE has more than 800MW of potential new builds or extensions in the pipeline which it could deliver in the right economic conditions, including the Viking remote island wind project in Shetland.



⁵ At point of sale in March 2016, Clyde's total installed capacity was 349.6MW. This has since been extended to 522.4MW. Two further sales have reduced SSE's holding, as of June 2018, to 50% of 522.4MW

⁶ In May 2018, outside of the study period April 2008 to March 2018, SSE divested a further 78MW of Clyde Windfarm (Scotland) Limited, taking its overall onshore wind capacity as of June 2018, to 1,917MW

⁷ Stronelaig has been included in the economic analysis due to development and capital expenditure incurred during the study period.

Powering the UK and Ireland

Between March 2008 and March 2018, SSE more than tripled its installed onshore wind capacity. Between March 2017 and March 2018 alone, SSE delivered over 500MW of new onshore wind to the system, from the west of Ireland to the highlands of Scotland, with an additional 228MW in construction.

This increase in capacity, combined with improved technologies at new sites, has helped SSE increase the output from its onshore wind sites. In 2008/09, output from SSE's onshore wind generation was enough to power the equivalent of 390,000 homes for a year, across the UK and Ireland. In 2017/18, this increased to 1.35m homes.⁸

March
2008

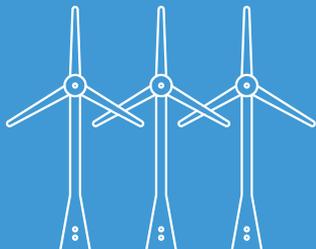


1,492
GWh

390,000
homes



March
2018



4,590
GWh

1.35m
homes



⁸ UK figures calculated using SSE's onshore wind generation output for GB and NI, divided by the average domestic electricity consumption for relative years, according to Ofgem TDCV Electricity Profile Class 1 (medium). Irish figures calculated using SSE's onshore wind generation output for Ireland, divided by the average household electricity consumption for relative years, according to Commission for Energy Regulation (CER)

Supporting economic growth

SSE's total overall committed spend associated with its onshore wind farms built and/or operated in the period 2008 to 2018 is estimated to be around £6.1bn, which includes just under £4bn capex and investment. With an average wind farm life of at least 20 to 25 years, the £6.1bn spend encompasses the period up to 2040. This includes wages paid to SSE's own employees, its expected expenditure, and community investment funds. Of this total investment and expenditure in the onshore wind industry, an estimated £3.4bn has or is expected to be spent in the UK, of which approximately £2.8bn has or is expected to be spent in Scotland. Around £680m (€830m), is estimated to be spent in Ireland. This division of investment and expenditure is consistent with SSE's onshore wind portfolio, with most of SSE's onshore wind capacity found within Scotland.

Calculating SSE's economic contribution

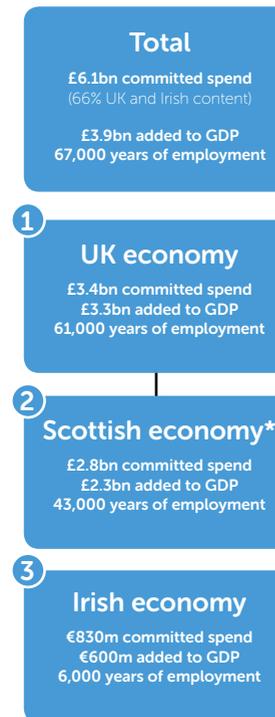
SSE's committed spend has been calculated as the sum of (1) the development and construction costs incurred during the period from April 2008 to end of March 2018; (2) operational costs between 2008 and 2018 for wind farms constructed before or during this period; and (3) expected future operational costs for the estimated remaining life of all wind farms in SSE's onshore wind portfolio at the end of March 2018 (including operation and maintenance, committed community investment, and management costs of projects when they reach the end of their life). Wind farms that have been decommissioned or divested have been included only to the point that SSE discontinued ownership. Likewise, joint ventures have been included in the analysis, according to SSE's equity share. For this reason, an average economic contribution per megawatt figure cannot be reported.

To understand the contribution to GDP and jobs, SSE has calculated the value added to the Scottish, UK and Irish economies through its onshore wind portfolio from April 2008 to March 2018 using the input-output economic model. The modelling was conducted in-house and peer reviewed by Little Blue Research Ltd, an independent consultancy firm. Results are in 2018 prices.

The full list of wind farms included can be found within the methodology document on sse.com/beingresponsible.



Contributing to GDP and jobs



An estimated £3.3bn of value was added to the UK economy as a result of SSE's committed spend on wind farms between 2008 and 2018 (including capex) and ongoing expenditure up to 2040 on onshore wind. Within Scotland, where the majority of SSE's onshore wind farms are located, £2.3bn of the £3.3bn was added to the Scottish economy, with more than 43,000 years of full-time employment supported in Scotland, as a result of this expenditure.

Within Ireland, approximately £500m (€600m) was added to Irish GDP over the study period. This brings the total contribution of SSE's onshore wind portfolio to £3.9bn, with over 67,000 years of full-time employment supported across the UK and Ireland.

Although the majority of economic activity and

impact for local areas will happen during the construction period of a wind farm, there will be lasting long-term economic benefits during the operational period, which typically lasts at least 20-25 years. This will include investment in the ongoing operation and maintenance of the wind farm infrastructure and turbines, the community investment funds provided by SSE (see p14) and the management of projects when they reach the end of their life.

The forward-looking portion of SSE's expenditure on onshore wind, between 2018 and 2040, represents around a third of the total £6.1bn committed spend. It is expected to add over £1.2bn to GDP (of the total £3.9bn contribution) and support just under 22,000 years of full-time employment across the UK and Ireland.

*Contribution to the Scottish economy is included within the UK economy contribution.

Inclusive jobs growth

As a company operating solely in the UK and Ireland, SSE has a vested interest in the long-term success of these countries. It believes this will be best achieved with economic growth that is inclusive, shares social value and is geographically balanced across both urban and rural areas. An estimated 66% of SSE's total committed spend into onshore wind was, or is expected to be, spent in the UK or Ireland.

Due to the geographic conditions suited to onshore wind, SSE's committed spend is within some of the most remote areas of the UK and Ireland. SSE has a proactive approach of investing in local businesses where possible and recruiting people from local communities. This is particularly important for creating social benefits from onshore wind – often rural areas where wind farms are constructed can otherwise correlate with poor economic conditions, and so high levels of investment in these places, with an emphasis on employing local people and using local services, can have transformative effects.

In early 2018, SSE was ranked number one on The Good Economy Job Ratings Index 2017 by social advisory firm The Good Economy. This rating is an independent assessment of FTSE 350 companies' contribution to inclusive job growth in Britain, and acknowledges that some economic growth has more social value than others. The development, construction and ongoing operation of SSE's onshore wind portfolio plays a key role in SSE creating inclusive, multi-regional economic prosperity.

THE
GOOD
ECONOMY

SSE's Green Bond

An ability to raise funds at competitive rates is fundamental to the sustainable financing of projects in a low-carbon economy. In September 2017, SSE issued the largest Green Bond by a UK company, and the first of its kind issued by a UK-headquartered energy company. The Bond was almost three times oversubscribed and had significant interest from green-only funds, whilst also representing the lowest coupon ever achieved by SSE.

The proceeds from SSE's eight-year €600m Green Bond have been allocated to refinancing part of SSE's £1.1bn portfolio of eligible projects of onshore wind farms in the UK and Ireland, as listed in SSE's Green Bond Framework which is available on sse.com/investors. When all eligible onshore wind projects are fully operational, they will have a combined qualifying capacity of 389MW.

The main criteria for a project to be eligible were that it must contribute to a positive environmental impact, support SSE's commitment to the ongoing reduction of the carbon intensity of its electricity generation and finally, support the United Nations Sustainable Development Goal 13 (take urgent action to combat climate change and its impacts).

Between 31 August 2017 and 1 April 2018, the carbon saved from the qualifying output of the eligible projects was 251,202tCO₂e.



An estimated 66% of SSE's total committed spend into onshore wind was, or is expected to be spent in the UK or Ireland

Supporting local and national supply chains

Onshore wind employs 18,500 full time employees in the UK (directly and indirectly), 8,000 of whom are in Scotland, and about 4,500 people in Ireland.⁹ These jobs are in areas such as manufacturing, turbine transportation, installation, operation and maintenance, as well as project management, financial and legal services. The industry also provides demand for secondary services, such as shops and accommodation, especially during project construction.

While SSE's expenditure in onshore wind has contributed substantially to GDP and jobs within the UK and Ireland, there is a significant proportion of expenditure which has benefitted other economies. The UK and Ireland do not at present have the technical capacity to produce at scale some of the key components of an onshore wind farm, such as wind turbines, which account for a high proportion of onshore wind project spend. These are primarily manufactured in countries like Germany, Denmark, China and Vietnam, which have developed their expertise in wind technology over a number of years.

It is well-understood that global supply chains in the wind industry are mature and complex, and there are many interrelationships between and within different economies. SSE has therefore worked with some of its major suppliers of wind turbines to try and understand in more detail the economic contribution from these contracts, knowing that some of the value is retained in the UK and Ireland.

In particular, SSE worked closely with one of its turbine suppliers, Siemens, and professional services firm PwC to understand the value retained within the UK when turbines are purchased from other economies. SSE, Siemens and PwC found that expenditure on turbines with Siemens generated around 20% of the total economic contribution of the wind farm to UK GDP.¹⁰ This work allowed value which would previously have been excluded from contribution to the domestic economy to be included, and its impact understood.

Opportunities for skilled jobs in Scotland

CS Wind provides an example of a home-grown piece of the onshore wind supply chain. Based near Campbeltown, Scotland, it is the only UK-based manufacturer of turbine towers. The factory opened in 2002. The plant was taken over by SSE and Highlands and Islands Enterprise, and Wind Towers Scotland was established in 2011 as a specialist supplier of high quality wind turbine infrastructure to markets across Europe, as well as providing repair and maintenance services to the wind industry. SSE's investment reflected a desire to stimulate a UK-based supply chain.

In 2016, SSE transferred its 80% ownership to CS Wind, presenting a growth opportunity for skilled workers in Argyll. Since 2016, CS Wind has extended its operations at the plant to manufacture towers for the offshore wind market, creating the first such factory in the UK.



9 Office for National Statistics (2018) Low-carbon and renewable energy economy indirect estimates and Irish Wind Energy Association.

10 See 'The economic contribution of the Clyde Extension wind farm construction project' report on sse.com/beingresponsible.

Investing in the Scottish Highlands

SSE created Open4Business in 2012 as a way of providing local businesses with a simple and free way to bid for opportunities relating to SSE's projects. Since its launch, Open4Business has awarded over £35m worth of contracts in the Highlands.

NB Civil Engineering, based in Inverness, is just one of the local businesses who have been awarded contracts through the Open4Business portal. The business is sub-contracted by RJ McLeod Contractors Ltd and has worked closely with them on a number of wind farms across the Highlands.

"We employ 28 local people of which 80% are sub contracted to RJ McLeod. Without their support and continued business opportunities through Open4Business we could not retain all our employees."

Keith Leslie, Managing Director of NB Civil Engineering

Supporting businesses in the Great Glen

The Lovat Hotel in Fort Augustus attributes 40% of winter business to SSE and its sub-contractors. The hotel has provided accommodation for workers during the construction of Bhlaraidh (108MW) and Stronelaig (228MW) wind farms, as well as nearby Glendoe – SSE's newest hydro-electric plant.

"We really appreciate the trade SSE's projects bring. Although the area enjoys a busy summer thanks to tourism, it quietens down during the winter months and projects like SSE's wind farms mean we have continued footfall throughout the seasons."

Martynas Salkauskas, Reservations Manager at the Lovat Hotel in Fort Augustus

Growing local industries in Galway

Galway Wind Park (169MW) is a joint project between SSE and Coillte . It is located in Connemara's Cloosh Valley. As Ireland's largest wind farm, it generates more low-carbon energy than any other wind generation site on the island.

"We provide steel for the wind turbine bases. Not only has our association with the project allowed us to significantly grow our business somewhere in the region of 20%, but crucially we have been able to employ an additional three people, creating much needed employment in the local area. We are also proud to have contributed in some way to bringing a source of renewable energy to Galway."

Tom Gilligan, Lydon Steel Ltd, Galway

"As a result of working on the project, not only have I been able to invest significantly in new plant machinery, I've been able to provide additional employment to six local people, not to mention the jobs created by other local businesses that I use to keep my machines working. As for the future, working on this project has already led to securing work elsewhere around the county."

Niall Curran, Niall Curran Plant Hire, Moycullen

Community Investment

SSE has provided more than £23m in community funding in the UK and more than €5m in Ireland.



Helping communities

SSE expects its onshore wind farms to operate for at least 25 years, so SSE takes a long-term view to its relationships with the communities it works alongside. With each wind farm that is built, SSE offers a package of benefits to the local communities in addition to the broader economic benefits; each year these funds accrue and are spent by local people on local priorities, providing an opportunity to transform local places.

While the approach taken to community benefit funds differs across jurisdictions, the principles are the same; providing benefit to local and regional communities. Older projects in Great Britain and Northern Ireland, and all projects in Ireland, receive funding based on the total amount of electricity produced at the wind farm each year, while newer projects in Great Britain and Northern Ireland receive £5,000 per MW of installed capacity in line with best practice guidelines adopted during the Renewable Obligation market mechanism period.

Since 2008, SSE has provided more than £23m in community benefit funding in the UK (£21.5m in Great Britain and about £1.5m in Northern Ireland) and more than €5m in Ireland. These funds have supported nearly 5,000 projects in communities across the local and regional areas in which SSE owns and operates its wind farms.



Supporting economic development

£55,208 awarded in June 2014, from the Achany Fund

A Sutherland community has benefited from a substantial economic boost thanks to the funding of a development manager.

The Kyle of Sutherland Development Trust demonstrates how funding can support economic development. The Trust was established in 2011 to strengthen and unite the local community and ensure that long-term, sustainable benefits are achieved. The multi-year funding of a development manager, secured in 2014, has enabled the Trust to implement an ambitious development plan focused on growing investment into the area, boosting job creation and sustaining local industries.

The work of the Trust has been transformational for Sutherland, supporting 14 local projects, including affordable housing and community ownership projects, and providing funding support to 30 local organisations. Through a strategic focus on long-term impact and the efforts of the development manager, this initial investment has had a multiplier effect, driving significantly wider community regeneration. 10 jobs have been created and £4m additional investment has been secured for the area between 2014 and 2017.

SSE's approach to Community Benefit

2008

Bricks and mortar support

2012

Management of funds in house plus £5k/MW for UK projects

2013

Introduction of Sustainable Development Funds

2015

Living Wage Friendly Funder in GB

2018

Developing skills and capabilities within communities

Leading the way in Community Investment

Over the past ten years, SSE has developed its approach to community investment, moving from providing mainly 'bricks and mortar' support, such as renovating community buildings, to developing skills and capabilities within communities. For example, supporting apprenticeships in local businesses and improving communities' digital skills.

In 2012 SSE took the management and administration of the majority of its community investment funds in house. As a responsible developer, this helps SSE work directly with communities to help them best harness the potential of their funds. SSE also led the way by setting the £5,000 per MW benchmark for community benefit payments for UK projects; this is now the recommended level in both UK and Scottish Government guidance.

By its nature, community investment can be focused on very narrow geographical areas, which can limit a desire to support transformational projects. In 2013, SSE launched its Sustainable Development Fund, a regional fund operating across local authority areas where SSE has developed a new wind farm since 2012. SSE is the only developer to have taken a regional approach to funding, allowing the benefit of its onshore wind farm funds to be spread more widely. Each year, 50% of the community investment fund is directed towards a regional fund, and the remaining 50% is set aside for the local community fund. In the last five years 146 projects have been supported through Sustainable Development Funds.

In December 2015, SSE built on its credentials as a Living Wage Employer, becoming the first accredited Living Wage Friendly Funder within the GB utilities industry. This means that any roles that receive funding from the SSE community investment programme are paid at least the Living Wage, supporting the campaign to end low pay in the voluntary and charity sector.



Stimulating the local economy

£250,000 awarded in 2017-18, from the Griffin and Calliachar Fund

Perthshire businesses have been given support to grow and develop through an innovative new fund.

Following a community consultation, the Griffin and Calliachar community panel decided to earmark £250,000 of investment for a new enterprise fund, facilitated by Growbiz. The enterprise fund's aim is to stimulate the local economy by providing business grants to local social enterprises and small businesses. The fund has been phenomenally successful with 30 projects being awarded for than £180,000 within one year. SSE is now working with the Scottish Rural College to evaluate the impact of the fund and determine the learning and legacy for the future during the Renewable Obligation market mechanism period.

The Aran bakery in Dunkeld is an example of a successful project benefiting from the enterprise fund. Flora Shedden, a previous participant on the Great British Bake Off, used £5,000 of enterprise funding to restore a derelict building in Dunkeld and set up a community bakery. The enterprise funding provided the missing support that was needed to kick-start the business.

"The enterprise grant has been crucial to the set-up of our business. Due to my age (I was 21 when we opened), my personal funds were limited and banks and other lending organisations viewed my youth as a concern. We would not have been able to open our doors without the enterprise fund. Six months in, we are already expanding to a second production kitchen to keep up with demand.

Funding that is set up in this way and community focused can totally alter the business and job opportunities for those in smaller and rural areas, as well as the younger generation."

Flora Shedden, Aran Bakery, Dunkeld

Investing in heritage, tourism and culture

SSE recognises the importance of tourism to local Scottish communities. Since 2013 SSE has invested nearly £1.15m of its community benefit funding in 173 tourism and heritage projects.

Stranraer Development Trust

£15,000 awarded in October 2016 from the Dumfries and Galloway Sustainable Development Fund

The Stranraer Development Trust received £15,000, which provided the initial investment to support the development of the first Stranraer Oyster Festival; a celebration of the area's unique coastal heritage. The three-day event included wild food foraging, celebrity chef demonstrations and a bustling festival market. The event helped to extend the summer tourism season, supported local business and capitalised on the growth of food tourism.

Independent research by MKA Economics found that the event contributed £500,000 to the local economy, with 10,000 people attending.

"The Trust is proud and delighted with every aspect of the Festival. The entire weekend was a fantastic example of what can be achieved when good people work together for the betterment of somewhere they love."

Romano Petrucci, Chairman of Stranraer Development Trust



Falls of Shin

£30,000 awarded in 2015 from the Achany Fund

The Falls of Shin is a popular tourist destination, where visitors can see salmon leaping up a beautiful waterfall. A fire in 2013 destroyed the visitor centre and reduced tourist numbers. A new state of the art visitor centre opened in May 2017. This new centre allows visitors to engage with the natural environment, includes a local produce outlet, a gathering space for community events, and a play park.

The £30,000 award from the Achany Fund helped secure over £1m of match funding. The centre has created 15 new jobs and is projected to attract 90,000 visitors per year.

Protecting and enhancing the environment

A responsible approach to onshore wind projects

The way SSE develops, constructs and operates its onshore wind projects is key to its responsible approach and to creating long-term environmental benefits. When SSE develops its onshore wind farm assets it interacts with the environment in a variety of ways, presenting challenges which need to be managed. SSE manages impacts from its activities by taking a strategic approach and adopting methods that take account of the environment at the point of project initiation and design, as well as during construction and operation of the asset.

Development

When developing new or existing projects, SSE begins by considering things such as options for reusing or extending existing assets, or factoring in future growth requirements. Assessing different options for infrastructure sites and routes at this early stage can significantly reduce the impacts of a development. SSE meets planning obligations by undertaking detailed Environmental Impact Assessments (EIA) for large projects, and completing an environmental assessment for projects where an EIA is not a statutory requirement. Where projects are expected to have unavoidable impacts on biodiversity, SSE strives to offset these through actions such as developing Habitat Management Plans (HMP) for renewable developments in the EIA stage, or funding conservation activity conducted by other groups.

Construction

During construction of major projects, SSE adopts detailed measures to mitigate adverse environmental impacts, under the guidance of a professional ecologist. These include implementation of relevant Species Protection Plans and Habitat Protection Plans that allow SSE to progress construction while protecting sensitive species and habitats. This could involve only undertaking aspects of work during certain times of the year, to reduce disruption to species during mating season. SSE will undertake any monitoring of biodiversity during construction that has been committed to during the planning phase, with additional measures taken if required.

Operation

SSE focuses on maintaining its environmental compliance obligations associated with the operation of its assets, and prioritises minimising any negative impact of operations in environmentally sensitive areas. Many of SSE's assets have ongoing Habitat Management Plans in place to mitigate environmental impacts and, in some cases, to enhance biodiversity in the areas in which we operate. SSE Renewable Generation also operates to an externally accredited ISO 14001 Environmental Management System (EMS). As with construction, during the operational phase of a project any monitoring commitments made in the planning stages are undertaken.



Increasing diversity through habitat management

SSE's 70MW Gordonbush wind farm is situated in Sutherland in the Scottish Highlands. The primary objective of the Gordonbush habitat management plan (HMP) is to mitigate potential adverse effects of the wind farm upon golden eagle, merlin and golden plover. It also aims to enhance peatland and native woodland habitats and species, and to promote black grouse habitat. Activities include, amongst other things: moorland restoration; heather management; drain blocking to help restore peatland; native woodland restoration; and management of deer, which can adversely impact biodiversity, for example through overgrazing of moorland habitats and by limiting the natural regeneration of native woodland.

In 2015, the HMP was reviewed following five years of implementation. Monitoring undertaken on the site showed that between 2009 and 2015, while the populations of a few species of birds had declined (some as expected due to the change in habitat as a result of management methods), the number of bird species recorded in all areas across the site had increased. In particular, there was a considerable increase in bird species diversity and population density in the semi-natural woodland and low ground zone of the Gordonbush HMP area. This suggests that the habitat management measures have been successful, especially the extensive planting of native broadleaf tree species and encouragement of natural regeneration through deer fencing.



Connecting people with the natural environment

The 169MW Galway Wind Park, co-developed by SSE and Coillte in Connemara's Cloosh Valley, entered commercial operation in 2017.

As part of the project, the team has delivered six recreation and interpretive trails ranging in length, from the wheelchair accessible Split Rock Trail (0.2km) to the Forest Cycleway Trail (15km). Some trails will have interpretive information to develop visitors' and local residents' understanding of the biodiversity, culture, and natural heritage which co-exists with Ireland's largest onshore wind farm. The team also delivered an education outreach programme, which includes projects such as: ornithologist visits to schools and community groups; a school photography competition to raise awareness of biodiversity; and partnering with the local Men's Shed in Moycullen to build wooden bird and bat boxes for local primary schools, all aiming to enhance understanding of local diversity and bird life.

Reducing carbon emissions

As a low-carbon form of electricity generation, onshore wind delivers enduring environmental benefits through avoiding the emissions of greenhouse gases (GHG). SSE's onshore wind portfolio plays a key role in meeting its ambitions to reduce the carbon intensity of the electricity it generates.

SSE has a long-standing target to halve the carbon intensity of the electricity it produces by 2020, based on 2006 levels. Having met this target early, in March 2017, SSE has now set a new, longer term ambition for the carbon intensity of the electricity it generates by 2030.

Meeting this ambition means that the carbon intensity of SSE's electricity generation is now forecast to be around 150gCO₂e/kWh by 2030, which represents a 75% cut based on its original 2006 baseline.

To achieve this, SSE's strategy is to move away from a portfolio weighted towards coal and gas, to one weighted towards renewables with complementary flexible thermal generation. By 2020, SSE expects to have over 4.2GW installed capacity of renewable energy (including pumped storage).

Over the ten years between April 2008 and March 2018, it is estimated that the output from SSE's onshore wind generation assets across the UK and Ireland has avoided over 13.4 million tonnes of CO₂e being released into the atmosphere. In addition, promoting the use of local supply chains helps to limit the carbon impact of developments through reduced transportation requirements.

Total avoided carbon between 2008/09 and 2017/18 through onshore wind generation output (tonnes CO₂e)*



Total avoided carbon between 2008/09 and 2017/18¹¹

8.4
m tonnes CO₂e
UK

5
m tonnes CO₂e
Ireland

* The fuel mix of generated electricity in the UK and Ireland has changed over the years, meaning that the carbon intensities for electricity supplied to the grid in these countries has also changed. In 2008, the carbon intensity for electricity supplied to the grid in the UK was higher than that in Ireland, however over the years, the average trend has been a reduction in intensity and it is now lower than the carbon intensity for electricity supplied to the grid in Ireland. The higher the carbon intensity of the electricity supplied to the grid, the more carbon is avoided per kWh of electricity generated by SSE's onshore wind farms.

22 ¹¹ Calculated using output of SSE's onshore wind generation assets and BEIS carbon intensities for electricity supplied to the grid that organisations purchase, except 2016 and 2017 intensity data for Ireland which was sourced from International Energy Agency.



SSE aims to reduce the carbon intensity of its electricity production by a further 50% by 2030, based on 2018 levels.

What next for onshore wind?

This decade of expansion, for SSE and the wider onshore wind industry, not only provides an opportune moment to reflect on what has been achieved, but also a chance to consider the future of onshore wind.

Onshore wind is a success story, for the UK and Ireland. Onshore wind now makes up 35% of installed renewable capacity in the UK (nearly 75% of installed renewable capacity in Scotland) and over 80% in Ireland.

The wind industry has created jobs, supported a growing and indigenous supply chain, stimulated investment in remote areas, reduced carbon emissions and cut costs; it is among the cheapest forms of generation.

The success of the onshore industry in the UK and Ireland can be attributed to targeted government incentives, supported by Ministers from all of the main political parties, that helped a nascent technology transform into an industry delivering benefits at local, regional and national level.

In Ireland, the Renewable Energy Feed-in Tariff (REFIT) scheme has stimulated growth in onshore wind development. In the UK, government support has been crucial in encouraging onshore development, with the Renewables Obligation (RO), and, for a period, its successor, the Contracts for Difference (CfD) scheme, providing the certainty investors need to commit to such projects. With the end of the RO and the exclusion of onshore wind from CfD auctions, there is no mechanism to underpin confidence in future investment. The onshore wind industry now faces the challenge of developing new projects and repowering existing projects to maintain and grow the installed capacity.

A maturing industry

Onshore wind developers have been challenged to reduce costs over the last decade, initially with reduction to the RO and REFIT support levels, then with the introduction of a competitive allocation via the CfD auctions in GB and the upcoming RESS scheme in Ireland. Most recently in GB, with onshore wind no longer eligible for support, there is a renewed drive to achieve further cost savings to enable projects to be built in a 'subsidy-free' environment. SSE has embraced this challenge, undertaking cost reduction programmes to optimise development and operation to identify capex and opex savings. However, 'subsidy-free', or merchant, investment remains very challenging under current market and policy conditions.

Onshore wind projects can continue to deliver further benefits across the UK and Ireland, help meet ambitious climate change and energy targets and play a significant role in developing a homegrown industry.

The £6.1bn total overall committed spend associated with onshore wind farms, the £3.9bn added to the UK and Irish economies, the 67,000 employee years supported and the 13.4m tonnes of carbon avoided, as a result of SSE's onshore wind developments between 2008 and 2018, demonstrate the scale of opportunity for the next decade and beyond.

Contributing to clean growth

By growing the economy whilst reducing carbon emissions, onshore wind is making a considerable contribution to addressing the clean growth challenge. Industry and governments now need to work together to build on the success of the industry to date and capabilities which have been developed to unlock greater economic opportunities in the future.

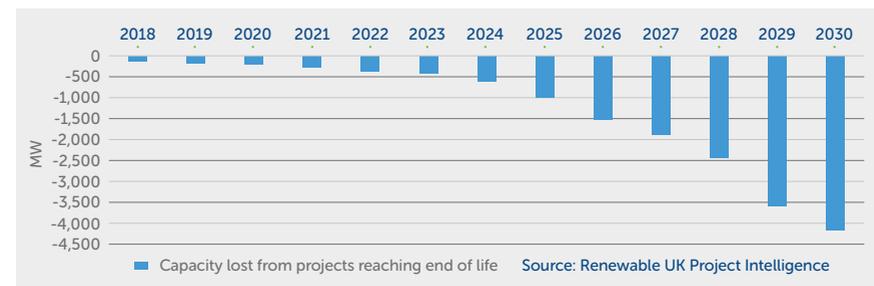
In tandem with opportunities for new developments, the future of existing projects must also be considered. As the mid-2020s approach, existing wind farms will begin to reach the end of their life, presenting opportunities to repower the most economic sites.

The 3.5GW of onshore wind installed in the UK between 2001 and 2010 will likely begin to retire from the mid-2020s onwards; this will ramp up into the 2030s. If this capacity is not replaced, a significant amount of zero carbon generation needed to meet climate targets will be lost. This UK data provides an example of the scale of capacity lost.

A programme of repowering will ensure that optimum sites can be re-used, with modern and more efficient turbines installed, maintain and even increase carbon savings, and create a sustainable, long-term industry with domestic suppliers having a predictable volume of orders for which to compete.

With the falling costs of onshore wind, a focus on the cost of energy, clear evidence of positive economic impact, and ever-stretching environmental targets, there is a strong case to continue, or re-instate, a limited amount of government support for onshore wind.

UK capacity lost from onshore wind projects reaching end of life



12 Arup, July 2017, <https://www.arup.com/-/media/arup/files/publications/e/enabling-investment-in-established-low-carbon-electricity-generation.pdf>; Baringa, April 2017, https://www.baringa.com/getmedia/99d7aa0f-5333-47ef-b7a8-1ca3b3c10644/Baringa_Scottish-Renewables_UK-Pot-1-CfD-scenario_April-2017_Report_FINAL; BVGA, June 2018 <https://bvgaassociates.com/the-power-of-onshore-wind/>

A decade of clean growth

A promising future

A number of reports have shown that, with access to a government-backed contract to stabilise revenues, onshore wind in GB could be built without any additional net cost to consumers.¹² Such a mechanism will be required in stimulating further development at a scale similar to that seen over the past decade. According to the UK's Committee on Climate Change, without long term government-backed contracts for renewables, it is unlikely the volume of low-carbon generation needed to meet legislated carbon targets will be deployed. This is attributed to higher risks associated with developing merchant projects fully exposed to wholesale price risk, which could in turn translate into increased cost of capital for developers and result in higher customer bills.

National and local governments can also play their part in supporting this promising industry by ensuring that the planning regime is set up to deliver on ambitious renewables targets. The planning system, as an enabler for low-carbon infrastructure, is critical to onshore wind's prospects. In Scotland, for example, the introduction of a new planning bill, combined with a review of planning policy, provides opportunities to facilitate the development of new sites and the repowering of existing sites. This means aligning planning legislation and policy with the objectives of the Scottish Energy Strategy and Onshore Wind Policy Statement.

A supportive framework that addresses market and planning challenges is vital for the future success of the onshore wind industry in the UK and Ireland.

With government action now, onshore wind can continue to deliver economic benefits for decades to come.



SSE onshore wind assets 2008-2018

Scotland

Wind Farm	Installed Capacity	Status
Achany	38MW	Operational
Ardrossan	30MW	Divested
Artfield Fell	19.5MW	Operational
Balmurrie Fell	9.1MW	Operational
Bhlaraidh	108MW	Operational
Braes of Doune	72MW (SSE share)	Divested
Bu	2.7MW	Decommissioned
Calliachar	32.2MW	Operational
Carcant	6.9MW	Divested
Cathkin Braes	3MW (SSE share)	Operational
Clyde Windfarm (Scotland) Limited	261.3MW (SSE share)	Operational 175MW divested March 2016 and 78MW divested May 2018
Dalswinton	30MW	Divested
Drumderg	36.8MW	Operational
Dunmaglass	94MW	Operational
Fairburn	40MW	Operational
Gordonbush	70MW	Operational
Griffin	156.4MW	Operational
Langhope Rig	16MW	Divested on completion
Hadyard Hill	119.6MW	Operational
Minsca	36.8MW	Divested
Spurness	10MW	Operational
Strathy North	67.7MW	Operational
Stronelaig	228MW	In construction
Tangy (inc.Tangy Extension)	18.8MW	Operational
Toddleburn	27.6MW	Operational

Ireland

Athea	34.4MW	Operational
Bindoo	48MW	Operational
Boggeragh	28.5MW (SSE share)	Operational

Coomacheo	41.4MW	Operational
Coomatalin	6MW	Operational
Corneen	3MW	Operational
Culliagh	11.9MW	Operational
Curragh	18.4MW	Operational
Dromada	28.5MW	Operational
Dunneill	11.1MW	Operational
Galway Wind Park	120MW (SSE share)	Operational
Gartnaneane	15MW	Operational
Kingsmountain	25MW	Operational
Knockastanna	6MW	Operational
Leanamore	18MW	Operational
Meentycat	72.4MW	Operational
Meentycat - Cark Extension	9.2MW	Operational
Meentycat - Meenbog Extension	6.9MW	Operational
Midas	16.2MW (SSE share)	Operational
Mullananalt	7.5MW	Operational
Rathcahill	12.5MW	Operational
Richfield	27MW	Operational
Tournafulla	27MW	Operational

Northern Ireland

Bessy Bell (1 and 2)	14MW	Operational
Bin Mountain	9MW	Divested
Glenconway	46MW	Operational
Slieve Divena 1	30MW	Divested
Slieve Divena 2	18.8MW	Operational
Slieve Kirk	27.6MW	Operational
Tappaghan	28.5MW	Divested
Tievenameenta	34.5MW	Operational

England

Keadby	68MW	Operational
Port of Tilbury	9.2MW	Divested

A woman wearing a yellow high-visibility safety jacket, a yellow helmet with a headlamp, and safety glasses is working inside the nacelle of a wind turbine. She is looking towards the camera with a slight smile. The interior of the nacelle is red and blue, and the exterior of the turbine is white. The background shows a clear blue sky with white clouds and a landscape with other wind turbines.

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