



# Seagreen Offshore Wind Farm Supply Chain Plan

Document Reference Number: LF000009-PMO-MA-PLN



**Background & disclaimer:**

This is a shortened version of the Seagreen Supply Chain Plan submitted by SWEL to the Department of Business Energy and Industrial Strategy in February 2019. This shortened version of the Seagreen Supply Chain Plan has a number of amendments compared to the original version, to ensure its suitability for publication. This shortened version reflects the procurement progress between submission of the original supply chain plan and decisions taken including actual contracts placed to date. The redaction of any content has been made where SWEL deem it is confidential, commercially sensitive, otherwise restricted or may compromise existing tender processes. SWEL has endeavoured to retain as much original content as possible and will disclose further details of any redacted content if/when/where appropriate (as deemed by SWEL) at future milestone dates of publication. SWEL's Supply Chain Plan and Annex document (shortened versions) are for information purposes only. SWEL makes no warranty or representation and shall have no liability to any party who may seek to use its content in respect of any decision or course of action.

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### 1. CONTACT DETAILS

<b>Company Name</b>	Seagreen Wind Energy Limited	<b>Authorised Representative</b>	John Hill, Project Director
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<b>Alternative Contact Number</b>	██████████	<b>Alternative Contact Mail</b>	██████████
<b>Project Name</b>	Seagreen Offshore Wind Farm (“Seagreen”)	<b>Project Size</b>	Up to 1,500MW
<b>Project Commissioning Date</b>	Full power 2023	<b>Project Location</b>	Seagreen is in the North Sea approximately 27km off the Angus coast. See illustration <i>Annex 3.4</i>
<b>Ownership</b>	100% owned by SSE Renewables Developments (UK) Limited part of the SSE plc group.		
<b>Maturity of Project</b>	<ul style="list-style-type: none"> <li>Seagreen Wind Energy Limited (“SWEL”) was awarded exclusive development rights to the Firth of Forth Zone by the Crown Estate in 2010.</li> <li>Seagreen is comprised of two lease agreements: one in respect of Seagreen Alpha Wind Energy Limited (“Seagreen Alpha”) and one in respect of Seagreen Bravo Wind Energy Limited (“Seagreen Bravo”) (see <i>Annex 3.2</i>). Both leases were entered into in 2011.</li> <li>Windfarm Section 36 Consents and Marine Licenses were awarded in 2014.</li> <li>Planning Permission in Principle has been granted under the Town and Country Planning (Scotland) Act 1997 for the onshore cable route – dated 5th Jan 2017.</li> <li>Grid connection for Seagreen is expected in October 2022 and is underpinned by grid connection agreements for Seagreen Alpha &amp; Bravo signed in January 2019.</li> <li>Subject to success in the Contracts For Difference auction, Seagreen will be fully operational by 2023.</li> </ul>		

## 2. EXECUTIVE SUMMARY

- 2.1 SSE plc (“SSE”) is proud to present the Supply Chain Plan for the Seagreen Offshore Wind Farm. The Seagreen Project, wholly owned by SSE the UK’s leading renewable energy developer, comprises two consented sites, Seagreen Alpha and Bravo, with a combined operational capacity of up to 1500MW.
- 2.2 SSE will invest around £3bn to construct Seagreen just 27km off the East Coast of Scotland and will cumulatively spend around £5bn over its lifetime. SSE is committed to making a material impact on Competition, Innovation and Skills in the offshore wind sector through the delivery of Seagreen and this Supply Chain Plan.
- 2.3 Seagreen builds on SSE’s leadership within the UK offshore wind sector and follows in the footsteps of Greater Gabbard and Beatrice, both built and operated by SSE. Together these projects represent an investment of £4.4bn of which SSE has an interest of 50% and 40% respectively. Positioned off the coast of Suffolk, at 500MW, Greater Gabbard was the largest offshore wind farm in the world at its commissioning date in 2013. Meanwhile Beatrice (588 MW), set in the Outer Moray Firth in Northern Scotland and on target for full operation in 2019, cements SSE’s credentials as a global leader in offshore wind development.
- 2.4 Seagreen represents a natural and logical progression, consolidating SSE’s position as the UK’s leading headquartered offshore wind energy developer, firmly establishing SSE’s Glasgow-based Centre of Offshore Engineering Excellence whilst extending and building the depth and breadth of UK capability in offshore engineering, construction and operations across the supply chain.
- 2.5 A recent renewal of SSE’s corporate strategy enhanced the company’s focus on the sustainable provision of energy aligned with the UN guiding sustainability principles: Climate Action; Industry Innovation and Infrastructure; Affordable and Clean Energy; and, Decent Work and Economic Growth.
- 2.6 These guiding principles underpin all of SSE’s activities and govern the commitments made within this Supply Chain Plan which comprises 52 actions that have already been undertaken and 55 future actions, (listed in *Annex 3.8*) aimed at achieving the UK Government’s supply chain development goals. SSE’s Supply Chain Plan commitments will primarily be implemented by Seagreen Wind Energy Limited (“SWEL”), an SSE subsidiary company that will deliver Seagreen. SWEL will:

### 2.7 Competition

- ✓ Maximise opportunity for UK suppliers to bid on the Project with an aspirational target of 50% - 55% lifetime UK content, setting the scene for future deployment in the Firth of Forth Zone to reach the 60% Sector Deal target.
- ✓ Competitively tender all major contract packages. To date a total of 69 suppliers have been engaged of which 15 (22%) are considered new or less established in the offshore wind sector.
- ✓ Secure contractual Supply Chain Plan commitments from all major Contractors. To date 26 individual Supply Chain Plans have been received from potential Tier 1 Contractors, embedding the Supply Chain Plan aims and principles all the way through the supply chain.
- ✓ Trigger significant investment in UK infrastructure which could result in new wind turbine component manufacturing facilities, new East Coast port facilities; new vessel orders and sustainable employment

throughout the supply chain.

✓ Provide leadership to the Forth and Tay Supply Chain Cluster to maximise the success of the Offshore Wind Sector Deal.

✓ Employ a dedicated Supply Chain Plan Manager to engage with stakeholders and implement the commitments set out in the Supply Chain Plan.

## 2.8 Innovation

✓ Deploy pioneering technologies for the first time at commercial scale including: [REDACTED] suction bucket jacket foundations and [REDACTED] next-generation wind turbines creating new growth opportunities and further reducing the future levelised cost of offshore wind.

✓ [REDACTED]

✓ Build on SSE's enviable track record of innovation and commit to support a diverse range of innovation programmes by feeding innovation challenges and operational data to the research community.

✓ Embed commitments from all major Tier 1 Contractors to invest in innovation as part of contractual agreements.

✓ Develop an advanced operations and maintenance strategy which will support the development of, and capitalise on the opportunity offered by, data analytics, remote monitoring and autonomous systems to reduce costs and risks.

## 2.9 Skills

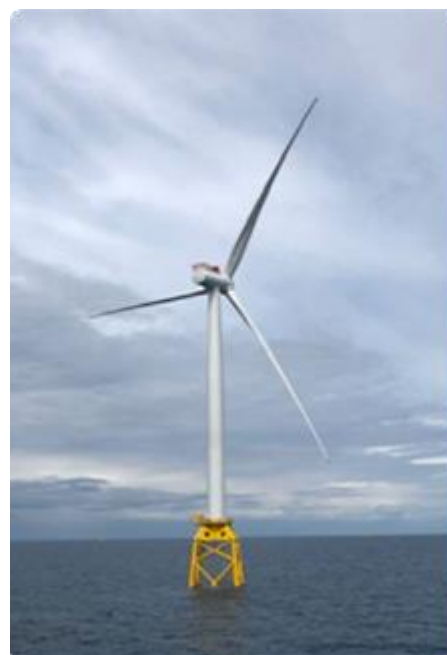
✓ Target 18,000 UK job years during construction with a target of 500 annual jobs during the twenty-five-year operations phase.

✓ Replicate SSE's successful offshore wind apprentice programme and work collaboratively with its Tier 1 Wind Turbine Generator Contractor to recruit apprentices and qualified staff in the Project's local area.

✓ Create a Project Skills Strategy through collaboration with Tier 1 Contractors and education bodies in Dundee, Angus and Fife.

✓ Provide a STEM Skills Fund of £100,000 per year for four years during construction to support STEM based student education.

**2.10 The investment in Seagreen will be the first in up to three major projects to be built in the wider Firth of Forth Zone which could represent an overall investment of c£12bn establishing a cluster of excellence and transforming the East Coast of Scotland into a powerhouse of the offshore wind industry. SSE and SWEL are excited about the material impact this SCP has and are eager to begin delivering these commitments in 2019.**

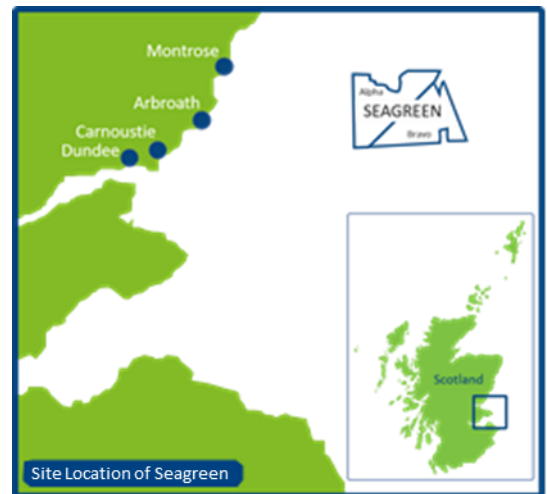


### 3. PROJECT SUMMARY

#### 3.1 The Seagreen Offshore Windfarm and SSE

3.2 Seagreen is being developed by Seagreen Wind Energy Limited (“SWEL”), a wholly owned subsidiary of SSE Renewables Developments (UK) Limited, part of the SSE Group, see *Annex 3.2*.

3.3 SSE is a UK Headquartered FTSE 100 listed company focused on the energy markets of UK and Ireland. SSE is one of the UK’s leading energy utility companies with over 21,000 employees and around 12GW of generating capacity. This total includes renewable generation assets of around 4GW,



the largest installed renewable capacity of any developer in the UK. SSE’s vision is to be a leading provider of energy and related services in a low-carbon world, underpinned by a strategic commitment to sustainability and social responsibility. These principles are directly aligned with the desired outcomes of the Supply Chain Plan (“SCP”) guidance (see *Annex 3.1*) and govern SSE’s commitment to making a material supply chain impact with the delivery of Seagreen by 2023.

3.4 SWEL has the exclusive development rights from the Crown Estate Scotland for the Firth of Forth Zone of the UK’s Round 3 Offshore Wind Farm Development Programme. The Zone has the potential for around 4GW of renewable generation capacity and Seagreen will be the first of up to three major projects to be built which could represent an overall investment of c£12bn.

3.5 SSE has an ownership interest in two operational offshore windfarms in UK waters, Greater Gabbard and Walney (see *Annex 3.3*), and is also the lead partner in the construction of the 588MW Beatrice Project, Scotland’s largest offshore windfarm due for completion in 2019. The timing of Seagreen (full power 2023) presents a fantastic near-term opportunity to seamlessly transfer learning and supply chain synergies from Beatrice to construct one of the world’s largest offshore wind farms (up to 1500MW) just 27km off the East Coast of Scotland.

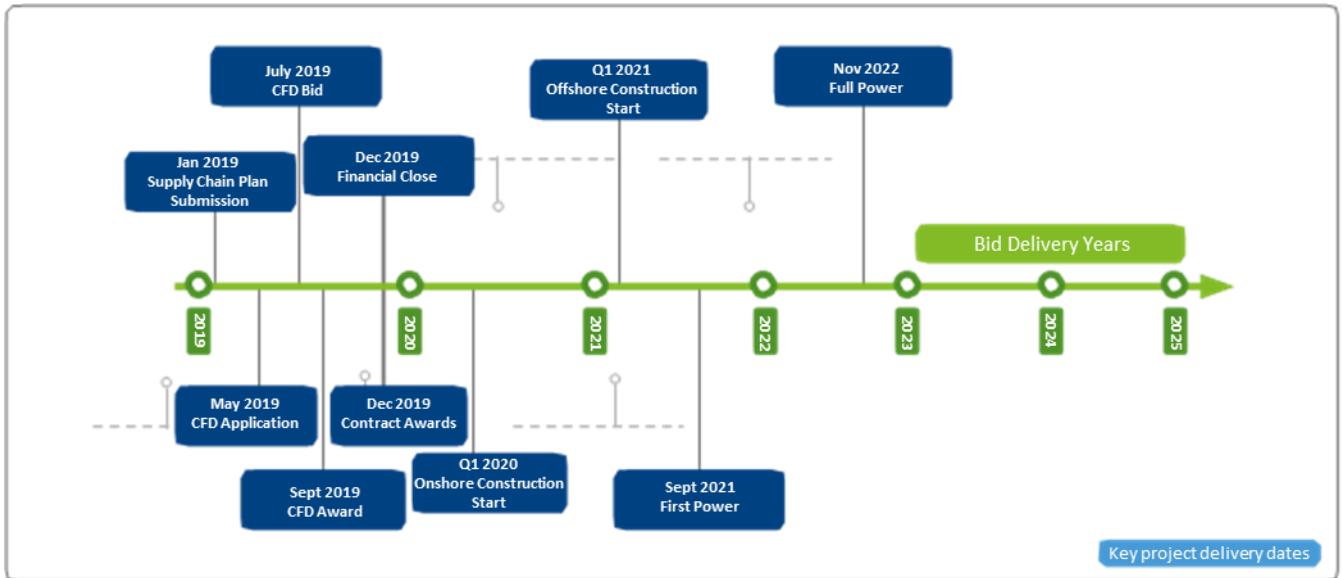
3.6 Seagreen is comprised of two consented sites: Seagreen Alpha and Bravo (see site illustration in *Annex 3.4*). Both consented areas were previously developed with a 50/50 joint venture partner, Fluor Limited. In September 2018 SSE purchased Fluor’s interest in SWEL for a consideration of £118m as a signal of its intent to ensure the successful near-term build out of Seagreen.

3.7 This SCP considers both the Seagreen Alpha and Bravo consented sites as a single combined project, “Seagreen”. SSE perceives great synergy and benefit in this project consolidation to achieve an operational capacity of up to 1,500MW, providing an economy of scale resulting in one of the largest and most cost-effective offshore windfarms in the world. The most optimum size for Seagreen is currently expected to be in the range of 1,000 – 1500MW.

3.8 SSE and SWEL look forward to commence implementing the commitments made in this SCP following success in the Contracts For Difference (“CFD”) auction in 2019.

### 3.9 Project maturity and timeline

3.10 A Gantt chart showing key project dates and procurement milestones for each of the major contract packages has been provided in *Annex 3.5*. This chart has been simplified in the illustration below:



3.11 SWEL is targeting the delivery of Seagreen by 2023 with a Final Investment Decision expected in 2019. This will enable Seagreen to have a near term impact, creating seamless continuity for the supply chain following the delivery of Allocation Round (“AR”) 2 projects. [REDACTED]

3.12 SWEL has commenced tendering activities for all its major tender packages. These tenders remain live at the time of submitting the SCP and are expected to conclude with contract awards in Q4 2019 pending the final timing and results of the AR3. Further details regarding SWEL’s procurement process and the status of these tenders are set out in sections 4.33 to 4.69 of the Competition section.

### 3.13 Guidance for the reader

3.14 The UK Department for Business Energy and Industrial Strategy (“BEIS”) guidance document presents sub-criteria for Competition, Innovation and Skills. To avoid repetition, an identifier is used to show which sub-criteria are being addressed and these will be cross referenced in the list of sub criteria in *Annex 3.1* by way of superscript. <sup>[C4]</sup>

3.15 The actions described in the plan will be delivered by SSE and/or SWEL. SWEL is a wholly owned subsidiary of SSE and SSE will maintain the obligations of lead operator throughout implementation.

[REDACTED]

3.17 A full list of abbreviations is included in *Annex 3.6*.

## 4. COMPETITION

### 4.1 Targets

SWEL has the following Competition targets:

- **Maximise opportunity for UK suppliers to bid on the Project with an aspirational target of achieving a range of at least 50% - 55% lifetime UK content based on the Industry Standard Methodology (section 4.14);**
- **Competitively tender all major contract packages (section 4.34);**
- **Secure Supply Chain Plan contract commitments from all major Contractors that oblige them to perform actions to achieve the Supply Chain Plan desired outcomes (section 4.39);**
- **Employ a dedicated Supply Chain Plan Manager to engage with stakeholders and implement the commitments set out in the Supply Chain Plan (section 4.15);**
- **Re-launch the successful Open4Business Platform to cascade opportunity throughout the supply chain and provide local companies visibility of SWEL's tender processes (section 4.20).**

### 4.2 SSE Competition Philosophy

4.3 **SSE believes in the power of competition** as a force for good in the offshore wind sector. The will to compete encourages the supply chain to continue to innovate and develop new products and services to reduce the overall cost of energy. SSE's default approach is to consistently implement competitive tender processes that offer opportunities to both incumbent suppliers and new market entrants. At the core of SSE's operating principles is the desire to be socially responsible and secure economic legacy for the communities its projects serve. These principles underpin the procurement approach of SWEL. <sup>[C5]</sup>

4.4 **SSE is stepping up to implement the Sector Deal** - SSE is one of the main developers supporting the work being undertaken to drive the Offshore Wind Sector Deal. One of the goals established is the creation of up to six supply chain clusters across the UK to pool knowledge, capability and capacity to serve future UK and global offshore wind deployment. SSE is supporting this initiative and has stepped forward to take a leading role in the proposed Scottish Offshore Wind Supply Chain Cluster(s). <sup>[C3]</sup>

4.5 SSE has taken a leading role in developing the potential cluster centred around the Forth and Tay region. This region has the potential to be the pre-eminent UK Balance of Plant ("BOP") and Skills and Growth Cluster owing to its substation and foundation fabrication capability, its proximity to leading academic entities and the Aberdeen Oil and Gas industry which has significant potential to diversify into the offshore wind BOP/ Operations and Maintenance space. <sup>[C3]</sup>

4.6 SSE will use its leading position within the cluster to guide and share its experience with the supply chain, promoting opportunities and maximising the effectiveness of the Scottish Cluster to secure investment and future orders across all tiers of the supply chain. <sup>[C2, C3]</sup>

### 4.7 Encourage broader supply chains by supporting new entrants [C1]

4.8 **Track record of introducing new suppliers and helping to develop the existing supply chain** - SSE is one of the most significant UK offshore wind developers with an interest in two operational offshore windfarms and a further project in construction. With this combined capacity of 1.5GW SSE has an exceptional track

record of introducing new suppliers and expanding the scope of existing suppliers in the market. <sup>[C1]</sup>

**4.9 SSE has invested c£1bn via its 40% stake in Beatrice Offshore Windfarm Limited (“BOWL”) to develop and construct Beatrice (588W in construction) off the North East Coast of Scotland**

- Providing the first major orders to UK-based companies: Sub-Sea 7 (£900m contract for foundations supply and installation); Babcock (c£20m for the fabrication of two offshore transformer modules); Global Energy Group (£23.5m for onshore marshalling, construction, pre-commissioning and snagging services);



Windhoist (£2m wind turbine pre-assembly work) and CS Wind (12 wind turbine towers). BOWL also placed multi-million-pound contracts with UK suppliers JDR Cables, Atkins and BAM Nuttall as well as spending tens of millions on UK-based project services for engineering, consulting and legal works all of which has broadened the scope, depth and capability of the UK supply chain. <sup>[C1]</sup>

**4.10 SSE has invested c£800m via its 50% stake in Greater Gabbard (504MW) offshore wind farm located off the coast of East Anglia**

– Completed in 2013, Greater Gabbard was the largest offshore wind project in the world and was key to attracting new suppliers to the nascent offshore industry. The project awarded the first offshore wind contracts to UK-based companies: 3Sun (c£3-5m for offshore wind technicians); Fluor (> £900m EPCI Contractor); Proeon (safety and control systems) and CLS (c£5m for davit crane exchange) The order placed by Greater Gabbard for five vessels from new supplier Windcat Workboats resulted in it establishing a UK head office in Lowestoft and subsequently going on to secure further substantial contracts in the offshore wind sector. <sup>[C1]</sup>

**4.11 SSE has invested £40m<sup>1</sup> via SWEL to develop Seagreen to date**

- The vast majority of this investment has been with UK-based suppliers and project team resources. During 2018 SWEL appointed IV Oil and Gas to perform engineering design services. IV competed against some established offshore designers and another company from the oil and gas sector to win the work. This is one of the first contracts in the offshore wind sector for IV which is diversifying skills and expertise from the oil and gas sector. <sup>[C1]</sup>

**4.12 The examples provided in sections 4.9 to 4.11 demonstrate how SSE and SWEL have brought new entrants and capacity to the market, establishing credentials which have allowed each of these companies to secure work on subsequent offshore wind projects. In several cases these new entrants have a background in the oil and gas sector (e.g. IV Oil and Gas and Global Energy Group) enabling these Contractors to transfer their marine know-how to the offshore wind sector.** <sup>[C1]</sup>

**4.13 Supporting new entrants with equity investment** – SSE has previously taken significant equity positions, in partnership with Scottish Enterprise and Highlands and Islands Enterprise, in UK companies Wind Towers Scotland Ltd (“WTS”) and BiFab. Both businesses have benefitted from SSE’s investment and contracts, directly contributing to the development of these organisations and their ability to provide UK

<sup>1</sup> £40m excludes acquisition consideration of £118m paid to acquire Flour’s interest in Seagreen in September 2018  
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manufacturing capability to the offshore wind sector. SSE no longer has any ownership in these businesses but has placed significant orders with both via Beatrice: BiFab secured an order with a final value of c£150m for foundations whilst CS Wind (formally WTS) provided its first offshore wind turbine towers, diversifying from onshore tower manufacturing. These major orders were crucial in enhancing the capability of these businesses to supply to the offshore wind sector. [C1, C2]

- 4.14 **Commitment to UK content encourages Tier 1 Contractors to consider new local entrants** - SWEL has set an aspirational target range of 50% - 55% UK content. This target provides a stepping stone for future projects in the Firth of Forth Zone to move towards the Sector Deal target of achieving 60% UK content by 2030. SWEL will provide a platform for UK suppliers to compete by working with its Tier 1 Contractors to encourage new suppliers into the market and promote supply chain opportunities to the local and national supply chain through its Invitation To Tender (“ITT”) requirements (see 4.37) and future meet the buyer events (see 4.27). SWEL will benefit from the experience gathered on Beatrice in securing local economic benefit which resulted in multiple awards to local contractors equating to some £240m of orders to Scottish based companies alone, see *Annex 4.11* illustration. [C1, C2, C3, C4, C5]
- 4.15 **Dedicated resource to implement the SCP** - To implement the targets and actions set out in the SCP, SWEL will employ a dedicated Supply Chain Plan Manager who will be responsible for monitoring and delivering the actions set out in this plan as well as liaising with the supply chain and relevant stakeholders such as: BEIS; Scottish Enterprise; Department for International Trade (DIT”); and the Scottish Government. Part of the role will involve working with Tier 1 Contractors to assess the support required by new market entrants to enter the market. [C1, C2, C3, C4, C5, I1, I2, I3, I4, I5, S1, S2, S3, S4, S5]
- 4.16 **Identify and remove barriers to entry [C2]**
- 4.17 **Engagement with Government stakeholders** - SWEL has engaged with BEIS; the Scottish Government; Scottish Enterprise and DIT to provide progress updates and discuss supply chain capability and perceived barriers to entry. SWEL will continue to engage with these stakeholders during the ongoing procurement phase to ensure the promotion of tendering prospects to new entrants and credible UK suppliers is maximised. SSE has a strong track record of working effectively with government stakeholders (as evident in the equity investments outlined in section 4.13) to support supply chain development. [C2]
- 4.18 **Engagement with Chambers of Commerce** - SWEL is a Platinum Member of the Dundee and Angus Chamber of Commerce and will be presenting to members of the Chamber in 2019 to provide an update on the status of the project and potential supply chain opportunities. SWEL also joined the Fife Chamber of Commerce in early 2019 and will replicate the same presentation with this body. [C2]
- 4.19 **Open4Business Portal** – Historically one of the largest barriers to entry for potential suppliers has been having access to the right customer with the right opportunities at the right time. SSE recognised this issue and in 2012 invested over £1m to create the Open4Business (“O4B”) portal in collaboration with Highlands and Islands Enterprise (“HIE”), see Case Study *Annex 4.1*. O4B is an online procurement portal that improves visibility of the SSE procurement process and opens up opportunities for local businesses to express an interest in contracts for free. Beatrice made use of this platform to post opportunities both directly and via main Tier 1 Contractors. In total 40 opportunities were posted, 28 of which were posted by Contractors

including RJ McLeod, Siemens and Seaway Heavy Lift (“SHL”). [C1, C2, C4, C5]

4.20 **O4B** – SSE is currently working with HIE to re-launch the O4B website in early 2019. SWEL will benefit from SSE’s previous in this platform and the learning gained from Beatrice in adopting this website to promote opportunities via Tier 1 Contractors. [C3, C4, C5]

4.21 **Contractor engagement on barriers to entry** – SWEL has engaged with 69 suppliers as part of market engagement and tendering work performed to date, of which 15 (22%) are considered either new or less established in the offshore wind sector. [REDACTED]. As part of the clarification process SWEL is requesting that potential Contractors indicate steps taken to remove barriers to entry. SWEL is also obtaining an understanding of the triggers for further supply chain investment in the UK as part of the review being undertaken of the Supply Chain Plan ITT template provided, section 4.37. [C2]

#### 4.22 **Sharing Best Practice and Lessons Learned [C3]**

4.23 **Personnel transition** - The timing of delivering Seagreen is favourable to allow relevant staff from SSE’s Beatrice project (completing in 2019) to seamlessly transition and bring their knowledge and experience to Seagreen. This is already happening in practice as evident by the Project Director, Project Services Manager and Package Managers moving from Beatrice to become dedicated Seagreen team members. In addition to the movement of staff, the Seagreen and Beatrice teams also share a floor in SSE’s Centre of Offshore Engineering Excellence in Glasgow to allow day-to-day contact and foster the natural transfer of knowledge. Lessons learned sessions between the Beatrice and Seagreen Project teams have already taken place on topics such as document control (11/7/18) as well as transport and installation approaches for foundations and array cables (27/6/18). [REDACTED] [C3]

4.24 **Contractor lessons learned sessions** – SSE is committed to maximising learning and knowledge transfer with its chosen Contractors. This is already evident in the work being undertaken on Beatrice which is planning a lessons learned session with Contractor SHL in 2019. This approach to knowledge transfer will continue on Seagreen and is already happening, as evidenced through the iterative tender clarification process resulting in optimisation of SWEL’s execution plans and the lessons learned session with foundation designer Ramboll held on the 15 January 2019. [C3]

4.25 **SSE is an active contributor to a number of industry forums** which provide an effective platform to share information with the supply chain. These are listed in *Annex 6.10*. [C3]

#### 4.26 **Improve awareness of commercial opportunities [C4]**

4.27 **Meet the buyer events** - SWEL has participated in the following meet the buyer events during 2018:

- Global Offshore Wind Conference, Manchester, June 2018, see *Annex 4.5*.
- Fit 4 Offshore Conference, Edinburgh, August 2018, see *Annex 4.6 and Annex 4.4*.

SSE has a track record of taking part in successful meet the buyer events from the Beatrice project where three meet the buyer events were held in 2015 in Inverness, Wick and Elgin attracting over 170 attendees from local and international businesses. At these events SSE was also joined by its Tier 1 Contractors, Siemens and Subsea 7, which in turn promoted opportunities further down the supply chain. A Beatrice supplier opportunities presentation was also provided at All Energy in 2016, see *Annexes 4.7 and 4.10*. SWEL will use this learning to implement a similar meet the buyer programme in 2019. As part of these

sessions SWEL will issue a follow up questionnaire to attendees to help understand perceived barriers to entry, using this information to work with its Tier 1 Contractors, Scottish Enterprise, the Scottish Government and BEIS to inform future events to help new suppliers access the offshore market. <sup>[C3, C4]</sup>

- 4.28 **SWEL commits to hosting targeted meet the buyer events in 2019 and post CFD award** – SWEL will work with Scottish Enterprise to host future meet the buyer events in the locality of the Project. SWEL understands that these events are most productive if the supply chain delegates are targeted to attract the right level of engagement. The next such events are planned to take place as part of the Scottish Renewables Offshore Wind Conference in January 2019. Once SWEL brings Tier 1 Contractors on board, they will be contractually obliged to join SWEL at future meet the buyer events to promote supply chain and recruitment opportunities to local companies. SWEL will use its role as a leading developer of the Forth and Tay Scottish Sector Deal Cluster to promote tendering opportunities to cluster members. <sup>[C4]</sup>
- 4.29 **Greater transparency of tenders via the new project website** – SWEL has recently revamped the Seagreen Project website<sup>2</sup>. The new website is currently being upgraded to include enhanced details of the Project procurement approach and to improve the functionality of collecting registered supplier information. At present SWEL has around 100 registered suppliers. The planned improvements will allow those registered to filter their supply categories more precisely which in turn will allow more intelligent review of this information by SWEL and Tier 1 Contractors. SWEL will use the registered supplier information to promote future tender opportunities, provide status updates on the Project and issue notifications of upcoming meet the buyer events or conferences at which SWEL has a presence. SWEL will filter details of those registered and will provide this to Tier 1 Contractors for their consideration. The website will also include links to opportunities posted on the O4B portal as outlined in section 4.19. Overall this upgrade will make it easier for suppliers to access opportunities with SWEL and Tier 1 Contractors. <sup>[C3]</sup>
- 4.30 **Working with Scottish Enterprise to identify local companies with potential** – SWEL has collaborated with Scottish Enterprise to compile a list of Scottish companies either active in offshore wind or those with transferable skills (such as companies involved in the oil and gas sector) capable of supplying to the sector. This has resulted in a list of around 367 companies. SWEL will review this list ahead of launching future tenders and will also share this information with Tier 1 Contractors to allow those listed to be given consideration during the tender process. This action will broaden the supply chain and give new entrants the chance to be considered. SWEL will pro-actively ensure this takes place through monthly contract monitoring meetings once Contractors are selected <sup>[C1,C2,C3]</sup>
- 4.31 **Project finance commercial promotion** - SWEL intends to secure project finance to fund the Project. Although finance is not ‘supply chain’ in its traditional sense, the way in which projects are financed is a crucial consideration and has a material impact on the levelised cost of energy (“LCOE”). SWEL is committed to working with its financial advisor, MUFU, to extend the opportunity to lend to the Project as wide as possible. Having an increased pool of lenders will help ensure the Project secures the most competitive cost

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<sup>2</sup> [www.seagreenwindenergy.com](http://www.seagreenwindenergy.com)  
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of finance which in turn will allow it to reduce its LCOE and bid the most competitive strike price. At present SWEL is likely to perform a market sounding with a pool of around 30 - 50 banks. Up to 10 of these banks have not been involved in financing a UK offshore wind farm before. <sup>[C4,C5]</sup>

#### 4.32 **Encourage competitive procurement processes [C5]**

4.33 **SSE is a responsible buyer** and aims to treat the companies it does business with in an ethical and fair manner. SSE seeks to work in partnership with its suppliers to achieve long-term sustainable benefits. SSE has a responsible procurement charter<sup>3</sup> which presents the principles that it expects its suppliers to adhere to. This responsible ethos is further demonstrated by SSE's approach to modern slavery, the living wage and prompt payment codes<sup>4</sup>. <sup>[C2, C5]</sup>

4.34 **Structured and open procurement processes** – SWEL will run open and competitive procurement processes for all its major contracts. SWEL is not bound by any restrictive long-term framework agreements and commits to ensuring competition between at least three separate Contractor options for each of its major tender packages. <sup>[C5]</sup>

4.35 **Market engagement and supplier identification** – SWEL has an inclusive approach to identifying potential suppliers for involvement in its tender processes, thereby ensuring consideration is given to potential new market entrants and local companies. Potential suppliers are identified via the following means <sup>[C5]</sup>:

- **Previous experience** – considering any suppliers which have tendered or have contracted with SSE or SWEL in the past.
- **Market knowledge** – suppliers known to the Procurement and Project Team from attending industry conferences, meet the buyer events or industry publications.
- **Supplier registration database** – before any major tender is issued the registered list of suppliers is consulted to identify potential bidders.
- **Desktop research** – key word searches are performed.
- **Achilles database search** – product category searches are performed.
- **Consultation with local enterprise bodies** - SSE has in the past consulted with Scottish Enterprise and Highlands and Islands Enterprise to identify potential suppliers for projects, section 4.30.

4.36 **Long list created** – Following market engagement a long list of bidders is invited to pre-qualification. SWEL makes use of the Achilles Utility Vendor Data Base (“UVDB”) platform to facilitate pre-qualification checks prior to finalising the list of bidders. SSE uses discretion to tailor these pre-qualification tests to ensure a highly competitive field remains in the bidding process. <sup>[C3]</sup>

4.37 **Tender launched including SCP template** – Following pre-qualification, the tender pack is launched to the pool of bidders. All bidders on SWEL's major contracts are required to respond to a Supply Chain Plan ITT requirements schedule (*Annex 4.8*), which requires Contractors to provide information regarding: actions undertaken to achieve the Supply Chain Plan desired outcomes; the expected number of jobs created or

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<sup>3</sup> [http://sse.com/media/530653/responsible-procurement-charter\\_0818.pdf](http://sse.com/media/530653/responsible-procurement-charter_0818.pdf)

<sup>4</sup> <http://sse.com/beingresponsible/responsiblebuyer/>  
Seagreen Offshore Wind Farm  
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sustained as a result of an order from SWEL; and, the projected UK content of their offer. Capturing this information will embed supply chain development principles and secure buy-in to delivering the desired SCP outcomes all the way through the supply chain. Some of the SCPs received have been included in *Annex 4.12* with highlights presented in the commentary on specific work package impacts in sections 4.42 to 4.70.

[C1,C2,C3,C4,C5,I1,I2,I3,I4,I5,S1,S2,S3,S4,S5]

**4.38 Tender returns and conclusion** – Tender returns are evaluated in a structured manner against common technical, commercial, and health and safety criteria. Consideration is also given to responses received to the Supply Chain Plan ITT template. Following the assessment, a supplier is selected or a further tender round is held until a satisfactory, technically compliant offer is accepted. For offshore projects there are often multiple tender rounds to maximise competitive tension that culminate in a Best and Final Offer phase. <sup>[C3]</sup>

**4.39 Supply Chain Plan contract obligations** – the successful Contractor will have a contract clause which is informed by their Supply Chain Plan ITT submission which obliges them to deliver against the actions provided in their tender response as well as additional actions that SWEL expects of them. This clause is already established in the Turbine Supply Agreement. The template clause is provided in *Annex 4.9*.

[C1,C2,C3,C4,C5,I1,I2,I3,I4,I5,S1,S2,S3,S4,S5]

**4.40 Multi-contract procurement strategy** – SWEL is deploying a concise multi-contract procurement strategy which naturally promotes competition. SWEL is approaching the supply chain market with five key work packages expected to result in between 4 to 10 contracts. This approach has been informed by knowledge gained on the Beatrice Project and is considered the best strategy to derive the lowest strike price with an acceptable risk allocation for the Project. The main contract packages are: <sup>[C1,C3,C4,C5]</sup>

- Wind Turbine Generator (“WTG”) Supply and Installation;
- Marine Installation Package;
- Electrical Systems Infrastructure;
- Operations and Maintenance (“O&M”); and
- Ports.

**4.41 SWEL is increasing opportunities for local suppliers with a UK content target of 50%-55%** – All major bidders are required to indicate the UK content of their offer following the standard industry guidance<sup>5</sup>. SWEL is already witnessing the impact of this request on changing Contractor behaviour by challenging default sub-contractor choices thereby broadening opportunities for UK and local suppliers. SWEL has developed a UK content model which is updated on a real time basis as tender returns are submitted and UK content estimates are returned by Contractors. <sup>[C1, C2, C5]</sup>

### ***Competition impacts of procurement approach***

**4.42 WTG PACKAGE COMPETITION**

**4.43** SSE has an unparalleled history of introducing new WTG technology to the market as follows; see sections

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<sup>5</sup> [https://cdn.ymaws.com/www.renewableuk.com/resource/resmgr/Publications/Guides/uk\\_content\\_methodology.pdf](https://cdn.ymaws.com/www.renewableuk.com/resource/resmgr/Publications/Guides/uk_content_methodology.pdf)  
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5.7 to 5.10 for further details:

- **2004 – First ever deployment of GE Energy 3.6MW WTG at the Arklow Bank Phase 1 Project.**
- **2006 – First ever demonstration of Repower 5MW WTG at Beatrice Demonstrator.**
- **2012 – First ever demonstration of hydraulic drivetrain MHI Sea Angel 7MW WTG at Hunterston.**
- **2013 – First ever demonstration of Siemens 6MW WTG in the UK at Hunterston.** [C1,C2]

4.44 **Open tender with new models under consideration** - SWEL is running a competitive tender for WTG supply with an option for installation. In parallel to this tender SWEL is also engaging the market for WTG installation services only (see section 4.47 to 4.48 ). This optionality helps identify the most efficient way to procure these packages. SWEL has a current preference to combine these items of scope (if economically justified) based on previous experience gained on Beatrice as core benefits are



perceived in reducing the interface and risk allocation under this approach. The market for offshore WTGs is relatively narrow and the WTG tender initially included four suppliers, with one relatively new to the offshore market. The tender considers options to supply and install up to 150 WTGs in accordance with the Project’s consent parameters. The timing of the next auction’s delivery period provides SWEL with an opportunity to deploy new WTG models which have higher power capacities that could help reduce the cost of energy, see section 5.10. [C5]

4.45 [REDACTED]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

4.46 The tender process is due to conclude in 2019 and SWEL will oblige the successful Contractor to deliver key aspects of their SCP submission as part of their final contract, see section 4.39. [C5]

4.47 **WTG INSTALLATION COMPETITION**

4.48 **Nine bidders have provided quotations to perform WTG installation.** SWEL is currently appraising these offers to determine if it is more favourable from an economic and interface perspective to separate this scope from the WTG supply package. By considering this option SWEL provides a platform to allow a wider pool of bidder's access to the opportunity rather than relying on the potentially narrower pool of suppliers preferred by the WTG Contractors. The potential installation Contractors have responded to SWEL's SCP ITT schedule. [Redacted] SCPs are included in Annex 4.12 with some extracts summarised below: [C4]

[Redacted]

[Redacted]

- MVOW – Annex 4.12.2 MHI Vestas Offshore Wind have committed to participate in relevant Supplier days and other supplier engagement for projects successful in CfD. This will improve commercial opportunities and support new entrants to the supply chain. [Redacted]

[REDACTED]

4.49 **MARINE INSTALLATION PACKAGE (“MIP”)**

4.50 **Wide variety of competing technologies consented** – The MIP package scope includes the supply and installation of up to 150 foundations with an option to include array cables supply and installation. SWEL’s planning consent allows a variety of foundations to be deployed on the site allowing SWEL to assess and consider a broad pool of competing technologies including gravity bases, pin pile and suction bucket jackets. Following a thorough market engagement exercise with nine suppliers SWEL has eliminated a gravity base solution from its choices [REDACTED] and is now focusing on a suction bucket solution. <sup>[C5, I2]</sup>

4.51 **First large-scale deployment of suction bucket jackets** – In 2018, SWEL contracted with UK based Gardline and Norwegian Contractor MMT to perform Geophysical and Geotechnical studies respectively. Following the results of these studies SWEL intends to use suction bucket jacket foundations. This will be the first time that such a solution has been employed on a commercial scale offshore with SWEL intending to deploy up to 114 [REDACTED] units. Deploying this technology will create new opportunities down the supply chain to develop fabrication skills and capability for the bucket solutions, see section 5.225.21 <sup>[I2, I4, I5]</sup>

4.52 **High number of designers considered** – SWEL is in the process of tendering a suction bucket design contract. SWEL has engaged with 13 designers and is now progressing to tender with three of these companies. SWEL will work closely with its chosen designer to optimise the design of the structure and ensure that the design does not restrict the pool of suppliers able to compete in the Foundations Supply and Installation tender process. <sup>[C5]</sup>

4.53 **Open competition for Foundations Supply and Installation** – SWEL launched a tender for the supply and installation of a mix of pin pile and suction bucket jacket foundations in May 2018. The tender included three options: (1) supply only; (2) installation only; (3) supply and installation. Adopting this optionality allows a wider pool of supply chain companies to participate in the process encompassing both the marine installation discipline and traditional fabrication. In total the tender was issued to 21 companies of which one is considered new to offshore wind. Following the responses from the first tender round and based on its learnings from the Beatrice Project, SWEL now considers that a wrapped approach (option 3 above) is the most optimal for the project to take. Due to the nature of jacket supply it is expected that the final contract for jacket supply may have to be placed with up to four fabricators, this in turn presents opportunities for multiple yards (including those in the UK) to secure an order. <sup>[C3, C5]</sup>

[REDACTED]

[REDACTED]

[REDACTED]



[REDACTED]

4.55 **Steel supply competition** – Around 30% of the fabrication cost of foundations is steel supply. SWEL will require that its shortlisted Contractors promote competition in the steel supply chain by considering alternative sources of supply compared to their usual default framework contractors where possible. SWEL has engaged with Edgen Murray and Liberty Steel (see *Annex 4.13*) to identify potential UK steel supply capability. SWEL understands that there is capability in the UK to provide around 80% of the steel necessary. SWEL will share this information with its shortlisted foundation Contractors for their consideration and will seek to provide an opportunity for UK suppliers to bid whilst reducing any perceived barrier to entry. [C1, C2, C4, C5]

4.56 **ELECTRICAL SYSTEMS INFRASTRUCTURE (“ESI”) PACKAGE COMPETITION**

4.57 **Multi-lot approach** – The ESI works are split into four tender packages as follows:

1. Export cable supply and installation;
2. Array cable supply and installation;
3. Onshore substation (“ONS”) supply and installation; and,
4. Offshore substation (“OSS”) supply and installation.

There are 11 bidders involved in the tender process of which three are new to the offshore wind sector. The tender allows bidders to respond with an offer to quote for any or all the above packages. This approach has allowed bidders with specialist capabilities across the different package disciplines to bid and for SWEL to identify the most optimal approach to procuring these works. An illustration of the multi-lot approach has

been provided in *Annex 4.14*. [C2, C5]

[REDACTED]

4.59 **ESI SCP bidder highlight:**

4.60 **OSS and ONS - Linxon** (*Annex 4.12.13*) is a newly formed merger of ABB and SNC Lavalin (September 2018). Linxon has projected a UK content level of 36.5% for the scope of works predominantly comprised of civils works and ancillary equipment supply. Linxon has expressed a willingness to use local suppliers for local operations and has been active in looking to break down barriers by not requiring any previous experience in the market for sub suppliers to be considered as part of its procurement process.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

4.66 **O&M PACKAGE COMPETITION**

4.67 **WTG O&M** – As part of the WTG Supply Contract negotiations SWEL is also negotiating separate O&M arrangements with each of the three WTG bidders. SWEL’s strategy is to secure an initial O&M arrangement covering the warranty period of the WTGs with some extension options. SWEL is committed to exploring the options of taking the O&M services in house after expiry of the warranty or outsourcing the provision of these services to third party entrants at this time. To enable this SWEL will oblige the WTG Contractor to provide all necessary operational manuals, service records, operational data and know-how prior to the end of the Service and Maintenance Agreement term in order to share this with potential third-party service providers as part of a future tender. <sup>[C2, C4]</sup>

4.68 **Challenging default O&M options** – SWEL is working collaboratively with potential Contractors to challenge the default O&M options being proposed and ensure appropriate consideration is given to alternative sub suppliers and O&M strategies. For example, SWEL is challenging the default CTV options being proposed by certain suppliers to ensure that adequate consideration is being given to Service Operations Vessels (“SOV”) maintenance strategies. This action in turn is allowing providers of these products a means of tendering at the Tier 2 level. <sup>[C4, I5]</sup>

**BOP O&M** – SWEL plans to tender for BOP O&M in 2019. To inform potential suppliers, SWEL plans to host an O&M Innovation Open Day (see section 5.67 ) during 2020 to identify both new technologies available and potential new suppliers. SWEL recognises the importance of developing this area of competition in the market with the significant level of transferable skills in this space from the UK’s Oil and Gas Industry. SWEL has committed to working with Scottish Enterprise to deliver this event and maximise the outcomes to further innovation and competition from it, letter of support *Annex 4.3*. <sup>[C2, I5]</sup>

4.69 **PORTS PACKAGE COMPETITION**

4.70 SWEL has a requirement for three port facilities as follows:

- O&M Port;
- WTG Staging Port;
- Foundations Staging Port.

4.71 **SWEL will use an O&M port on the East Coast of Scotland** – SWEL is working with the WTG bidders whilst undertaking modelling to identify the optimal location for the Project’s O&M port. An open selection process is underway. Final selection will be heavily influenced by the proximity to the site and the ability of the port to meet SWEL operational requirements. Ports under consideration include Montrose, [REDACTED]



None of the ports are currently being used as operational offshore wind ports. SWEL is likely to be the first project to utilise these ports in the O&M phase which will add new capability and will further develop the local supply chain in the East Coast of Scotland. [C1, C2, I5]

4.72 **SWEL will use a WTG staging port on the East Coast of the UK** – [REDACTED]  
[REDACTED] SWEL has received proposals from each of these facilities and will decide on this port in 2019. SWEL’s WTG bidders are also making enquiries with these ports for SWEL to consider the best means of securing these facilities, either directly or indirectly, through its WTG Contractor. Use of any of these facilities will result in investment in infrastructure and valuable experience for these ports, building capacity for future offshore wind deployment. [C1, C2, I5]

4.73 **UK and European ports are under consideration for foundations marshalling:** [REDACTED]  
[REDACTED] SWEL is currently reviewing offers from its MIP Contractors which include some of these options (depending on the fabrication option and execution plan). SWEL issued a quotation request to these ports independently in January 2019. The use of these facilities is likely to result in an investment in infrastructure (such as new crane and lay down capacity) which will benefit both SWEL and future offshore windfarms. [C1, C2, I5]

4.74 **Beatrice ports experience** - SWEL will use lessons learned from Beatrice where around £20m was invested in Wick Harbour to create a construction and operations base. [REDACTED] [REDACTED] This investment provided employment for 150 people, including two apprentices, and established capacity for future offshore wind farm projects. Beatrice’s use of the port at Nigg also resulted in tangible economic benefits. These examples are an indicative guide of the impact Seagreen will have with its choice of port.

#### 4.75 **Summary Impacts – Competition conclusion**

- **Significant opportunity promotion supported by the 69 suppliers SWEL has engaged with to date and the planned future actions such as meet the buyer events and the roll out of the Open 4 Business portal which is a proven platform for advertising tenders. This together with the industry leading UK content target will ensure high visibility of opportunities to new entrants and UK companies.**
- **Investment in local port infrastructure for SWEL’s new O&M base and potential wind turbine and foundation marshalling facilities to benefit future offshore windfarms.**

- **Potential suppliers have indicated a SWEL order will result in significant investment in UK facilities for WTG components and will also underpin existing investments made to date in manufacturing and new vessels capability.**
- **Historic equity investment in Beatrice and Greater Gabbard has helped build and maintain capability and skills in the UK and wider offshore wind sector.**
- **SSE's membership of key industry bodies and its commitment to lead on the Sector Deal will support the offshore wind industry to continue to prosper and grow in the UK.**

## 5. INNOVATION

### 5.1 Targets

Seagreen has the following Innovation targets:

- Deploy suction bucket jacket foundations at commercial scale for the first time, section 5.22.
- Support the development of the Offshore Wind Industry Sector Deal which includes ambitious targets for Research and Development (“R&D”) funding to create new intellectual property in the UK, section 5.4.



- Nurture existing R&D relationships to embed innovation in Seagreen, sharing data with the academic community and supporting the work of universities and research centres in contributing to better offshore wind projects, sections 5.32 and 5.54.
- Secure financial commitments from Tier 1 Contractors to invest in innovation activities and proactively engage with suppliers and potential new market entrants, sections 5.39 and 5.42.
- Host an O&M innovation open day in 2019 to provide visibility of opportunities and enable suppliers with innovative technology or services to present concepts to SWEL, section 5.69.

5.2 **SSE innovation** – SSE defines innovation as a process by which it implements something new that generates value for SSE and wider society. SSE channels innovation focus into three categories: *optimising*; *enhancing* or *disrupting* core business, see *Annex 5.1*. SSE’s renewables business directly invests around £12m per annum on innovation activities with contributions to academia and industry bodies and internal resource dedicated to the design, management and delivery of projects. <sup>[11, 12]</sup>

5.3 **Group innovation** – SSE actively engages with: Scottish Government; Innovate UK; BEIS; Offshore Renewable Energy (“ORE”) Catapult and Horizon 2020 on offshore wind innovation. In the last 18 months SSE has been awarded c£12m of funds to support innovative ways of providing energy in the UK. SSE also supports 14 EPSRC energy focused research programmes with a combined value of £42m<sup>6</sup>. <sup>[11, 12]</sup>

5.4 **Offshore Wind Sector Deal** – SSE is supporting the development of an Offshore Wind Sector Deal. Commitments in the Deal are expected to include strengthening support for innovation through working closely with the Catapult network to improve the development of intellectual property in the UK. The Deal proposes ambitious new ways of supporting innovation in established businesses, creating high value jobs and accelerating the development of new technologies. SSE commits to support the implementation of all innovation ‘Ideas’ included in the final Deal. <sup>[11, 12]</sup>

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<sup>6</sup> <https://gow.epsrc.ukri.org/NGBOViewPartner.aspx?OrganisationId=1001570>  
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5.5 **SSE has driven offshore wind innovation through its investment in Beatrice and Greater Gabbard**, two of the largest projects in the world at their commissioning point in time, and each delivering highly innovative technology and industry firsts as listed below:

**Greater Gabbard:**

- 140 monopile foundations for the largest offshore windfarm in the world at the time (2013);
- New turbine technology at scale using Siemens 3.6MW turbines with 54m blades;
- Innovations in structural monitoring, using sub-sea strain gauges and acoustic monitoring; and,
- The first use of helicopters for operations support in offshore wind.

**Beatrice:**

- Largest ever deployment of deep water jacket structures (84 positions) with pin-piles (2017).
- One of the first major offshore wind projects to deploy direct drive turbine technology with one of the first deployments of 7MW WTGs with 75m blades.
- The first deployment of new Offshore Transmission Module systems.

5.6 **R&D, links to universities, examples of testing, demonstration and technological development [I1] [I2]:**

5.7 **WTG Innovation – SSE Actions**

5.8 **Hunterston test site: MHI Sea Angel** – SSE invested around £20m in the National Offshore Wind Turbine Test Facility (“NOWTTF”) at Hunterston in 2012 which enabled the testing of the world’s first hydraulic drivetrain in a full scale (7MW) offshore WTG. This demonstration was instrumental in securing investment for UK company Artemis which developed the innovative hydraulic drivetrain technology at the heart of the concept. This demonstrates the enthusiasm of SSE to invest in disruptive innovations at full scale and to support the entry of new WTG manufacturers to the market, *Annex 5.2.* [11, 12]



5.9 **Hunterston test site: Siemens Direct Drive** – The £20m investment in NOWTFF also enabled the demonstration of a Siemens 6MW direct drive WTG. This demonstration was crucial in building confidence for SSE ahead of placing an order for the 7MW variant of this WTG at Beatrice. There are very few other WTG test facilities of this type in the UK and SSE was unique as a site developer in contributing to WTG technology development in this way. The site was also a key part of the WTG manufacturers R&D programme and testing by SSE enabled the success of this WTG platform at several other UK offshore wind projects, underpinning the Siemens’ investment at Hull, see *Annex 5.2.* [12] [56]

5.10 **Offshore demonstration** – The deployment of two 5MW WTGs at the Beatrice Demonstrator in 2006 was a global first and helped the manufacturer, Repower, win contracts with other offshore projects in the UK and Europe. The installation concept was also innovative, see section 5.45. Meanwhile, the 25.2MW Arklow Bank Phase 1, which is owned and operated by GE Energy, was co-developed by Airtricity (part of SSE) and GE Energy and remains the first and only operational offshore windfarm in Ireland, see *Annex 5.3.* [11, 12, 14, 16]

5.11 **WTG Innovation – SWEL Actions**

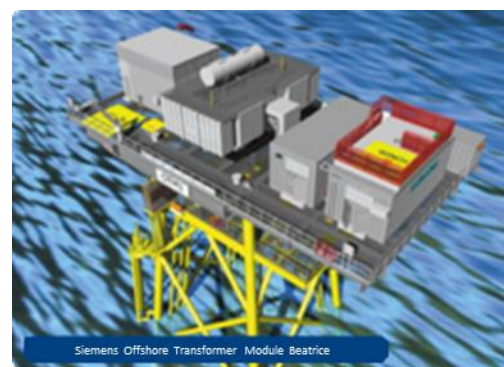
5.12 **First deployment of new WTG models** – Responses from all potential suppliers indicate that SWEL is likely to be among the first to deploy any of the turbine models currently being offered at commercial scale. SSE is not bound by framework agreements or other commitments with turbine manufacturers and expects that the conclusion of the turbine tendering process will support innovation in turbine technology by enabling a large order of a turbine model which will be new to the market, see section 4.44 <sup>[12]</sup>

5.13 **Innovation reducing LCOE** – The deployment of a new model will have a significant impact on the LCOE of Seagreen by diluting the BOP and O&M costs resulting from fewer turbine positions. All submissions from WTG manufacturers indicate that innovation will be inherent in any turbine selected. All models being considered include new WTG control approaches such as individual pitch control optimised for the management of loads. The impact of advanced WTG control strategies will be increased annual energy production (“AEP”), reduced WTG loading, and increased design life or a combination of all three. <sup>[12]</sup>

5.14 **Ancillary services** – SWEL is also investigating the possibility of providing ancillary services to National Grid which could provide an additional revenue stream and the opportunity to bid a more competitive strike price. Research at the University of Strathclyde Technology and Innovation Centre has been conducted to support this aspiration whilst tender responses from potential suppliers have likewise indicated an interest in exploring this option, see *Annex 5.4*. <sup>[11, 12, 16]</sup>

5.15 **Electrical Systems Infrastructure (“ESI”) – SSE Actions**

5.16 **SSE installed the first ever Offshore Transformer Module (“OTM”) offshore substation** on Beatrice following development work from Siemens in collaboration with SSE and the Offshore Wind Accelerator (“OWA”) <sup>7</sup>. These lightweight platforms significantly reduced the capex cost by c10%. SSE directly contributed to the successful commercialisation of this technology which offers a significant cost saving for future offshore windfarms, including Seagreen. Following the SSE led proof-of-concept demonstration this technology has been widely adopted across the industry, see case study in *Annex 5.5*. <sup>[11, 12]</sup>



5.17 **Electrical Systems Infrastructure – SWEL Actions**

5.18 [REDACTED]

[REDACTED] SWEL is considering the deployment of lightweight OTM style substations. This technology will provide a 10% reduction in the capital cost of the offshore substations, see *Annex 5.5*. <sup>[11, 12]</sup>

5.19 **Marine Installation Package (“MIP”) – SSE Actions**

5.20 **Beatrice Demonstrator turbines** – SSE was a leading member of the consortium that developed and

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<sup>7</sup> [https://www.carbontrust.com/media/675874/dp-otm\\_gber-Annex-ii-ad-hoc-aid-notice-bowl.pdf](https://www.carbontrust.com/media/675874/dp-otm_gber-Annex-ii-ad-hoc-aid-notice-bowl.pdf)  
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installed the Beatrice Demonstrator turbines in 2006. These turbines were among the first to be installed on jacket foundations in some of the deepest waters attempted by offshore wind projects at the time (45m). Jacket structures were fabricated by BiFab, facilitating future production of similar jackets for other projects, including Beatrice, and paving the way for subsequent jacket projects thereby underpinning the development of UK manufacturing of jacket foundations. <sup>[12]</sup>

#### 5.21 **Marine Installation Package (MIP) – SWEL Actions**

5.22 **Innovative foundation concept** – SWEL intends to use suction bucket jacket foundation technology. Suction bucket jackets offer the potential to reduce installation and decommissioning noise levels and durations and contribute to an overall reduced LCOE. This technology has only been used on single turbine locations as part of research projects or in demonstrator scale arrays to date. Innovations such as the evolution of this technology to mate suction bucket and jacket structure with grout during installation are evident in tender returns. An order of suction bucket jackets from SWEL would be the first large scale deployment of this type of foundation in offshore wind globally. By using this technology SWEL will contribute significantly to growing the design, development and know-how required to deploy suction buckets and the supply chain capability to fabricate this type of foundation in commercial volumes. SWEL expects to conduct trial installation of this innovative foundation type in 2019. <sup>[12, 14]</sup>

#### 5.23 **Operations and Maintenance (“O&M”) – SSE Actions**

5.24 **System Performance, Availability and Reliability Trend Analysis (“SPARTA”) project** – Greater Gabbard participates in the SPARTA knowledge sharing platform<sup>8</sup>, contributing (£25k / year) to this Joint Industry Project (“JIP”). Once operational, SWEL will contribute data to this system, using it to benchmark the operational performance, availability and reliability of Seagreen against the UK offshore wind portfolio. This will help inform the maintenance strategy of the Project ensuring that best in class performance is achieved whilst conversely benefiting the wider industry by including Seagreen in benchmarks. <sup>[15, 16]</sup>

5.25 **O&M Experience** – SWEL will benefit from an exceptional track record in wind generation O&M gained from SSE’s experience operating a renewable portfolio of around 4GW. <sup>[15, 16]</sup>

5.26 **Supporting innovation in access methods** – SSE was the first UK offshore wind operator to include helicopter transfer in its O&M logistics for the Greater Gabbard site. This first-hand experience of helicopter operations will be a consideration in determining the optimum O&M logistics concept for Seagreen. As the first UK windfarm operator to use a helicopter from Bond helicopters, a UK company, SSE played a crucial role in developing the supply chain of helicopter services for UK offshore wind. <sup>[12, 15]</sup>

5.27 **Advanced control strategies** – SSE is supporting the Wind Farm Control Trials OWA project<sup>9</sup>. This work will test advanced control strategies on an existing full-scale offshore windfarm. Whole windfarm control technology offers significant potential to improve the productivity and or increase the asset life of offshore wind projects with studies suggesting annual energy production (“AEP”) improvements in the order of 1%

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<sup>8</sup> <https://s3-eu-west-1.amazonaws.com/media.newore.catapult/app/uploads/2018/11/21101931/SPARTA-Portfolio-Review-201718.pdf>

<sup>9</sup> <https://www.carbontrust.com/offshore-wind/owa/demonstration/wfct/>  
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to 5%. Demonstration opportunities are a significant barrier to progression of this technology. The trials enabled by the OWA project will be an essential step in proving this technology prior to widespread use for the benefit of offshore wind in the future. <sup>[11, 12, 16]</sup>

- 5.28 **Research on turbine performance and maintenance** – The University of Strathclyde (“UoS”) Technology and Innovation Centre (“TIC”), see section 5.54, with support from SSE, has conducted research into turbine performance analysis using Copula models. The TIC has also developed a tool to improve maintenance practices by automatically assessing turbine maintenance records regardless of the non-standard nature of the records. The outputs of these projects, and others, will be available to SWEL and are expected to drive more efficient, data driven approaches to O&M. SWEL is also cognisant of the geographic location of the project and the proximity to considerable digital expertise in the City of Dundee and plans to explore links with academics and innovators in this area. <sup>[11, 15]</sup>
- 5.29 **Data pilots** – As part of an enduring relationship with ORE Catapult, which supports a wide variety of innovation and R&D activity, SSE has undertaken two ‘data pilot’ projects. The first delivered a tool which integrated disparate sources of business, operations and maintenance data into a single connected dashboard. This work contributes to optimised inventory and maintenance management and will benefit operational and future windfarms, including Seagreen. The second pilot applied natural language processing which involves computer science and artificial intelligence to systematically analyse wind turbine alarm descriptions from multiple WTG models. This work will contribute to data driven maintenance practices including the integration of artificial intelligence into routine O&M activity<sup>10</sup>. SSE expects to disseminate findings from these projects to benefit future offshore windfarms. <sup>[11, 15]</sup>
- 5.30 **Operations and Maintenance (O&M) – SWEL Actions**
- 5.31 **Virtual Seagreen** – SWEL will include a virtual test site. This initiative will support the optimisation of O&M strategies, R&D and technological development. Virtual Seagreen will generate insight into the operation of a contemporary offshore windfarm, demonstrating a proactive mind-set and an approach which embraces O&M innovation. Virtual Seagreen will both collect new operational data (see section 5.33) and share that data with the academic community (see section 5.32) whilst trailing pioneering robotic inspection techniques, see section 5.34. <sup>[11, 12, 15, 16]</sup>
- 5.32 **Virtual Seagreen – Data sharing** – Access to data is a significant barrier to innovation. Virtual Seagreen will help the UK R&D community overcome this barrier by directly sharing operational data. SSE already provides data from other sites on an ad-hoc basis. Virtual Seagreen will formalise this arrangement by compiling a catalogue of relevant data available. Access to this data will be controlled using the existing ‘Portal for Operational Data’<sup>11</sup>, managed by the ORE Catapult and used to administrate agreements and data access rights. Some anonymisation or redaction may be necessary to protect the commercial interests of SWEL and its Contractors. However, SSE has already led the industry in both the volume and diversity of

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<sup>10</sup> <https://ore.catapult.org.uk/operation-performance/strategic-programmes/data-digital/>

<sup>11</sup> <https://pod.ore.catapult.org.uk/>  
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data made available to third party organisations, successfully delivering value whilst maintaining anonymity. This includes sharing operational data with UoS (see section 5.54) and active participation in: SPARTA (see section 5.24); Innovate UK funded initiatives; (see sections 5.59- 5.60); Joint Industry Projects (see sections 5.53, 5.55 and 5.62) and ORE Catapult programmes, see section 5.65. <sup>[11, 12, 16]</sup>

- 5.33 **Virtual Seagreen – Structural monitoring** – SSE has undertaken several research projects related to the structural monitoring of operational wind turbines, see *Annexes* 5.2 and 5.4. Virtual Seagreen will conduct structural monitoring at small number (2 – 5) WTG locations. Monitoring the structural health of turbine towers and foundations is key to optimising asset management through the operational life of the site and could involve online monitoring of scour around foundations. Data from these systems would be invaluable in analysing the performance of innovative foundation technology (see section 5.18) and informing the design of foundations at future offshore windfarms, contributing to wider R&D and deeper understanding of the interaction of site conditions and turbine loading. <sup>[11, 12, 15, 16]</sup>
- 5.34 **Virtual Seagreen – Robotics** – SSE has pioneered innovative inspection techniques, such as UAVs at Greater Gabbard and has supported the UK company Cyberhawk in use of UAVs for turbine blade inspections<sup>12</sup>. Virtual Seagreen will take this further, making considerable use of remote inspections and paving the way for the commercialisation of robotics and autonomous systems in O&M, particularly to displace high risk or repetitive activities. The offshore wind industry is set to benefit from considerable cost and risk reductions associated with displacing the requirement for personnel to work in high risk environments. As an early adopter SSE has accelerated the use of remote inspection techniques in offshore wind and will continue to trial new solutions as part of the Virtual Seagreen initiative. <sup>[12, 15]</sup>
- 5.35 **Autonomous seabed survey** – SWEL is actively planning an O&M strategy which will rely on the use of autonomous surface vessels for periodic seabed and subsea asset surveys. By adopting this technology SWEL will reduce cost of this activity by up to 50% whilst also reducing risk and helping to stimulate the growing UK supply chain of companies offering innovative autonomous solutions. <sup>[12, 15]</sup>
- 5.36 **Active blade management** – SWEL is considering an active blade management strategy. This approach would reduce blade integrity risk and downtime due to blade repair, which will have a positive impact on the LCOE as blade surfaces in optimal condition may improve AEP by around 1.5%<sup>13</sup>. This approach involves more proactive owner-led inspections using UAV technology to provide O&M teams with regular, accurate reports of asset health enabling early maintenance interventions where required. <sup>[12, 15]</sup>
- 5.37 **Service Operations Vessels (“SOV”)** – SWEL is actively considering the use of a SOV in its O&M logistics strategy. If selected this is likely to be one of the first SOVs operated from a Scottish port contributing to local economic benefit associated with regular resupply and port visits. The SOV may be engaged for the construction phase of the project and retained for O&M. Developing project work coordination and planning functions on board would be innovative and is being actively considered. <sup>[12, 15]</sup>

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<sup>12</sup> <https://www.thecyberhawk.com/cyberhawk-working-with-sse-on-programme-of-wind-turbine-blade-inspections/>

<sup>13</sup> <https://ore.catapult.org.uk/press-releases/catapult-delivers-first-blade-leading-edge-erosion-measurement-campaign/>  
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### 5.38 **Innovative procurement or contracting practices [I3]**

5.39 **Innovative financing** – SSE issued a £600m green bond in August 2017 and a £650m green bond in August 2018. These issues were the largest of their kind sourced by a UK company. Proceeds of the issues have been used to refinance renewable generating assets, predominantly onshore windfarms. In the future SSE will continue to investigate innovative sources of finance to fund its offshore wind projects such as Seagreen. <sup>[I3]</sup>

5.40 **Innovation investment targets** – SWEL will seek to secure innovation investment targets from its Tier 1 Contractors as part of final contract agreements. SWEL has developed a SCP contract clause for this purpose, see *Annex 4.9*. The targets will be valued either as a GBP figure or a percentage of annual turnover. This is a signal to Contractors that SWEL expects continued support for, and investment in, innovation and will help the wider offshore industry to continue to reduce its LCOE in the future. <sup>[I3, S3]</sup>

5.41 **Contract optimisation** – SWEL has created a Value Opportunities Schedule in its ITT pack, *Annex 5.6*. This schedule provokes a dialogue with Contractors and challenges them to innovate. For example, if Contractors can offer lower risk or reduced delivery timescales they are encouraged to submit an alternative tender and propose how such changes could optimise the delivery of the project. Specific examples of optimisations proposed in tender returns received to date include offers to optimise foundation design, proposed alternative balances of contract scope to share risk for optimised cost of energy and moving costs between project phases to achieve optimum project economics. SWEL expects to continue open dialogue to optimise contracts agreed with Tier 1 Contractors. <sup>[I3]</sup>

5.42 **Offshore Wind Innovation Hub** – SWEL will contribute to the definition of industry innovation needs through engagement with the Offshore Wind Innovation Hub (“OWIH”)<sup>14</sup>. The OWIH will enable SWEL to engage the supply chain with innovation challenges which offer a proven mechanism such as the Offshore Wind Innovation eXchange (“OWiX”)<sup>15</sup> to connect innovators with end users and ensure that innovation is based on a clearly defined industry need.

5.43 **Scottish Enterprise (“SE”) Seek and Solve** – SSE has worked in partnership with SE to develop an innovation challenge process- Seek and Solve. This online platform will engage SMEs and new entrants to seek potential solutions to specific industry problems. SSE will take part in a trial launch of Seek and Solve in January 2019 by contributing up to six problems, potentially including some connected to offshore wind. During 2020 SWEL will publish at least one of its innovation challenges through either OWiX or Seek and Solve. Tender responses from potential Tier 1 Contractors also include a commitment to participate in innovation challenges and SWEL will seek to bring its Contractors into the process where possible. These competitions typically attract responses from suppliers and innovators from outside of the sector to showcase their products. <sup>[I3, I6] [I3, I5]</sup>

### 5.44 **Innovative or new installation methods [I4]**

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<sup>14</sup> <https://offshorewindinnovationhub.com/>

<sup>15</sup> <https://offshorewindinnovationhub.com/what-we-do/owix/>  
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#### 5.45 **Transport and installation (“T&I”) – SSE Actions**

5.46 **Innovations in installation methods** – SSE’s track record of supporting innovative installation methods stretches back to 2006, when the first Beatrice Demonstrator turbines were installed. The installation method was ground breaking at the time with turbines fully assembled in port then connected with foundations in a single lift from a floating crane barge, see *Annex 5.3*. The Beatrice Demonstrator contributed significantly to the body of expertise in WTG installation techniques for large machines. Subsequently commercial projects have tended not to use whole turbine installation, but SSE was unique in creating the environment to pilot this innovation. <sup>[14]</sup>

5.47 **Blue Pilot Project**<sup>16</sup> – SSE contributed £181k to the successful offshore trial of the Fistuca BLUE 25M hammer as part of the OWA Blue Pilot Project. This hammer utilises a large water tank to provide a more energetic but quieter blow for offshore piling. The hammer will reduce the level of environmental noise pollution and harm to marine mammals, possibly eliminating the need for use of noise mitigation. Fistuca are targeting a total cost reduction of £36m for a 720MW windfarm. Use of this technology may also unlock further potential innovation in substructure design by significantly reducing the fatigue damage imparted on piles during installation<sup>17</sup>. <sup>[12, 14]</sup>

5.48 **Impacts of piling noise** – SSE through the Offshore Renewables JIP initiative (see section 5.55) has conducted a review of herring spawning data from a range of sources and a review of differing regulatory approaches in the UK and Europe. This study will be valuable in informing future decisions relating to piling restrictions for offshore windfarm construction. <sup>[11, 14, 16]</sup>

5.49 **Installation logistics research** – Several projects at the UoS TIC have researched the optimisation of offshore vessels and installation processes including "*Enhanced simulation and logistics of offshore windfarm installation*"<sup>18</sup>. SWEL will be able to compare its installation logistics strategy utilising tools developed by the TIC when conducting installation planning. Improvement offers potentially significant savings in the costs associated with installation vessel charter, as a result of an optimised weather calibrated installation programme. <sup>[11, 14]</sup>

#### 5.50 **Transport and installation (T&I) – SWEL Actions**

5.51 **New installation vessels** – Tender responses from potential Contractors indicate that installation work will likely to be conducted by new build vessels specifically designed for the next generation WTGs. In some cases, potential Contractors, cite the opportunity offered by a contract with SWEL as a trigger to construct new vessels. Optimisation of installation through more complex modelling and simulation is considered highly likely, with contributions from both academia and industry suggesting that innovation will be a strong influence on optimising SWEL installation work. <sup>[11, 14]</sup>

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<sup>16</sup>All financial values in this paragraph have a base denomination in Euros and have been translated at a rate of GBP:EUR, 1:1.11, source: oanda.com 9.1.19

<sup>17</sup><https://www.carbontrust.com/news/2018/08/carbon-trust-offshore-wind-accelerator-announces-successful-execution-of-offshore-test-of-innovative-new-installation-technology-to-reduce-underwater-noise-and-costs/>

<sup>18</sup><https://pureportal.strath.ac.uk/en/projects/tic-lcpe-enhanced-simulation-and-logistics-of-offshore-wind-farm->  
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5.52 **Other innovative practices [I5]**

5.53 **SSE is a founding member of the OWA** – SSE has contributed c£1.8m in funding to the core work programme of OWA over the last 10 years as well as c£400k per year to support discretionary projects. For a summary of OWA initiatives to which SSE has contributed, see sections 5.16, 5.47, 5.57, 5.60 and 5.61. Further information is also included in *Annex 5.7*. SSEs funding and expertise has contributed to the success of these projects which in turn have been shown to decrease the LCOE of offshore wind. <sup>[11, 16]</sup>

5.54 **SSE has an enduring commitment to the University of Strathclyde Technology and Innovation Centre** – providing £300k of funding per year. The work of academics and researchers at UoS is strongly aligned with SSE strategy with SSE playing an active role in defining research projects undertaken at the centre. These projects form a key component of the University’s Research Excellence Framework. SSE shares information and data from operational windfarms with the TIC and has recruited graduates from the university. For examples of TIC R&D projects, see sections 5.14, 5.28, and 5.49. Information on relevant TIC projects undertaken to date is included in *Annex 5.4*. SSE is actively scoping further projects in collaboration with the TIC which will contribute to reduced cost of energy of future offshore wind. <sup>[11, 12, 16]</sup>

5.55 **Offshore Renewables Joint Industry Programme (“ORJIP”)** – SSE is an industry partner of the ORJIP which aims to reduce consenting risks for offshore wind. SSE has contributed funding as part of this JIP for: *Bird collision avoidance study* (£100k) which delivered empirical evidence of the behaviour of seabirds in the proximity of wind turbines; and, *Impacts of piling noise on fish* (£20k), see section 5.48. SSE is currently in discussions around funding the next phase of this JIP. SSE is also supporting the EirWind collaborative research project which is studying the impact of wind development in Irish waters. <sup>[11, 16, 14]</sup>

5.56 **SCP responses from potential Contractors show support for R&D** – Responses from potential WTG Contractors have highlighted that all are actively connected to offshore wind R&D in the UK either as members of ORE Catapult industry Advisory Group or through commitments to conduct R&D and testing using UK facilities and connections with UK universities. These strong links to the R&D community will be enhanced by obtaining contractual commitments to invest in innovation, see section 5.40. <sup>[11, 16]</sup>

5.57 [REDACTED]

5.58 **Lidar technology** – SSE contributed to the commercialisation of floating lidar through the OWA and SWEL

is using this technology to conduct resource assessments. Floating lidar significantly reduces development phase costs. SSE has also been an early adopter of both nacelle and transition piece mounted lidar units, which have been used to facilitate low cost turbine performance assessment and detailed investigation of generating assets. SSE has actively conducted research and published information contributing to the body of evidence in industry for the de-risking and wider adoption of the technology<sup>19</sup>. [11, 12, 16]

5.59 **Digital Twin** – The Innovate UK funded 'Digital Twin Wind Array' project will use data from Greater Gabbard with SSE as an industrial advisor. Operational insight provided by SSE will support the development of a virtual tool using a digital twin to minimise unplanned maintenance. Digital twinning offers tremendous potential to contribute to a step change in the level of preventative rather than unplanned maintenance taking place in offshore wind. Having access to operational data with which to validate digital twins is a barrier and SSE is contributing industry benefit using data from its fleet. [11, 12, 15, 16]

5.60 **Atmospheric and wake modelling research** – SSE has contributed to considerable research into atmospheric and wake modelling. This includes OWA work on boundary layer profiling aimed at reducing uncertainty related to wind measurements across sites which will influence the cost of finance for future projects. SSE was the industrial advisor to the SWEPT 2 project<sup>20</sup> which developed and validated flow simulation tools to optimise the design of windfarm layouts. Modelling experts from SSE contributed invaluable industry insight into the optimisation of array layouts through improved wake modelling. The impact of this work will be better wake modelling tools for future offshore wind projects. [11, 12]

5.61 **Share best practice and lessons learned [I6]**

5.62 **Knowledge sharing – SSE Actions**

5.63 **Knowledge sharing groups** – SSE is an active member of several relevant industry groups whose function is intended to inform best practice in the industry by sharing of knowledge and experience. These include:

- The G+ offshore wind health and safety organisation<sup>21</sup>. SSE was instrumental in establishing G+, demonstrating industry leadership in safety within the offshore wind industry. SSE's engagement in G+ includes: management of the group; delivery of its work programme and contribution to lessons learned through initiating and actively participating in knowledge sharing events. [16, 56]
- The Offshore Wind O&M Forum at which teams from operational SSE sites (Greater Gabbard) regularly attend and contribute to quarterly meetings. This in-person sharing of information helps to drive the dissemination of best practice and promote innovation in offshore wind O&M. SWEL will actively participate in this forum once Seagreen becomes operational. [16, 56]
- The Power Curve Working Group<sup>22</sup> aims to improve the understanding of turbine performance. SSE has been a member of the steering committee for 2 years, undertaking testing and benchmarking of software

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<sup>19</sup> [http://sse.com/media/387114/Hunterston\\_WindEnergy\\_LidarStudyReport.pdf](http://sse.com/media/387114/Hunterston_WindEnergy_LidarStudyReport.pdf)

<sup>20</sup> <https://gtr.ukri.org/projects?ref=102239>

<sup>21</sup> <https://www.gplusoffshorewind.com/>

<sup>22</sup> [www.pcwg.org](http://www.pcwg.org)

tools before release to the group for use in intelligence sharing initiatives. SSE has contributed analytics from power curve tests from several operational sites to support this collaborative group. <sup>[16, S6]</sup>

- International Energy Association Task 32<sup>23</sup> industry working group promotes the use of lidar in the wind energy industry for site assessment, power performance, turbine loading and control and complex flow measurement. <sup>[16, S6]</sup>
- The Aviation Industry Working Group which seeks to link the renewables industry with relevant stakeholders on aviation matters. <sup>[16, S6]</sup>

**Academic links** – SSE is an active member of MIT’s Industrial Liaison Programme (contribution £60k pa) and Imperial College’s Business Partners Programme (contribution £50k pa) where SSE collaborates with leading academics and industry peers in the evaluation of emerging innovation and assessment of policy / regulatory changes. <sup>[11, S6]</sup>

- 5.64 **O&M case studies** – SSE contributes to a programme of O&M case studies which are part funded by the Crown Estate and delivered by ORE Catapult<sup>24</sup>. These public documents are used to share lessons learned with the wider offshore wind industry. SWEL will actively participate in this programme and contribute relevant case studies once operational. <sup>[15, 16]</sup>
- 5.65 **BLEEP JIP** – SSE is a participant in the ORE Catapult blade leading edge erosion JIP. SSE has contributed blade inspection data from operational sites and provided funding (c£56k) support to research the turbine performance impacts of blade leading edge erosion. This project has been key in developing improved understanding of the performance impacts of blade damage contributing to better informed maintenance decision making across the industry. The JIP has enabled a step change in understanding of blade damage and would not have been possible without the support and contribution of SSE. SWEL will reference the findings of this work when defining its blade O&M strategy and expects to have an optimum approach to blade maintenance planning as a direct result of this collaborative effort. <sup>[15, 16]</sup>
- 5.66 **Supply chain lessons learned** – SWEL commits to conduct lessons learned engagements with each of its Tier 1 Contractors. This provides a mechanism for proactive sharing of innovative ideas, best practice and safety information. SWEL is already providing potential Contractors with lessons learned through its tender requests leading to optimisation of work scopes. <sup>[16]</sup>
- 5.67 **Hunterston test site knowledge sharing** – A key deliverable of the government funding secured for Hunterston test site (see Annex 5.2) was the sharing of information and lessons learned, for example through conference presentations on the installation methodology and operational experience of the turbines and through formal report submissions to DECC (now BEIS). In partnership with Ayrshire College SSE also hosted the Wind Turbine Technicians Course for site visits. This included presentations on topics including safety, civils, electrical and wind resource assessment. <sup>[15, 16, S6]</sup>
- 5.68 **Knowledge Sharing – SWEL Actions**

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<sup>23</sup> <https://www.ieawindtask32.org/>

<sup>24</sup> <https://ore.catapult.org.uk/stories/operations-maintenance-case-studies/>  
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5.69 **O&M innovation open day** – SWEL commits to host an innovation open day in 2020 with O&M Contractors to provide an overview of the future opportunities in key maintenance work scopes such as WTG, BOP and High Voltage electrical systems. As well as providing an introduction for new suppliers, this engagement will also provide a platform for potential suppliers to present O&M innovations to the Project. The impact will be clear sight of opportunities for potential suppliers and a forum for SWEL to listen to new ideas. SWEL has engaged with Scottish Enterprise to assist in identifying and inviting relevant companies to this event, see their letter of support in *Annex 4.3*. SWEL will also engage the ORE Catapult in preparation for this event. <sup>[15, 16, 12]</sup>

5.70 **Portfolio O&M review** – The SWEL O&M Manager has access to the performance data and monthly reporting from the entire SSE wind fleet. This ensures visibility of performance trends, technical issues and lessons learned from across a broad operational fleet. The SWEL O&M strategy will be informed by review of the performance of around 300 operational wind turbines helping to ensure that lessons learned by existing projects contribute to a well-rounded strategy. <sup>[15, 16]</sup>

### 5.71 **Summary Impacts – Innovation**

- SWEL is actively investigating a design which will deliver [REDACTED] pioneering elements: volume order of suction bucket jacket foundations; [REDACTED]  
[REDACTED] These deployments will contribute to industry confidence in the maturity and technology readiness of new approaches, paving the way for exploitation of new technologies and continued cost reduction in future offshore windfarms, see section 5.6.
- **SSE has helped to push forward the development and deployment of modern technologies in offshore wind making a unique contribution to the development and demonstration of new WTGs, foundations, and installation methodologies through delivery of the Greater Gabbard, Beatrice and investment in three demonstration sites, see sections 5.6 to 5.10.**
- **SSE has nurtured the world class landscape of R&D activity related to offshore wind in the UK by offering unparalleled levels of support in financing and making data and expertise available to , universities, Innovate UK, OWA, ORE Catapult and other collaborative innovation projects. This will result in better informed research and innovation for future projects, see sections 5.6, 5.53 and 5.54.**
- **SWEL will proactively seek to bring new suppliers into the offshore wind industry and expects its Tier 1 Contractors to support initiatives intended to do so. This will help to contribute to a broad supplier base and visible routes to market for innovators with new products or services to offer, see section 5.38.**
- **SWEL will challenge the mind-set of the Contractor pool and make innovation implicit in project delivery by securing commitments from Contractors to invest in supporting innovation, see section 5.40.**

Jacket installation at Beatrice Offshore Wind Farm





## 6. SKILLS

### 6.1 **Targets** – SWEL has the following Skills targets:

- UK target of up 18,000 job years during the construction phase. Annual jobs target of 500 job years during the operations phase of the Project.
- Provide a STEM Skills fund of £100,000 per year for four years during construction to fund STEM based student education and tuition fees.
- SSE will support the implementation of the Skills Sector Deal commitments.
- Replicate SSE’s successful offshore wind apprentice programme and work collaboratively with its Tier 1 WTG Contractor to recruit apprentices and qualified staff in the local area.
- Create a SWEL Skills Strategy through collaboration with education bodies in Dundee, Angus and Fife to consider how their strengths in Engineering and Computer Science could be employed to foster skills in offshore wind.
- Continue to invest in initiatives at an SSE level to attract school leavers and graduates to the energy sector and promote diversity in the workplace.

## 6.2 SSE Skills Philosophy

6.3 **SSE is a responsible employer at its core** recognising long-term success depends upon a sustainable pipeline of highly engaged employees. SSE seeks to secure its future by anticipating the looming skills gap expected to impact on the energy industry by the mid 2020s. This will be achieved by building a diverse workforce, more representative of the communities it serves, whilst maintaining and investing in developing its workforce. SSE is considered the top company for inclusive jobs growth in the FTSE 350 and was ranked #1 in the Good Economy Jobs Ratings Index 2017 (published in 2018).<sup>25</sup> [S1]

6.4 **SSE has a track record of fostering skills in the wider energy industry and offshore wind sector** – SSE directly employs around 21,000 employees, of which over 20,000 are based in the UK, and its activities support around 80,000 further jobs<sup>26</sup> in the UK and Ireland. Of SSE's direct workforce, a total of 667 personnel are employed in its dedicated renewables business with 196 people working within offshore wind. SSE supports continuous learning and professional development and invested over £25m on these activities during 2017/18<sup>27</sup> with similar investment levels expected during 2018/19. SSE offers a number of learning and development programmes and supports several initiatives to attract people to careers in the energy industry and develop transferrable skills to work in the offshore wind sector. [S1]

6.5 **SSE is committed to implementing the Sector Deal Skills commitments** - SSE is an active contributor to the Sector Deal being negotiated with BEIS. At the time of writing, the Deal's commitments are expected to include: targets to deliver greater diversity in the workplace (at least 25% women by 2030); coordination of skills activities with other relevant sector; the development of transferrable skills between sectors and the establishment of a standardised industry curriculum. SSE considers that the actions already underway, as described in sections 6.31 to 6.37, are wholly complementary to the targets being proposed. [S1,S2,S3,S4,S5]

## 6.6 Assessment of future skills required [S1]

6.7 **SWEL will generate significant employment opportunities and value for the UK economy** – A socio economic assessment was included as part of SWEL's consent application in July 2018<sup>28</sup>. SWEL is eager to surpass the employment impacts set out in the consent application and commissioned a specific study to identify how SWEL can maximise its economic impact. [REDACTED] The findings of this study indicate an opportunity to maximise employment impacts as follows:

- **Construction phase** – Around 18,000 job years could be fulfilled during the construction phase generating GVA of £1.0bn. Around 10,000 of these jobs are expected to be direct roles fulfilled by SWEL and its Tier 1 Contractors. This phase is expected to last 3 – 4 years.
- **Operations phase** – Around 500 jobs per annum could be sustained during the 25-year lifetime of the Project. Around 300 of these jobs are direct roles.

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<sup>25</sup> <http://sse.com/media/522476/SSE-plc-Sustainability-Report-2018.pdf> (page 33)

<sup>26</sup> <http://sse.com/media/522419/sse-28225-ar2018-web-03-july-2018.pdf> (page 77)

<sup>27</sup> <http://sse.com/media/522419/sse-28225-ar2018-web-03-july-2018.pdf> (page 82)

<sup>28</sup> [https://docs.wixstatic.com/ugd/fe5128\\_c73c048299ff40a2a8bd2cf74106dca8.pdf](https://docs.wixstatic.com/ugd/fe5128_c73c048299ff40a2a8bd2cf74106dca8.pdf)

These job projections were calculated following standard economic analysis methodology. SWEL will adopt these jobs targets and will actively measure actual jobs supported by the Project once Tier 1 Contractors have been selected and the final project scale is confirmed through the CFD auction process. <sup>[S1]</sup>

6.8 **SSE has a track record of monitoring and evaluating the economic impact of its major offshore wind projects.** The Beatrice socio-economic impact analysis was published in July 2017. The report indicated that Beatrice will add £1.13bn to UK GDP and support 18,100 job years in the UK, see *Annex 6.3*. SSE has also carried out sustainability impact analysis for a wide range of energy infrastructure projects publishing the findings online<sup>29</sup>. SWEL will replicate this approach and will publish its own similar analysis once all key Contractors are in place. <sup>[S1]</sup>

6.9 **Skills gaps assessment [S2]**

6.10 **Development phase** - refers to the period prior to financial close. This phase of the Project is directly delivered by SWEL's Project team of 79, based in SSE's Glasgow Centre of Offshore Engineering Excellence. SWEL typically relies on Contractors to perform the site-based surveys and studies and provide professional advice in relation to contracting, negotiating with land owners and securing finance. In this phase SWEL has no material gaps in resource although is aware of increased demand for many roles due to the growing number of offshore windfarms in development worldwide. <sup>[S2]</sup>

6.11 **Construction phase** - This phase of the Project is expected to last for around 2-3 years and is estimated to require around 10,000 direct roles in the UK. The SWEL internal project team is expected to grow to 100 – 150 during the construction phase based on SSE's experience on Beatrice. The majority of construction roles will be provided by the supply chain through SWELs Tier 1, 2 and 3 level contracts. SWEL is currently challenging its Contractors to communicate skills gaps and actions being taken to address these as part of the live tender process, see ITT template and SCPs submitted: *Annex 4.8* and *Annex 4.12*. [REDACTED]

[REDACTED] This information will be used to inform a Skills Plan to be created by each successful Contractor post award, see section 6.17. <sup>[S2]</sup>

6.12 **Operations phase** - The operations phase of the project will support long term roles over the expected 25-year operating life of the windfarm. These roles will be based at a local O&M base Montrose [REDACTED] [REDACTED] created by SWEL. Within the total jobs estimate of 500 roles (see section 6.7), direct job numbers of 300 are expected to be required in the O&M phase. A large proportion of these roles are expected to be filled by SWEL's WTG O&M Contractor. Due to the large growth of offshore wind deployment in the UK and other markets, there is some concern regarding key technician availability. SWEL plans to develop a local apprenticeship scheme to help avoid this constraint, see sections 6.32 to 6.34. <sup>[S2]</sup>

6.13 **Sector wide skills gaps considerations:** SSE assesses skills demand at a sector wide level and is a leading

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<sup>29</sup> <http://sse.com/beingresponsible>

member of the EU Skills Group. SSE recently contributed to the ‘Skills and Labour Requirements of the UK Offshore Wind Industry 2018 to 2032’ study which was performed by the EU Skills Group and published in October 2018<sup>30</sup>. These findings have been used to inform the work commissioned with Biggar Economics (see section 6.14) whose findings will be used to inform SWEL’s Skills Strategy. <sup>[S2]</sup>

6.14 **Actions and plans to be implemented to invest and develop skills to meet the future needs at each stage of the Project [S3, S4 combined]**

6.15 **Construction phase: SWEL will create a Skills Strategy during 2019** to determine the most effective actions required to maximise employment opportunities in the local area. SWEL is using the findings of its Maximising Economic Impact study [REDACTED] to inform this strategy. This analysis identified opportunities to generate local economic impact in Dundee, Angus and Fife through foundation and substation fabrication activities. The greatest opportunity for local economic benefit is in the longer term O&M phase. From these findings SWEL considers that the best means of ensuring that the skills supply meets the expected future demand is to attract adequate new recruits to the sector. SWEL will do this by targeting its actions in the following areas <sup>[S2, S5]</sup>:

- **Promoting diversity (sections 6.22- 6.24);**
- **Apprenticeships (sections 6.32 - 6.34);**
- **Higher Education (section 6.25);**
- **Promoting STEM at school (section 6.30);**
- **On the job training (sections 6.26- 6.29).**

6.16 **Construction phase: SWEL will engage with relevant bodies to inform its Skills Strategy:** SWEL has had some initial engagement with Skills Development Scotland and the Energy Skills Partnership to inform its Skills Strategy. SWEL will also engage with SE as envisaged in its letter of support (see *Annex 4.3*) and local education providers to maximise the effectiveness of its strategy. SWEL has already made contact with Dundee & Angus College (see *Annex 6.1*) to begin collaboration in this area. <sup>[S3,S4, S5]</sup>

6.17 **Construction phase: SWEL will contractually oblige Contractors to create Skills Plans** which sets out their approach to identify and mitigate skills gaps for future projects, see *Annex 4.9*. SWEL will create a template Skills Plan for Contractors to follow which will touch on the key skills criteria within the SCP. Each Contractor will have 12 months from contract signature to produce their Skills Plan. These actions are forcing Contractors to think more broadly about the long-term sustainability of their business and align their Skills Plans more closely to those required to serve the sector in future. <sup>[S1,S2,S3,S4,S5]</sup>

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<sup>30</sup> <https://www.euskills.co.uk/wp-content/uploads/2018/10/Aura-EU-Skills-Study-Summary-Report-October-2018.pdf>

- 6.18 **Construction phase: SSE is one of five founding organisations to launch the Skills Accord Initiative with the EU Skills Group** – This initiative was launched in June 2018. The Accord has challenging commitments<sup>31</sup> that require signatory companies to ensure that responsible procurement practices are used to drive investment in skills through the delivery of contracts. The aim is for it to be standard practice for signatories to adopt these commitments and, in turn, to cascade them down to their own supply chain. This approach is complementary to SWEL’s intention to oblige Contractors to sign up to a specific SCP clause, see section directly above. One of the main commitments is to ensure 5% of the sector headcount is enrolled on an apprenticeship/ graduate programme with a technical engineering focus. This initiative has initially been targeted at SSE’s Networks business, however SWEL sees merit in looking to adopt this accord in offshore wind and will explore this with its Tier 1 Contractors. This action will have the impact of encouraging greater investment in transferable skills across the industry benefiting projects such as SWEL in the long run. <sup>[S3,S4]</sup>
- 6.19 **Operations phase: SWEL will work with its Tier 1 WTG Contractor to secure a high proportion of the operations workforce from the local area** – SWEL has worked collaboratively on its Beatrice and Greater Gabbard offshore windfarms to promote local employment opportunities. At Greater Gabbard around 95% of the employees at the O&M base in Lowestoft are from the local area. Beatrice is not yet fully operational and so the equivalent metric is not available, however, of the total workforce employed on the construction of the O&M base, 75% are local to Wick. These examples demonstrate SSE’s track record in maximising local employment on its projects. SWEL will follow this approach by encouraging its WTG Contractor to prioritise recruitment of personnel and apprentices from the local area and will track this metric as work progresses. <sup>[S3,S4]</sup>
- 6.20 **Operations phase: SWEL will seek to implement an apprenticeship scheme similar to Greater Gabbard with local colleges once the Project is operational in 2023**, see sections 6.32 to 6.34. <sup>[S3,S4]</sup>
- 6.21 **Wider actions on skills being taken**
- 6.22 **Diversity: SSE has an exemplar Inclusion Strategy to increase diversity in the offshore wind sector** – It is widely acknowledged that the industry needs to do more to engage with females and individuals from minority ethnic backgrounds to create a more diverse workforce. SSE developed its Inclusion and Diversity policy<sup>32</sup> with specialists Equal Approach. This policy ensures managers have more self-awareness of unconscious bias and will ensure that a broader pool of labour has access to opportunities in the energy and offshore wind sector in the future. <sup>[S3,S4]</sup>

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<sup>31</sup> <http://www.euskills.co.uk/sites/default/files/Skills%20Accord%20Flyer.pdf>

<sup>32</sup> <http://sse.com/media/466067/SSE-Inclusion-and-Diversity-Policy-PO-COR-055.pdf>

- 6.23 **Diversity: SSE has worked with inclusion specialists Equal Approach** to quantify the financial return from investing in inclusion initiatives, with the results detailed in its ‘Valuing Difference’ report. The results in the report show that for every £1 invested by SSE in 2017 in gender diversity initiatives there was a £4.52 ‘Return on Inclusion’ (ROI), but that by 2020 it could reach a £15 ROI with a more targeted and strategic approach to investment in inclusion. SSE has worked with Equal Approach to develop a new Inclusion Strategy for up to 2020, designed to tackle the low representation of woman in the organisation, and in particular women in the most senior roles. SSE was also the first FTSE Company to disclose its Gender Pay Gap, and importantly, it is working hard to close that pay gap. Its gender-specific strategy is focussed on three elements: In, On and Up. The objective is to encourage more women IN to the organisation; ensuring more women stay ON and more women work their way UP to senior management level. Further detail about SSE’s gender pay gap and what is being done to close it can be found online<sup>33</sup>.
- 6.24 **Diversity: SSE is a Flagship Partner for ‘Women in STEM’** with Teach First – Senior SSE employees have been involved in going into classrooms to show pupils the opportunities available to all in the energy sector. The programme also encourages pupils to visit SSE sites for a behind the scenes look at the different career paths open to them. This action, together with those set out in sections 6.22 and 6.23, encourages more female recruits to careers in the energy industry helping widen the labour pool available to support offshore wind projects in the future.<sup>[S3,S4]</sup>
- 6.25 **Higher Education: Graduate Recruitment Programme** – SSE runs an engineering graduate recruitment programme<sup>34</sup> accredited by both the Institution of Engineering and Technology and Institution of Mechanical Engineers, which aims to identify and develop future engineering experts. Each graduate post involves placements across SSE’s Distribution, Transmission, Generation and Renewables businesses, providing a wealth of transferable skills and experience, see *Annex 6.4*. SSE has taken on 27 graduates in the last three years. The 2018 cohort includes six graduates within SSE’s engineering programme of which four are within the renewables business. SWEL currently has two graduates (one first year, one second year) working as part of the project team. SSE will continue to provide a graduate platform to help plug the expected future skills gap and expects to take on 60 in total during 2019 with around eight of those being placed in the Wholesale part of the business which includes renewables. *Annex 6.9* shows some of the events attended by SSE in 2018 to promote this programme.<sup>[S3,S4]</sup>
- 6.26 **On the Job/ Diversity: SSE supports the Career Ready Programme:**<sup>35</sup> This programme links schools and students with employers to provide vital opportunities for 15-18 year olds from low income families of a pathway to work. SSE’s HR Director is the chair of this organisation. To date SSE has supported 57 young people by providing four-week paid internship opportunities. The actions taken by SSE help to transform

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<sup>33</sup><http://sse.com/media/525968/SSE-UK-Gender-Pay-Gap-2018.pdf>

<sup>34</sup><http://sse.com/careers/graduatesandundergraduates/>

<sup>35</sup><https://careerready.org.uk/>



the lives of young people by helping to increase their awareness of career pathways in the energy sector and improve social mobility. SWEL will seek to offer internship opportunities via the Career Ready Programme or through one of its university partners (see section 6.41) during 2020 once the Project is in construction. <sup>[S3,S4]</sup>

6.27 **On the Job/ Diversity: SSE supports the Barnardo's Works Programme**<sup>36</sup> Aimed at 16-24 year olds in receipt of Job Seekers Allowance for more than six months, Barnardo's Works offers young people a six month supported work placement with SSE. Since 2008 the programme has given over 230 young people the opportunity to turn their lives around with 70% of participants going on to secure employment, education or further training, SSE's Barnardo's Works Programme is one of the most successful employment schemes in Scotland. Of this 70%, around half are kept on with SSE. <sup>[S3,S4]</sup>

6.28 **On the job: Technical Skills Training ("TST")** – SSE offers a TST programme<sup>37</sup> designed to develop competent engineers with broad knowledge of theory and practice within the Renewable Generation Business with the aim of producing safe and competent technical staff. This programme is targeted at candidates with A-levels (or equivalent) in Maths and Science and has delivered over 240 engineers to date.



SSE currently has around 50 students on the TST programme at an annual cost of around £1m. Previous analysis performed by SSE indicated that for every £1 invested in the TST programme a return of £7.65 was generated between the individual, employer & wider society<sup>38</sup>. The TST training provides these employees with valuable transferrable skills that can be deployed in future to support SSE's offshore wind projects such as Seagreen. SSE will continue to support this scheme and is working with the University of the Highlands and Islands to enhance the programme in 2019. <sup>[S3,S4]</sup>

6.29 **On the job: Multi-skilled O&M staff** – SWEL is developing an O&M strategy which will include the multi skilling of staff. This innovative approach would see the combining of certain roles with minimal additional training overhead. Roles which could be combined or overlapped could include training some WTG technicians in aspects of BOP maintenance or as High Voltage authorised persons, or marine coordinators crossing over with operational controllers. This increases flexibility and improves the career prospects of staff whilst also contributing to a low-cost operation which can reduce the cost of energy. <sup>[15, S4]</sup>

6.30 **STEM in Schools: SWEL will promote careers in offshore wind at local primary and secondary schools** by holding a series of career talks and taking part in skills fairs in the region during 2019 and 2020. SSE has taken part in 42 events connected to STEM learning and diversity and inclusion during 2017/18, see Annex 6.5. SWEL will contractually oblige its Tier 1 Contractors to take part in these events where appropriate.

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<sup>36</sup> [http://sse.com/media/385008/Changing-lives-growing-value\\_2016.pdf](http://sse.com/media/385008/Changing-lives-growing-value_2016.pdf)

<sup>37</sup> <http://sse.com/careers/apprentices-and-trainees/trainee-engineers/>

<sup>38</sup> [http://sse.com/media/306295/SSE-Human-Capital\\_Final\\_For-Web.pdf](http://sse.com/media/306295/SSE-Human-Capital_Final_For-Web.pdf) (page 13)

SWEL's Development Manager is already due to present at a Woman in STEM careers event at Edinburgh University on the 7<sup>th</sup> of February 2019. <sup>[S3.S4]</sup>

6.31 **Actions the Project will take to engage apprentices [S4]**

6.32 **SSE is committed to supporting apprenticeships** to develop the workforce for the future. SSE currently employs 747 apprentices representing an investment of c£60m. Most of these apprentices are currently within the networks business, however, the proportion of those within renewables is expected to increase following the establishment of SSE's dedicated renewables business in 2018 which is central to SSE's growth plans. Within its renewables business SSE currently employs 14 apprentices (1 onshore wind, 2 offshore wind and 11 hydro). SSE already partners with Fife College to support its renewables apprentices and has donated three wind turbine blades in the past to provide the college with practical teaching equipment. SSE has historically retained 92% of its apprentices and trainee engineers with progression into technician, engineer and management roles. SSE is committed to continuing to support apprentices in the future to provide a pathway for school leavers into the offshore wind and wider energy sector. <sup>[S4]</sup>

6.33 **SSE has helped create and implement an offshore wind apprenticeship scheme at Greater Gabbard.** In 2012 SSE helped develop a bespoke offshore wind apprenticeship aligned with O&M and local supplier needs. Six SSE apprentices have now successfully completed the three-year programme and have secured full time employment at Greater Gabbard in a variety of positions ranging from embedded technicians to a trainee electrical engineer now undertaking further education at Higher National Certificate level. SSE currently has two active apprentices going through the scheme at East Coast College, case study *Annex 6.6*. In addition, SSE has influenced Siemens to recruit and secure two apprentices from the local area on the Beatrice Project (see Siemens Apprenticeship flyer advertised locally -*Annex 6.8*) who will start their course in September 2019. <sup>[S4]</sup>

6.34 **SWEL commits to securing technicians and apprentices from the local area** - A similar level of local training and development investment will be necessary for the planned Seagreen operations base in ██████████ Montrose ██████████ to ensure that SWEL is well placed to provide competent locally trained technicians for future work. SWEL will seek to replicate the apprenticeship model that it has established at Greater Gabbard on Seagreen and will work with its selected WTG Contractor and local education providers to bring this to fruition during the first three years of Project operations. <sup>[S4]</sup>

6.35 **Skills Fund**

6.36 **SSE has 29 community benefit funds in operation across the UK which invested £5.1m in 2017/18<sup>39</sup>** to support community projects. Of this total investment, £1.2m was allocated to skills and employment projects which increase people's life chances. Some examples of the projects funded have been provided in *Annex 6.7*. These actions have broad impact on helping young people access employment as well as helping promote SSE and the energy sector as a future career of choice. Details of the fund established on Beatrice are included on page 5 of *Annex 6.3*. SWEL also plans to create its own community benefit fund

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<sup>39</sup> [http://sse.com/media/531016/sse-community-investment-report-2018\\_2.pdf](http://sse.com/media/531016/sse-community-investment-report-2018_2.pdf)

following the outcome of the CFD auction. <sup>[S3,S4]</sup>

6.37 **SWEL will provide a STEM Skills Fund of £100,000 per year for four years during construction.** SSE will use its community benefit funding platform to establish a fund in Dundee and Angus to attract more skilled people to STEM based careers. SWEL will use this fund to provide resources to local colleges providing STEM based learning. Funding will also be allocated to an external organisation to deliver STEM based learning and workshops at local primary and secondary schools in the area. This fund will be deployed following financial close expected in late 2019. <sup>[S3,S4]</sup>

6.38 **Sharing best practice and lessons learned [S5]**

6.39 **SSE is an active contributor to major industry offshore wind groups** which act as an effective forum to share knowledge regarding the skills and experience, all listed in *Annex 6.10* <sup>[S6]</sup>:

6.40 **SWEL will also use industry events to share knowledge,** for example, the Marine Installation Package Manager will present views on the skills transition from Beatrice to SWEL as part of an industry event being organised by Scottish Enterprise on the 7<sup>th</sup> of March 2019 in Scotland. <sup>[S5]</sup>

6.41 **SSE collaborates with many education and skills bodies** to maximise the success and targeting of the events that it supports. *Annex 6.10* lists several partners that SSE collaborates with on events, including Skills Development Scotland, Grad Cracker and Talent Source amongst others. SSE also has partnership relationships with Aston University (see section 6.27), Strathclyde University TIC (see section 5.54) and East Coast College (apprentices programme). Partnering with these bodies provides a platform to share best practice to deliver fit for purpose training and recruits for future renewable energy projects. <sup>[S3,S4, S5]</sup>

6.42 **SSE's pool of offshore wind engineers is concentrated** in its Centre of Offshore Engineering Excellence in Glasgow. These engineers, around 50 in total, have a matrix organisational structure and are deployed across projects. Having a concentrated pool of skilled staff in the same location is conducive to sharing knowledge and skills across SSE's entire offshore wind portfolio and is directly benefitting SWEL. SSE also has an engineering resource presence in Perth, Ferrybridge, Lowestoft and Dublin which provides good geographical coverage in the locality of its projects. <sup>[S6]</sup>

6.43 **Tier 1 Contractor Skills Plans and contract commitments** – Introducing these contractual requirements (see section 6.17) will naturally result in greater collaboration and knowledge sharing in the skills space. Contractors will be expected to join SWEL to collaborate on skills initiatives going forward. <sup>[S6]</sup>

[REDACTED]

6.45 [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

6.46 An order from SWEL would initiate the skills actions above and in others would support the continuation of the existing skills and recruitment activities underway to deliver a future pool of *recruits* to benefit the wider offshore wind industry. SWEL will capture any Skills commitments made in the final contract of the successful bidder, section 4.39. <sup>[S3,S4]</sup>

#### 6.47 Skills Impact Summary

- The creation of 18,000 UK FTE years of employment during the construction phase with a further 500 roles annually over the 25 years of project operation. Many of these roles will have the potential to become sustainable long-term with the delivery of future projects in the Firth of Forth Zone.
- Enhanced employment opportunities in the local area through plans to establish an apprenticeship scheme and promote careers in offshore wind with Tier 1 Contractors.
- Greater awareness of careers in offshore wind and engineering through STEM promotion enabled by the new annual £100k STEM fund (see section 6.37) and through continued investment by Tier 1 Contractors in their own internal skills programmes to deliver a future pool of recruits to benefit Seagreen and the wider offshore wind industry.
- The continuation of SSE's broader graduate and apprentice recruitment programmes will continue to attract new recruits to the energy industry resulting in a greater pool of labour with transferrable skills to deploy in offshore wind.

