

Sofia Offshore Wind Farm

Supply Chain Plan

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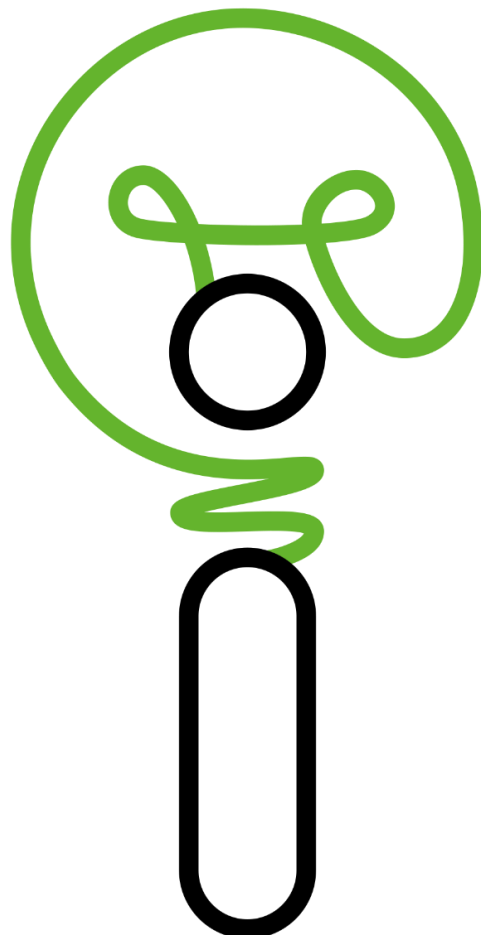
This document was subsequently reviewed at post-CfD stage with further text made visible.

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Rev: 01 Redacted at CfD

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1 Contact and project details

1.1 Contact details

Company name	Sofia Offshore Wind Farm Limited (SOWFL)	Authorised representative	David Few, Project Director
Address	Windmill Hill Business Park, Whitehill Way, Swindon, Wiltshire, SN5 6PB	Contact number	<u>+44 (0) 7818 458428</u>
Email	<u>david.few@innogy.com</u>	Preferred contact	Clare Davies, Consent Manager
Alternative contact number	<u>+44(0) 7500 916336</u>	Alternative contact email	<u>clare.davies@innogy.com</u>

1.2 Project details

Project name: Sofia Offshore Wind Farm (SOWF)	Project size: The Development Consent Order (DCO) allows for a maximum generating capacity of 1.2 GW. SOWFL submitted a non-material change (NMC) application to the Department for Business, Energy and Industrial Strategy (BEIS) in June 2018 to increase the maximum generating capacity up to 1.4 GW.
Project commissioning date: 2023 onwards	
Project location: Dogger Bank, North Sea	
Ownership structure: Innogy Renewables UK Ltd is the UK subsidiary of Innogy SE (both referred to as innogy). Innogy has 100 per cent ownership of SOWFL.	
Maturity of project: The project was granted development consent in August 2015 for both the onshore and offshore works. The project is being developed for a CfD in delivery years 2023/2024 or 2024/2025, with final investment decision (FID) expected in 2020/2021. SOWF has been developed through a [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] A high level of informal engagement with potential suppliers has taken place during 2018 on all of the main asset	

contracts, although particular focus has been given to the WTG foundations and offshore cables. The current high-level procurement and construction timetable is shown in Figure 1.

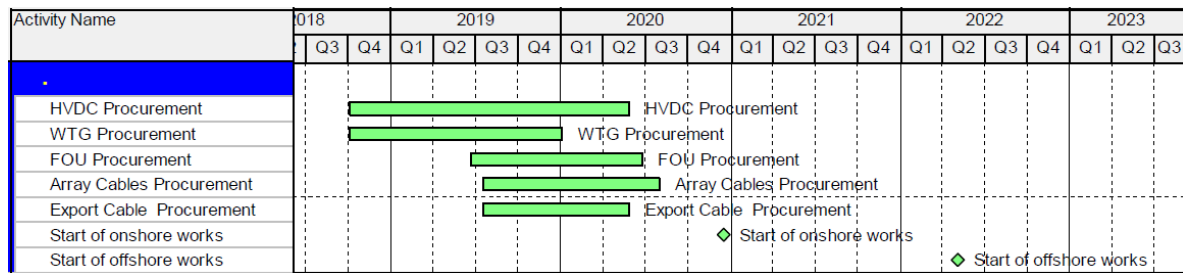


Figure 1 High level procurement and construction timetable. FOU is shorthand for foundations.

2 Executive summary

2.1 **This supply chain plan (SCP) has been submitted to BEIS as part of the eligibility requirements for SOWFL to bid into the Third CfD Allocation Round.** SOWFL is a 100 per cent innogy company, developing SOWF. Innogy employs over 43,000 employees with an embedded UK presence of around 7,000 employees. It has a 15 year track record in developing and constructing offshore wind projects in the UK and in Europe. At 1.2 GW consented capacity, SOWF is a flagship project for innogy. If SOWFL secures an increase in the consented maximum generating capacity of up to 1.4 GW and if successful in the Third CfD Allocation Round, SOWF would be the largest project to be awarded CfD and could be one of the world's largest offshore wind farms. The scale of the project is sufficient to present significant opportunities to drive competition, innovation and skills development in the UK.

2.2 **Innogy is fully committed to the UK as a core market for developing its pipeline and has already delivered five successful offshore wind projects in the UK,** with Triton Knoll the most recent project to start construction. This commitment drives the long-term aspiration to expand the capability of the UK supply chain in order to increase competition in the domestic market and help identify innovative solutions to drive down costs. SOWFL will continue to take action which could lead to significant investments in the UK offshore wind supply chain. These are not just for the benefit of SOWF, innogy recognises the success of its future portfolio and the wider UK market relies on implementing best practice learning on each project it delivers. This follows the example set on innogy's latest operational offshore wind farm, Galloper, which was delivered within the planned time frame and budget. Innogy's completed projects have significantly strengthened areas of the UK supply chain and innogy recognises that its global portfolio ambitions also creates significant opportunities for increasing UK suppliers' export potential as a result of its developed capability and experience.

2.3 **Competition:** [REDACTED]

annually. SOWFL’s latest modelling shows that during operation, SOWF has the potential to create around 140 annual UK direct FTEs.^[EV045]

2.6 The Competition, Innovation and Skills sections demonstrate aspects of how SOWFL intends to deliver the project and bring significant benefits to the UK offshore wind industry through its delivery.

2.7 To supplement statements in the SCP, the following Annexes are included:

- Annex A End notes
- Annex B Guidance for readers and structure of statements
- Annex C List of supply chain plan sub-criteria and identifiers
- Annex D Summary of statements made in relation to SCP criteria
- Annex E List of evidence
- Annex F Evidence documents
- Annex G Triton Knoll Interim Post Build Report

2.8 This SCP includes 181 actions or commitments made by SOWFL, innogy and its potential suppliers, of which 59 relate to competition, 82 to innovation, and 40 to skills (Annex D). Table 1 and Figure 2 (See Annex C for list of sub-criterion identifiers) show the spread of statements within the SCP.

Table 1 Past, present and future statements as a percentage of each criterion.

	Competition	Innovation	Skills
Past	26%	30%	26%
Present	46%	50%	39%
Future	29%	20%	35%

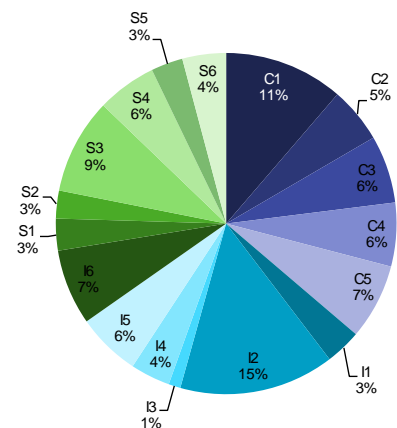


Figure 2 Summary of statements for each sub-criterion.

3 Overview of SOWFL’s Procurement Strategy

3.1 **SOWFL’s procurement strategy offers opportunities for UK suppliers and new entrants to participate and maximise competition.** ^{[C1,C2,C5] [EV005]} SOWFL will best promote competition through a multi-contract approach, which is based on a competitive tendering approach to the market for all main asset contracts. [REDACTED]

3.2 [REDACTED]

[REDACTED]

3.3 [REDACTED]

3.4 **SOWFL will approach at least four Tier 1 suppliers for each of the main packages in order to achieve the optimum contractual solution.** This will maximise competition, secure best value, allow the supply chain to bid to their strengths and reduce interface risks. It also makes it easier for new entrants to bid. Triton Knoll approached at least three suppliers for each of the main packages and SOWFL is building on this best practice by increasing the number to four. ^[C1, C2, C5]

3.5 **The procurement strategy allows SOWFL to utilise the experience and knowledge of the supply chain pre-CfD to provide a robust project solution.** ^[C3, I3] SOWF has two main differences from other projects innogy has procured and constructed: the HVDC system and the distance offshore. In order to facilitate a better understanding of the risks and costs, engagement has so far primarily focused on:

A. **The lead time to deliver an HVDC system, which is typically 2.5 times longer than a high-voltage alternating current (HVAC) system.** For the HVDC Electrical System, the project commenced informal engagement with Tier 1 suppliers in early 2018 to obtain a better understanding of the technology options available to the project. [REDACTED]

[REDACTED]

B. **The 220 km offshore export cable route: the far-offshore position increases the complexity of offshore construction logistics.** For the offshore export cables and wind turbine foundations it was decided to [REDACTED] in order to seek the best technical and commercial solution for the offshore export cables and foundations.

3.6 **The approach with the supply chain is open and transparent with a more interactive engagement between the project team and the chosen suppliers compared to that of a more traditional formal procurement process.** ^[C2, C3, I3] The approach facilitates more open dialogue on best technical solutions and related associated costs and risk apportionment. In addition, it is also providing an opportunity to discuss the delivery solutions of the supplier's subcontractors including UK content opportunities.

3.7 The three main outputs from the collaborative engagement will be best technical logistics and installation methodologies, construction programmes and budget prices.

4 Competition

Innogy commitment to the UK offshore wind industry

- 4.1 **The UK is a core market for innogy.** It built the UK's first offshore wind farm commissioned in 2003. Since then, it has developed a pipeline of over 1.5 GW of operational offshore wind projects, 857 MW in construction, 1.2 GW in development and over a further 1 GW in accepted extension applications. Innogy has significant experience, providing valuable lessons to SOWFL on how to build large projects on time and cost-effectively. ^[C3] [EV001, EV133]
- 4.2 **Innogy is involved at every stage in the life cycle of UK offshore wind projects as a long-term investor and asset owner.** This incentivises innogy to work with local and national government for robust and sustainable policy, to focus on the lifetime cost of a project and optimise the project design. As a result it improves long-term performance and reliability and supports the growth of local supply chains with the skills to deliver projects effectively.
- 4.3 **Innogy aims to achieve [REDACTED] new offshore wind projects globally securing a route to market by 2030.** This ambitious target will strengthen innogy's position as a leader in both the UK and the global offshore wind markets and, as a result, innogy's pipeline will drive market sustainability and enable it to capitalise on economies of scale. Innogy is on track [REDACTED] with projects successful in competitive auctions in 2017 and 2018 (Triton Knoll and Kaskasi respectively). The success of SOWFL in the Third CfD Allocation Round is imperative for innogy to be able to continue positively impacting the UK offshore wind market and supply chain. The forthcoming Sector Deal will target 30 GW by 2030 and innogy is working with The Crown Estate (TCE) and Crown Estate Scotland for opportunities to grow its UK pipeline. Its bids to extend Greater Gabbard (50 per cent owned with SSE), Gwynt y Môr and Galloper represent almost half the extension applications submitted to TCE. In July 2018, innogy attended events held by TCE as part of its first phase of engagement for Round 4 and has attended events held by Crown Estate Scotland, demonstrating that innogy is committed to exploring the potential for new offshore wind sites in the UK. ^[EV150] [C1]
- 4.4 **Innogy recognises that SOWFL's impact on its supply chain will also improve the ability of UK companies to compete and export globally,** which in turn ensures a robust supply chain is available to deliver innogy's global ambitions. For example, Kaskasi [REDACTED]
[REDACTED]
- 4.5 **Innogy commits to supporting the development of the UK supply chain as a vital part of ensuring the sustainability of UK offshore wind.** New UK suppliers not only have the potential to increase competition and drive innovation and thereby reduce costs, but also consolidate UK industry learning which enhances the long-term viability of the sector. ^[C1,C3,C5] As a long-term investor and asset owner

of offshore wind projects, innogy has both a short-term and long-term perspective on market growth and sustainability in order to meet both project needs (such as SOWF) and fulfil its ambitious growth targets at a corporate level.

- 4.6 **Innogy is playing a leading role in developing the industry's offer in the forthcoming Sector Deal.** It is a committed member of the Offshore Wind Industry Council (OWIC) Clusters Development Group (CDG) and Supply Chain Review Group.^[EV151, EV188] It is the industry champion for the Wales and North West cluster and a supporter of the North East cluster. In 2018, SOWFL attended the Durham ORE Catapult (OREC) Supply Chain Event. Innogy attended the Humber event and was the industry champion for the North West event. These events allowed companies to understand the potential supply chain opportunities arising from the forthcoming Sector Deal. Companies also provided feedback on the barriers faced in securing offshore wind contracts to be considered by the CDGs. As the champion for the North West event, innogy presented on how its significant presence in the Irish Sea has positively benefitted the region and the future opportunities available.^{[C1, C2, C3] [EV059]}
- 4.7 **Innogy has played an active role in enabling large-scale investments in the UK** by major suppliers, in many cases by new entrants to the market.^[C1,C2] In some cases it has provided opportunities for UK companies to export for its other European projects. For example:
- A. **Steel production is a significant opportunity for the UK and innogy worked closely with Corus in 2009 to build a business case for an investment in a monopile manufacturing facility** on Teesside, and Corus secured a grant from the Government to progress the initial build requirements.^{[C1,C2] [EV061]}
 - B. **Innogy gave Granada Material Handling its first offshore wind contract** at Gwynt y Môr. Granada has since secured a 3-year operations and maintenance (O&M) contract with Gwynt y Môr and delivered 56 cranes to Galloper.^[C1] In August 2018, Granada was also contracted for crane maintenance and servicing.ⁱ In October 2018, Granada secured a major contract with Smulders (part of the 3SF joint venture) to design, manufacture, deliver and commission 90 Python cranes for Triton Knoll. Further to the work with innogy, Granada has also secured a number of contracts in the global market.ⁱⁱ
 - C. **Innogy supported the market entry of JDR**, giving it its first major renewable contract for Greater Gabbard.^[C1] This helped JDR make the decision to build its array cable factory in Hartlepool. JDR's business and market position was strengthened further with contract awards for innogy's Galloper and Nordsee One wind farms. The company is now a leading array cable supplier and has also exported to several European projects as a result.ⁱⁱ [REDACTED]
[REDACTED]
[REDACTED]
 - D. **Innogy's Galloper project was instrumental in securing a future extension for longer blade moulds at the Siemens Green Port Hull blade manufacturing facility.** The facility opened in 2016, and brought

state-of-the-art composite manufacturing to the UK's east coast. Whilst Galloper was not in Siemens' original plan for the Green Port Hull investment, it provided the additional capacity required to stimulate investment by Siemens to install the necessary foundation work in anticipation of a future expansion to allow the manufacture of larger blades. Estimates at the indicated this expansion would result in a further 200 jobs with an additional investment of over £50 million. The total investment in the Green Port Facility was over £310 million. The scale of SOWF is now driving innovation in turbine and blade technology, and projects of its size are critical to underpinning future investments in existing facilities, such as Green Port Hull. (Para. 5.14)

- E. **Innogy explored using Able Marine Energy Park (AMEP)** for Triton Knoll installation and how it could stimulate wider supply chain investment, and commissioned a detailed feasibility study. ^[C1,C2] Innogy met with BEIS, Department for International Trade (DIT) and key stakeholders throughout the latter part of 2016 and almost weekly in 2017 to push for Government support in realising AMEP. ^[EV022, EV175]
 - F. **Triton knoll is investing in East Coast ports.** Triton Knoll was the only fully committed developer to AMEP but Able could not secure a sufficient number of other tenants to make the development viable. In light of the situation, Triton Knoll's contingency option was activated. This comprised an agreement with MHI Vestas (MVOW) to deliver the assembly port and for Triton Knoll to separately contract with an O&M port. The O&M base of choice, in final stages of contracting with Triton Knoll, [REDACTED]
[REDACTED] Triton Knoll took special measures to promote UK content solutions by issuing a request for information (RFI), conducting an East Coast Ports Review and providing a shortlist of suitable UK ports to MVOW. The award underpins a £16 million investment by Able in additional new heavy-duty quayside at the port, and new equipment and facilities to support delivery of the project. [REDACTED]
[REDACTED]
[REDACTED]
 - G. **Innogy is working collaboratively with MVOW to increase UK content** on Triton Knoll. As a result of the cumulative volume of orders from innogy and other developers, MVOW has recently announced that it will invest in a second production line at the Isle of Wight (IoW) blade factory. MVOW has already been able to make the case to invest in a new UK blade finishing facility in Hampshire. MVOW also aims [REDACTED]
[REDACTED]
[REDACTED]
- 4.8 **As the next project in innogy's UK pipeline, the success by SOWF in the Third CfD Allocation Round provides the necessary continuity between innogy's operational and under construction projects,**

and its future portfolio. This continuity is essential to enable large-scale UK investments to continue by innogy, which could have substantial impact due to SOWF's size and innovative technology choices.

SOWFL sustainable supply chain strategy

- 4.9 See Section 3 for an overview of the SOWF procurement strategy and approach to the supply chain.
- 4.10 **SOWFL will continue to identify supply chain bottlenecks and engage with suppliers to explore ways to mitigate them.**^[C5] SOWFL's competitive procurement strategy is based on a deep understanding of the offshore wind supply chain and the identification of uncompetitive areas. The strategy identified turbines, electrical plant and high voltage offshore cables as key areas of concern. Therefore SOWFL has started assessing the capability of UK suppliers and new entrants to participate in the tendering process within these areas of concern. (Para. 4.29, 4.33 and 4.42)^[C5] ^[EV005]
- 4.11 **SOWFL understands and supports the work of BEIS and DIT** to encourage investment in the UK, particularly to sustain the UK as the global market leader in offshore wind. Innogy has maintained regular contact with BEIS and DIT throughout the development of its UK offshore wind pipeline and has made efforts, wherever possible, to support their aspirations. For SOWFL, engagement with BEIS and DIT has continued since 2017, and as such all parties understand the areas considered to be high priority in relation to UK supply chain bottle necks.^[C1,C3]
- 4.12 **An assessment of the UK content which could be achieved on SOWF has been undertaken.** SOWFL is at an early stage of the procurement process and as such, SOWFL has received limited definitive input from suppliers to inform our assessment properly. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] As SOWFL has the potential to be the first UK project to use HVDC technology. There are significant uncertainties about costs and the opportunity for UK supply, particularly in subsea export cables and converter station electrical equipment. As a far-offshore HVDC project, operational expenditure (OPEX) makes up a lower percentage of total expenditure than a nearshore HVAC project. Completing this initial analysis demonstrates that SOWFL considers increased UK content critical for the continued sustainability of the offshore wind supply chain and as part of the long-term drive to reduce levelised cost of energy (LCOE) for the benefit of consumers. To date, SOWFL has placed numerous consultancy and investigation contracts associated with the development of SOWF with UK suppliers.^[EV192]
- 4.13 **SOWFL has identified, and already started to deliver on, actions to achieve its supply chain requirements** (encompassing and prioritising BEIS's SCP criteria). These actions are both upon SOWFL

and through its Tier 1 suppliers, which will also support SOWFL in its aspiration to realise greater levels of UK content on the project.^[EV187] These actions are summarised as follows:

- A. Currently there are no UK suppliers of subsea DC export cables and only one electrical plant Tier 1 supplier that manufactures the converter station electrical equipment in the UK. As part of its informal and formal supplier engagement and tendering, SOWFL has proactively worked with suppliers, [REDACTED] [REDACTED] to understand and explore how greater UK content could be achieved within the export cable/array cable and HVDC works respectively. [REDACTED] It has also engaged with turbine manufacturers to understand options for achieving UK tower supply and logistics. [REDACTED]
[REDACTED]
[REDACTED]
 - B. All Tier 1 bidders will provide the UK content data needed to meet the terms of the Offshore Wind Industry Council (OWIC) agreement and support an independent check of the analysis. (Para. 4.14)
 - C. SOWFL will establish the role of Supply Chain and Skills Manager. (Para. 4.15)
 - D. All Tier 1 bidders will be required to submit a Supplier SCP (SSCP), which will be formally assessed as part of the tender evaluation process. (Para. 4.16 to 4.18)
 - E. All Tier 1 bidders will be required to detail options for increasing competition by identifying potential UK companies and new entrants which could secure sub-contracts. (Para. 4.19)
 - F. All Tier 1 bidders will be obliged to submit a Value Outcomes Report to demonstrate the impact that a SOWFL contract is expected to have upon their business. (Para. 4.20)
 - G. All Tier 1 bidders will be required to make procurement opportunities visible for lower-tier suppliers. SOWFL also does this, by means of brochures and a procurement portal (Para. 4.21 to 4.23)
 - H. SOWFL is increasing engagement with local organisations and companies. (Para. 4.24 and 4.25)
 - I. SOWFL will organise supply chain events, requiring Tier 1 attendance. (Para.4.26)
- 4.14 **SOWFL commits to ensuring that the UK content data it provides is as accurate as possible.** As a leading member of the OWIC, innogy welcomed the introduction of the UK content reporting framework but sees benefit in robust independent scrutiny to encourage accuracy and consistency in reporting across the industry. SOWFL will commission an external consultant to validate its approach and challenge the values calculated by SOWFL and its suppliers. SOWFL will regularly provide updates to BEIS and DIT. Innogy's commitment is evidenced by the fact that it has commissioned numerous studies on the economic impacts of its projects.^{[C1][EV023, EV198, EV187(6)]}
- 4.15 **SOWFL commits to establishing the role of Supply Chain and Skills Manager (SCSM).** The individual's primary responsibility will be to proactively track and monitor the commitments made within this SCP and its SSCPs. The SCSM will represent the project at supply chain events and industry groups to drive

awareness of opportunities amongst the supply chain.^[C1,C4] The SCSM will co-ordinate with the SOWFL procurement managers to ensure SOWFL's supply chain requirements and BEIS' SCP criteria are embedded with Tier 1 suppliers and to ensure that supply chain sustainability is taken seriously across the industry. SOWFL will appoint the SCSM at an early stage in the project procurement, to work with the SOWFL procurement managers to be able to accurately communicate potential opportunities with the local supply chain.^[C1,C3] We expect synergies across the supply chain with Triton Knoll so the SCSMs will work closely to maximise the potential opportunities for the supply chains of both projects, ensuring lessons learned are transferred.^[C3]

4.16 **SOWFL requires all Tier 1 bidders to produce a 'satisfactory' SSCP** that complies with SOWFL's supply chain requirements (encompassing and prioritising BEIS's SCP criteria).^[C1-C5] This approach ensures that SOWFL benefits from suppliers' commitments and focuses Tier 1 suppliers on innogy's and BEIS's aims for a strong and sustainable supply chain. It contributes to a culture change in the sector that can lead to lower project risk and cost of energy in the longer term.^[EV187(8)] Triton Knoll took this approach in 2016 and 2017 and received over 50 SSCPs, which it believes was the largest exercise undertaken ahead of project FID in aligning the offshore wind industry with the UK Government's objectives.^[EV189] SOWFL has already demonstrated that it will continue this good practice on SOWF. (Para. 4.17)^[C3]

4.17 **SOWFL's first major procurement activity requested SSCPs from [REDACTED]**. SOWFL expended significant effort working with the bidders [REDACTED] to improve their SSCPs due to a lack of understanding of BEIS's criteria, with several not initially providing satisfactory plans. SOWFL provided bidders with feedback on the strengths and weaknesses of their SSCPs and required bidders to re-submit. SOWFL will continue to work collaboratively with the suppliers to develop their commitments [REDACTED]
[REDACTED]
[REDACTED] The SCSM and procurement managers will maintain regular contact with suppliers and challenge them on the progress of their SSCP commitments.

4.18 **SOWFL commits to assessing SSCPs using BEIS's guidance as part of supplier selection.**^[C1-C5] To assess SSCPs objectively, SOWFL will adopt and adapt the scoring framework used for Triton Knoll. This considers the number of actions or commitments made, the type of impact, the scale of the impact on SOWF or the wider industry, and the extent of supporting evidence and intent.

4.19 **SOWFL will request that all Tier 1 bidders submit information necessary for SOWFL to understand its lower-tier supply chain.** This will include detailing potential UK companies and new entrants, and providing an assessment of their potential UK content.^[C1,C4] It will request bidders to submit information on the opportunities for increasing competition and engaging with new entrants for sub-contracts on SOWF work packages. Through informal engagement, SOWFL will seek to understand the

barriers faced by lower-tier suppliers and assist where possible, and what steps could be taken to enhance competition.^[C2] SOWFL will share the outputs with BEIS and DIT.^[C3] ^[EV187(12)]

- 4.20 **SOWFL will oblige all Tier 1 bidders to submit a Value Outcome Report**, identifying the impact the contract placed by SOWFL would have on their businesses. This is the first time innogy will have requested a report of this nature during its procurement processes for an offshore wind farm. It will explain how a contract with SOWFL, for the scope of work as tendered, would enable the contractor to invest in existing and new facilities (including any in the UK), increase the contractor's capabilities, develop partnerships with other contractors^[C5], win future contracts, improve quality, improve manufacturing efficiencies, invest in innovation and R&D^[I2], invest in people and skills, and improve health and safety practices. It will include the anticipated number of new jobs created, jobs sustained and apprentices engaged.^[S3] SOWFL will require a post-contract report from each supplier to demonstrate how the SOWFL contract has impacted the contractor and realised the expectations in the pre-contract Value Outcome Report. ^[EV187(7)]
- 4.21 **SOWFL commits to continually improving the visibility of procurement opportunities on the project.**^[C4] Innogy has a strong ability to communicate opportunities on the project and wants to instil this mentality across the supply chain. Our online approach will communicate the project procurement structure, the timescales of upcoming supply chain opportunities and provide a direct contact in the Tier 1 suppliers as well as links to their procurement portals. It will benefit the lower-tiered supply chain to identify their potential clients and prioritise engagement. This approach added value to Triton Knoll and SOWFL intends to continue and improve on this best practice. ^[C3] ^[EV009, EV187(6)]
- 4.22 **SOWFL will update and maintain a procurement portal.** The portal is live on the SOWF website and follows innogy best practice. ^{v,vi,vii, viii} As of January 2019, it has about 180 companies registered. SOWFL will ensure a wide pool of suppliers are registered through the portal and make these available to Tier 1 suppliers. It will align the database with the Forewind, Triton Knoll and Galloper databases and encourage potential suppliers to register by means of: direct engagement and awareness of opportunities ^[EV087]; attendance at local supply chain events; SOWFL's dedicated supply chain events; ^[EV051, EV188, EV030] and through local or sector ^[C3,C4] ^[EV028, EV048, EV058] organisations.
- 4.23 **Innogy has produced a brochure to highlight business opportunities** across its portfolio and it regularly produces newsletters to highlight opportunities for local suppliers. It includes details on likely required services and project procurement portals. It has been distributed at both local and innogy's supply chain events and is available to download from the SOWF website. ^{[C4][EV009, EV087]} ix
- 4.24 **SOWFL is escalating its engagement with local organisations to increase awareness of, and maximise, local opportunities.**^[C4] Its focus is in North East England and it has begun engagement with the Tees Valley Combined Authority (TVCA). TVCA is committed to an ambitious strategic economic

plan to grow the local economy.^[EV020] In May 2018, SOWFL attended the Tees Valley Business Compass Growth surgery as an important step in understanding the make-up of local organisations and companies, and has engaged and held follow-on meetings as a result.^[EV003, EV020, EV030] SOWFL's work follows best practice of innogy's activities to increase awareness and maximise local opportunities in the supply chain across the East of England (associated with Galloper), Humberside (associated with Triton Knoll) and in Wales (associated primarily with Gwynt y Môr).

- 4.25 **SOWFL commits to working with local industry organisations to increase the commercial awareness of the project and understand the barriers facing new entrants.**^[C2,C3,C4] Innogy has already organised a pre-event workshop attended by over 100 delegates to understand procurement opportunities on SOWF and Triton Knoll as part of the NOF Energy Offshore Wind North East Conference in November 2018. Since the workshop, SOWFL's supplier portal received over 40 new registrations. Triton Knoll provided delegates at the workshop with direct contacts in its Tier 1 suppliers and SOWFL intends to do similar at future events. Through the NOF event, SOWFL also attended site visits in Teesside and Tyneside, including: Wilton Engineering, JD Ports, JDR, Heerema, Port of Blyth, DeepOcean, Smulders and SMD. To continue building relationships with local stakeholders, innogy invited delegates from Tees Valley Combined Authority, North East LEP, South Tees Development Corporation and Invest North East England.^[EV095, EV051] x In 2018, innogy and SOWFL attended numerous other local supply chain events.^[EV011, EV111, EV188]
- 4.26 **SOWFL commits to organising meet the buyer events.** SOWFL will host at least two meet the buyer and skills events (construction and operations) and build on innogy best practice.^[EV016, EV017] These events will communicate opportunities and provide a forum for SOWF's Tier 1 suppliers to have open dialogue with lower-tier suppliers.^[C4] They also enable suppliers to share experiences and build partnerships with local suppliers.^[C3] Triton Knoll held a number of supply chain events with its Tier 1 contractors, Siemens Transmission and Distribution and J Murphy & Sons, to maximise opportunities for Lincolnshire businesses to be involved in the construction of the project's electrical system. Murphy appointed three local contractors to work on the project.^[EV018, EV144] xi, xii Triton Knoll is also presenting O&M opportunities to local suppliers at the Grimsby Renewables Partnership Conference and a bespoke meet the buyer event in February 2019 at which SOWFL will hold a series of one-to-one meetings with suppliers. SOWFL will also host an 'innovation corner', which is a new approach by an innogy project, to allow local business to present new technologies relevant to the project.^[I2] ^[EV187(6)]

Converter stations

- 4.27 **SOWFL will contract the onshore and offshore converter stations in [REDACTED] stages: [REDACTED]**
[REDACTED] SOWFL's strategy intends to reduce cost uncertainty and identify the most technically and economically advantageous

solution through a competitive process. [REDACTED] This approach also secures supply chain capacity at an early stage to mitigate the risk of bottlenecks to the project delivery.

4.28 **SOWFL has encouraged participation by UK suppliers and new entrants** to the offshore wind converter station market in the procurement process. [C1,C5] [REDACTED]

[REDACTED] The technology and market immaturity of high voltage source converter stations means that competition in the European market is limited [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] Innogy also

invited [REDACTED]
[REDACTED]
[REDACTED] will be on the supplier tender list for the HVDC main works contract.

4.29 **SOWFL has, and will continue to work with the [REDACTED] to improve their SSCPs.** [REDACTED]

[REDACTED] SOWFL engaged informally with bidders on how they should improve their SSCPs and to understand their anticipated UK content over several meetings [REDACTED] This increased SOWFL's understanding of the potential UK content from [REDACTED]

[REDACTED] As a result of SOWFL's effort, the suppliers will have significantly improved SSCPs for submission as part of [REDACTED]

4.30 **SOWFL received SSCPs from [REDACTED]**

[REDACTED] Highlights of the SSCPs are:

- A. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

- B. [REDACTED]
[REDACTED]

C. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Additionally, it will give the opportunity to develop local UK suppliers in international competition within the offshore wind market. [REDACTED]

4.31 SOWFL has established that there are 10 UK yards as potential Tier 2/3 subcontractors, of which at least two would be new entrants to the offshore substation market.^{[C1] [EV164]} All of the substations for innogy’s UK operational projects used UK fabrication yards: Gwynt y Môr (Harland & Wolff); Greater Gabbard (McNulty and Heerema); and Galloper (Heerema).^[EV066]

Turbines

4.32 **SOWFL held meetings with suppliers and informally engaged on supply chain and innovation opportunities for SOWF.**^[C5] This informed the formal engagement which commenced in December 2018 with invitations to tender for the asset contract.^[EV191]

4.33 **SOWFL has requested submission of SSCPs from turbine suppliers at an early stage** in the formal procurement process. This enables SOWFL to influence turbine suppliers’ ability to meet innogy and BEIS’ SCP criteria on the project and explore what options the forthcoming Sector Deal provides to improve UK supply chain sustainability.^{[C1] [EV008, EV182, EV183, EV185]} SOWFL will continue innogy best practice and work with turbine suppliers and attempt to secure new opportunities for the UK supply chain (for example on Triton Knoll, Para. 4.7). SOWFL has also engaged informally to promote the opportunities on SOWF.^{[EV191, EV176, EV183] xiii}

4.34 **SOWFL has invited** [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] Innogy has a strong record of promoting competition in the turbine market and is one of the two developers to have contracted three different suppliers across its European portfolio. Its selection of Senvion for the Thornton Bank project was a first for the company. Innogy also introduced Vestas to the UK offshore wind market with the contract for North Hoyle, and Rhyl Flats was the first UK wind farm to use Siemens turbines.^{[C1,C2][EV008]}

4.35 **SOWFL received SSCPs from** [REDACTED] **suppliers.** [REDACTED] SOWFL is providing feedback to suppliers on their SSCPs and will continue to work with them to strengthen their SSCPs. Highlights are:

A. [Redacted]

B. [Redacted]

C. [Redacted] It has worked closely with all interested parties and welcomes the decision by [Redacted]
[Redacted]
[Redacted]
[Redacted]
[Redacted]
[Redacted]
[Redacted] Contracts with large projects, such as SOWFL, are critical to underpinning future investments in [Redacted]

Foundations

4.36 **SOWFL will use monopiles for the wind turbine foundations** [Redacted]
[Redacted] There are at least five experienced European marine contractors and the market is competitive. Fabrication is a low margin, high volume business and the European market supports only three suppliers. SOWFL has extensively engaged with the market and

is working collaboratively with several manufacturers and installers pre-ITT to give them familiarity with the project's needs and opportunities, whilst informing project development and shaping ITTs. ^[C4,C5] SOWFL will issue a formal ITT for the wind turbine foundations asset contract [REDACTED]

4.37 **SOWFL has engaged with UK companies** to understand their capability and obstacles to expand capacity. ^[C1,C2] [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

4.38 **SOWFL is undertaking joint studies with [REDACTED] contractors,** [REDACTED] [REDACTED] to explore best practice [REDACTED] and identify an optimum solution [REDACTED]
[REDACTED]

4.39 **Innogy will require bidders for this package to provide a detailed plan for how they will subcontract,** notably for large items such as sea fastenings and mobilisation services. SOWFL recognises that bidders cannot commit to suppliers at the bidding stage but it will expect that their plans to maximise competition are clear. ^{[C5] [EV187(12)]}

Export cables

4.40 **SOWFL has been engaging informally with several suppliers, similar to the foundations asset contact approach.** SOWFL will issue a formal ITT for the export cables asset contract in mid-2019.

4.41 **SOWFL is promoting greater competition in the HVDC offshore export cable market.** The subsea export cable market has only four experienced HV suppliers following recent consolidation in the market. Whilst this gives suppliers greater production flexibility, the increase in demand for HVAC and HVDC cable from forthcoming far-offshore wind projects and interconnector projects, and increased demand for HVDC cable for German onshore projects means that supply is likely to be constrained from the early 2020s. SOWFL has issued an RFI [REDACTED] globally, [REDACTED] [REDACTED] This, in combination with [REDACTED] is the first time innogy has issued a request to such a large number and geographically diverse range of cable suppliers. [REDACTED]
[REDACTED]

4.42 [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] SOWFL will use HVDC technology, and has been in detailed discussions with [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

4.43 **SOWFL will collaborate with [REDACTED] contractors, [REDACTED] to optimise the HVDC cable-laying.** Innogy will seek to understand contractor preference on cable manufacturers at an early stage. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

4.44 **To promote greater competition in the onshore HV cable market, SOWFL has issued an RFI [REDACTED] globally, including new entrants to UK offshore wind.** [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Offshore logistics

4.45 **SOWFL has undertaken a ports assessment for UK port options.** [REDACTED]
[REDACTED]
[REDACTED] held site visits and meetings with [REDACTED] ports between April and July 2018 to discuss opportunities on SOWF, and also visited a number of these ports [REDACTED]
[REDACTED]
[REDACTED]

4.46 **SOWFL will select its installation port through a competitive tendering process.**^[C5] SOWFL will learn from the process that Triton Knoll ran to ensure the competitive tender of its ports. (Para. 4.7F)

4.47 **SOWFL will select its onshore operations hub through a competitive tendering process.** ^[CS] In line with our approach to project development, SOWFL has developed an O&M strategy that maintains flexible options for the onshore hub until engagement with Tier 1 suppliers has commenced. This O&M strategy will be developed through early [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

4.48 **SOWFL will assess the potential to develop** [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] SOWFL could further contribute to a naturally-developing regional cluster, bringing wider benefits to the economy through improvements in infrastructure and skills development. [REDACTED]

Innogy track record and sharing best practice

4.49 **SOWFL will capture the learning from innogy’s past offshore wind projects and share its experiences with future project teams.** BEIS can have confidence that SOWFL will deliver on its commitments because of innogy’s track record over 16 years on projects from North Hoyle to Triton Knoll. SOWFL’s commitments are founded on the experience of its project team on numerous UK offshore wind projects. This sharing and continuity is a key part of SOWFL’s formulation and delivery of this SCP. ^{[C3,I6,S6][EV046, EV052, EV096, EV126, EV147, EV154, EV172, EV179]}

4.50 **Innogy has a long-standing commitment to share its experience in the offshore wind industry.** Staff have provided input into studies, spoken at numerous conferences and supply chain events over the past decade. ^{[C3,I6,S6] [EV170, EV111, EV016, EV017]} This continues with SOWFL. This activity has helped make offshore wind in the UK, and in Europe more widely, the astonishing success that it has been. ^[EV188]

4.51 **Innogy forms valuable relationships** with companies and shares its experience to support the sustainability of the industry, of which one way is through sharing best practice and engaging with trade and public sector enabling bodies. ^[C3,I6,S6] For example, innogy sits on seven RenewableUK working groups and in 2018 become a strategic partner to NOF Energy and a member of North East of England Process Industry Cluster (NEPIC). ^[EV002]

5 Innovation

- 5.1 **Embedding innovation into innogy's projects is fundamental to increase its competitiveness and secure a long-term future for offshore wind.** Innogy has a significant track record of innovation which has positioned it as a leading European developer. It has consistently brought larger turbines to market and worked further from shore in deeper water. Innogy's pipeline of offshore wind projects, including SOWF as its flagship project, will continue its innovation focus. [EV001, EV150, EV193]
- 5.2 **Innogy undertook action to target LCOE reduction** and in 2016 signed a pledge to reduce costs to below €80/MWh by 2025 (around £62/MWh^{xv}). [I2] [EV037] ^{xvi} Innogy is working to reduce costs well in advance of this target. In 2017, Triton Knoll was awarded a CfD in the Second Allocation Round with a strike price of £74.75/MWh.^{xvii} This exemplifies the work innogy has undertaken on its projects to accelerate the trend of cost reductions. This was further evidenced by innogy's success with Kaskasi in the 2018 German auction.^{xviii} Innogy bid into the 2018 Dutch Holland Kust Zuid auction, demonstrating under certain market regimes it can achieve zero subsidy bids.
- 5.3 **Innogy is committed to innovative offshore wind technologies** through research partnerships, involvement and investment in innovation programmes, and driving internal innovations. [EV002, EV031, EV034, EV035]. Examples include:
- A. **Innogy is involved in the Carbon Trust Offshore Wind Accelerator (OWA).** [I2,14,15.16] Innogy was a founding member of the OWA and has invested [REDACTED] in the programme in addition to significant internal resource. It is currently committed to a further four years as part of OWA Stage III. Innogy is part of several Carbon Trust projects including: Offshore Maintenance Joint Industry Project II, which aims to determine operational criteria for offshore maintenance and apply these to suitable maintenance logistics; Offshore Renewables Joint Industry Project (ORJIP), which aims to reduce consenting risks by better informing authorities on the true environmental risks; and Floating Offshore Wind Joint Industry Project, which focuses on commercial deployment challenges for floating wind.
- B. **Innogy's parent company collaborated with the Far and Large Offshore Wind (FLOW) project.** [I2,14,15.16] Thirteen companies and knowledge institutions which operate in the Netherlands worked together on innovation to reduce the cost of offshore wind energy and the results of the project showed that a well-coordinated industry approach can achieve 40 per cent cost reduction in ten years. [EV002, EV079] ^{xix}
- C. **Innogy is a partner to GROW** (Growth through research, development and demonstration in offshore wind), a consortium that has agreed on a programme of knowledge exchange and cooperation with the aim of reducing the costs of offshore wind. [I2,14,15.16] ^{xx}
- D. **Innogy is committed to engaging with the OREC, particularly to understand its plans on embedding the Offshore Wind Innovation Hub (OWIH) roadmaps and the Fit-4 Renewables programme.** ^{xxi}

Through this engagement, innogy and SOWFL will explore how it can further support OREC in its aims to enable and support supply chain development, provide a clear route to market for innovative companies and technologies, and draw applied research through from the UK's academic base. ^[12,14,15,16]

^[EV013, EV056] The OWIH coordinates innovation, focusing on cost reduction and maximising UK economic impact. The OWIH's innovation roadmaps identify the high priority innovation needs of offshore wind. SOWFL identified areas (Para. 5.31, 5.35, 5.44 and 5.49) where potential SOWF innovations align with those on the roadmap and which SOWFL could support if successfully awarded CfD. ^[12]

5.4 **Innogy implements a governance process of R&D project review and approval.** This means that outcomes from relevant R&D projects, tests and demonstrations made across the entire innogy portfolio are available for the benefit of SOWFL. ^[12,15] This ensures that innovation at the corporate level is aligned with industry need and innogy's projects, and drives cost reduction at project level. ^[EV031, EV035]

5.5 Each of the following sections provides examples where innogy has already supported innovation and provides context on how this benefits SOWFL. It also details the present and future innovations we have thus far identified to be explored for SOWF. ^[EV018]

Project development

5.6 **Innogy has driven the commercialisation of light detection and ranging (LIDAR) mounted on floating buoys to collect wind speed data.** ^[12] The technology reduces installation cost when compared to a fixed met mast and provides more accurate data. ^{xxii, xxiii} Innogy was involved in a two-year OWA trial at Gwynt y Môr, which ended in 2015. Innogy also supported a FLOW project which validated the performance of a metocean buoy with LIDAR in the Dutch North Sea. ^[EV018] On SOWF, the Dogger Bank met mast was the first in the UK to use a "human-free" installation technique. ^[EV193] These studies supported LIDAR prototypes to become a "bankable" technology. Innogy also supported QinetiQ's floating LIDAR, SeaZephIR, through a collaboration agreement. ^[EV025]

5.7 **Innogy has supported research to understand the environmental impact of offshore wind farms.** ^[11] Innogy was involved in the ORJIP Acoustic Deterrent Devices Development and Testing Study, and the Bird Collision Avoidance Study, which was completed in 2017. ^{xxiv, xxv} Innogy also supported the FLOW project which tested a noise mitigation system on the effects of piling noise on wildlife, and was subsequently installed on a commercial project. ^[EV018] Triton Knoll is currently undertaking a feasibility assessment to inform the use of innovative camera technology for bird monitoring. Potential innovations for SOWFL will be assessed through preparation of its monitoring plans.

5.8 **Innogy is a leading member of the Min/Max R&D group Joint Industry Project, run by Norwegian Geotechnical Institute (NGI).** ^[11] It aims to standardise a methodology, which will be used on SOWF, of

laboratory determination of the minimum and maximum density of sands; the current approach can lead to design conservatism and therefore increase costs of offshore wind. ^{EV107]}

5.9 **Innogy has been working with NGI since 2013 on the ‘Synthetic’ cone penetration test (CPT) project to develop a ground model of the SOWF project area.** ^[1] The methodology uses a probabilistic approach to defining a soils profile which will minimise the scope of the SOWF site investigation campaign and hence reduce LCOE. ^[EV108]

5.10 **Innogy, through Forewind, supported the British Geological Survey (BGS) and UK Universities during project development.** ^[1] BGS accessed all seabed data collected by Forewind during the development phase of the Dogger Bank OWF projects and this enabled a number of studies to remap the geological history of the Dogger Bank area. A number of PhDs have resulted from this work. SOWFL is benefitting from this greater geological understanding, as will future projects in this area. ^[EV109]

5.11 **Innogy is involved in a project funded by the German Fraunhofer Institute for Wind Energy Services** into the application of hydro-acoustic methods for the detection of buried objects. ^[1] The study is due to end in 2019 and will benefit SOWFL due to its 220 km offshore export cable corridor. ^{xxvi}

5.12 **Innogy, through Forewind, donated 71 core samples collected on Dogger Bank** to the National Geological Repository. ^[5] This has enabled the wider scientific community to benefit from this survey work and it will also benefit any future offshore wind projects in this area. ^{xxvii}

Turbines

5.13 **SOWFL will allow and encourage its Tier 1 bidders (not just in the turbine package) to propose innovative technology through invitations to tender.** ^[2,13] SOWFL recognises that innovation can be driven throughout the supply chain and should not be dictated solely by SOWFL. Nonetheless, this needs to be encouraged by its Tier 1 suppliers enabling innovation further down the supply chain.

5.14 **Innogy has a history of introducing innovative turbine models to its projects.** ^[2] It was first to deploy both 5 MW and 6 MW turbines into commercial use. Triton Knoll has contracted MVOW to deploy the V164 9.5 MW turbine which will be the largest wind turbine ever commercially deployed. ^{xxviii}
SOWFL is exploring the use of [REDACTED]

5.15 **Innogy drives turbine innovation with manufacturers.** ^[2] [REDACTED]

5.16 **Innogy is working to understand wake losses for offshore wind farms and the knowledge gained will be applied to SOWF.** ^[5] Innogy collaborated with the FLOW project on a study of wake effects and the testing of sensors on turbines at Rhyl Flats. ^[EV018] Innogy is also involved in the OWA Active Wake

Control project which aims to lower LCOE by increasing overall energy yield as a result of reduced wake losses. It aims to demonstrate a yield increase of between 0.5 per cent and 3.5 per cent and could enable turbine load reductions of up to 50 per cent, resulting in increased component life and reduced O&M costs.^{xxix}

5.17 **Innogy's internal LuTe project, seeks to validate and optimise the quality and lifetime of gearbox lubrication.**^[12] The output has already been used to inform innogy's offshore projects with a view to reducing maintenance costs and is intended to be used on SOWF, depending on the WTG technology used.^[EV035]

5.18 **Innogy is running an internal project to review and test different condition monitoring systems in order to identify those of most benefit in reducing LCOE across its portfolio, including on SOWF.**^[15] It considers drive train and blade monitoring, protection of electrical equipment (cable, transformer, converter), and advanced analysis of SCADA data.^[EV035]

5.19 **Innogy's [REDACTED] Project developed a process for monitoring [REDACTED]**
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] It enables optimum production and reduces LCOE by [REDACTED]

5.20 **Innogy is supporting research to tackle wind turbine blade leading edge erosion.**^[12] The BICEPS (Blade Industry Classification of Erosion Protection Systems) programme aims to develop a consistent approach to testing and classification of leading edge protection. The BLEEP (Blade Leading Edge Erosion Programme) aims to reduce the cost impacts of blade erosion.^{xxx} The research will be applied to SOWF where applicable and could contribute to reduced maintenance costs.

5.21 **Through engagement with turbine suppliers, SOWFL has identified the potential for self-powering mode.**^[12] Demonstrating this technology would avoid the need for expensive carbon-heavy back-up diesel fuelled auxiliary power capability and reduce the risk of environmental impacts from fuel leakage. Self-powering mode has not been implemented on a UK offshore wind project to date. **[REDACTED]**
[REDACTED] have confirmed to SOWFL that they have self-powering mode under development and planned to be available for SOWF. SOWFL will encourage development of this technology through engagement with the supply chain and will commit to using the technology if it reaches a suitable level of maturity.^[EV011]

5.22 **[REDACTED] SOWFL**
is providing feedback to suppliers on their SSCPs and will continue to work with them to strengthen their SSCPs. In addition to self-powering mode, highlights are:

- A. [REDACTED]
[REDACTED]
[REDACTED] has demonstrated significant investment in blade technology in the UK [REDACTED]
[REDACTED]
- B. [REDACTED]
[REDACTED] It will continue to innovate in blades, optimising energy capture and power production. [REDACTED]
[REDACTED]
- C. [REDACTED]
[REDACTED] SOWF will play a significant part in the continued development of the [REDACTED] product line.
[REDACTED]

Foundations

- 5.23 **Innogy contributed to the OWA PISA (Pile Soil Analysis) project, which investigated and improved design methods for monopiles.** SOWFL is implementing this into its designs, [REDACTED]
[REDACTED]
- 5.24 **Innogy commissioned a pioneering laboratory research [REDACTED] into t [REDACTED]**
[REDACTED]
[REDACTED]
[REDACTED] The research has the potential to reduce maintenance costs and improve future designs, such as could be used on SOWF.
- 5.25 **Innogy is involved in SLIC (Structural Life cycle Industry Collaboration), led by Cranfield University, which researches the behaviour of offshore structures.**^[12] Due to SOWF's far-offshore location, improved knowledge contributes to a better understanding of the life expectancy of assets, helping to improve design, optimise O&M and reduce costs.^{xxxii}
- 5.26 **Innogy is involved in the Research Council of Norway-funded WAS-XL (Wave loads and soil support for extra-large monopiles) project.**^[11] It aims to overcome challenges associated with large offshore support structures, such as those likely to be required for SOWF, through reliable analysis and testing methods and advancement of modelling and experimental techniques.^{xxxiii}
- 5.27 **Innogy is involved in the ALPACA (Axial-Lateral Pile Analysis for Chalk Applying multi-scale field and laboratory testing) project.**^[11] The work, led by Imperial College, will design procedures to overcome shortfalls in knowledge regarding pile driving, ageing, static and cyclic response under axial and lateral loading in difficult ground conditions.^{xxxiv}

- 5.28 **Innogy funded the SysPark (System Model for Offshore Wind Park Support Structures) project at the Technical University of Denmark to help predict failures in structures as a result of series production manufacturing.** ^[11] The results will help optimise inspection and maintenance strategies for foundations on SOWF.
- 5.29 **Innogy champions the commercialisation of floating offshore wind.** ^[12] Innogy, Shell and Stiesdal signed a cooperation agreement committing to build a TetraSpa demonstration project in Norway, with an investment of €18 million (around £15.7 million^{xxxv}). Innogy has appointed an Offshore Project Engineer and is currently exploring the potential of floating wind in Scotland. Innogy is a member of the Carbon Trust Floating Wind Joint Industry Project and will share its knowledge with the wider industry. [REDACTED]
- 5.30 **SOWFL is exploring foundation innovations and will encourage its Tier 1 bidders to propose innovative foundation technologies.** ^[12] Possibilities include the demonstration of [REDACTED] [REDACTED] This innovation has been included in the ITTs for other innogy-owned offshore wind farm projects to help understand the technology readiness and for potential cost reduction. The demonstration of [REDACTED] is also being explored. [REDACTED]
- 5.31 **SOWFL will investigate design of integrated foundations with turbine and foundation suppliers during the project FEED.** ^[12] The OWIH innovation roadmaps concluded that integrating the transition piece into the tower design could reduce costs from reducing the weight of components to be manufactured, transported and installed offshore.
- 5.32 **SOWFL is undertaking a study to explore best practice in [REDACTED]** [REDACTED] The study is in collaboration with [REDACTED] contractors including [REDACTED]

Export electrical system

- 5.33 **Sofia is exploring the use of [REDACTED] DC cable.** [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] This technology has significant cost-saving potential for SOWF [REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

5.34 **Innogy has investigated the opportunities for offshore wind cross-border interconnectors and networks for the large scale deployment of offshore wind in the North Sea.**^[15] For example, innogy and TenneT looked to investigate feasible design options, the economic rationale, and the regulatory and market requirements of such a combined and international infrastructure, for example between SOWF and a North Sea Wind Power Hub.^[EV038] Innogy also held a meeting with National Grid in January 2019 to discuss the issue.^[EV194]

Converter stations

5.35 **SOWFL is committed to using HVDC technology on SOWF and could be the first UK project to demonstrate the use of the technology.**^[12] Due to the 220 km export cable route, HVDC technology is more cost effective. OWIH identified this innovation as having a high potential to reduce LCOE with a timescale of 2023, which is aligned to the timescales for SOWF if successful in CfD award.

5.36 **As innogy’s first deployment of HVDC technology, it drives knowledge and skills development within the business for future HVDC projects.**^[16] In order to leverage cost reduction from European HVDC experience, SOWFL has opted for [REDACTED]

5.37 **SOWF could be the first offshore wind project to use a VSC for more than 1 GW of capacity.**^[12] SOWFL engaged with contractors to understand the required design advancements for VSC and is driving innovation t [REDACTED]

5.38 SOWFL received [REDACTED] SSCPs from suppliers c [REDACTED] Highlights are:

A. [REDACTED]

B. [REDACTED]

[REDACTED]

- C. [REDACTED]

5.39 **Through the HVDC FEED studies, SOWFL will determine the foundation configuration for the converter platform**, which includes the option for jacket foundations. Innogy leads the OWA GOAL (Grouted OPC Connections with Annuli of Large Dimension) project which aims to develop reliable, industry-wide design guidelines for the design of large leg-pile connections for jacket substructures, such as could be used on SOWF's converter platform.^{xxxvi}

Installation

5.40 **Innogy has demonstrated commitment to improving offshore turbine installation techniques.** Innogy assisted SGRE with the installation of accelerometers on some towers at Galloper to measure hub accelerations during installation of the blades.^[14]

5.41 **SOWFL has identified several promising innovative hammer technologies for potential test and demonstration** at SOWF and innogy is supporting the development of some of them:

- A. [REDACTED]

B. **With the development of the full size blue piling hammer by Fistuca, SOWFL will be able to model this hammer which is now included as an option in Pile Dynamics' GRLWeap driveability software.**^[14] Benefits include greatly reducing both bolt driving-induced fatigue and the noise envelope in the high frequency range. It has not been used in the UK to date.

C. **Innogy supported the OWA VIBRO discretionary and VIBRO RE-Strike projects which investigated vibrodriving of foundation piles to reduce foundation installation costs and environmental impacts.**^[14] Land tests were undertaken in 2014 and highlighted that using vibration could make the process up to 10 times faster than conventional methods. Further tests will demonstrate if this method is suitable for SOWF.^{xxxvii, xxxviii}

5.42 **SOWFL is exploring innovative installation techniques which could reduce costs as alternatives to traditional cable burial.**^[14] SOWF has a 220 km offshore export cable in waters of up to 82 m deep. [REDACTED] is conducting a burial and routing risk assessment. This specifically requested a 0 per cent burial (ie. bottom lay) assessment option, alongside a range of other degrees of

burial. It is believed that no other UK offshore wind developer to date has used a 0 per cent burial regime. SOWFL would be innogy's first project to use this regime. SOWFL is collaborating with six marine contractors to optimise the HVDC cable-laying methodologies ahead of formal procurement.^[16] (Para. 4.43) Innogy was a partner in the OWA Cable Burial Risk Assessment Methodology study.^{xxxix}

Operations and maintenance

- 5.43 **Innogy has a track record of making its wind farms available for innovation trials.** This enables innogy to commercialise innovative technologies for the benefit of its future projects, including SOWF. Previous trials held at innogy's offshore wind farms have driven a deeper knowledge of innovative technologies which could be implemented on SOWF to significantly reduce costs. Examples include:
- A. **The world's first Intelligent Fender System (IFS) trial was completed by Strainstall at Greater Gabbard in 2015.**^[12] IFS is an in-house-developed technology which aims to provide accurate and recordable data to improve safety and increase operational efficiency for vessel and offshore wind farm operators. IFS is currently on further trial at Rhyl Flats.^{xi}
 - B. **Bibby HydroMap completed five days of sea trials of DriX, an autonomous unmanned survey vessel, at Gwynt y Môr in August 2018.**^{[12] xii}
 - C. **UK-based Modus Seabed Intervention, in partnership with UK-based Osbit and OREC, will trial an autonomous underwater vehicle (AUV) docking station at Gwynt y Môr.**^[12] It aims to enable AUVs to remain at offshore sites without a support vessel. For an 11 GW European offshore wind market (now exceeded) it estimated savings of £1.1 billion over 25 years.^{xlii}
 - D. **UK-based EDS HV Group successfully completed trials of Cable Sentry, an innovative solution based on Distributed Acoustic Sensing (DAS) technology that detects subsea cable faults in real time.** The trial was completed at Gwynt y Môr in 2018 as part of an EU Funded Horizon 2020 project. Innovative cable technology like Cable Sentry could be deployed on SOWF's subsea cables to allow for immediate identification of fault location and help minimise consequential losses.^{xliii}
- 5.44 **Innogy supported the OWA Sliding Access project to review the available systems in the market and assess the risks.**^[12] This aligns with the OWIH's innovation priority of "Improved access systems" to maximise operational performance and safety. OWIH identified this innovation as having a medium potential to reduce LCOE.^[EV196]
- 5.45 **Innogy has supported the OWA Reducing Emissions and Fuel Consumption in Offshore Wind vessels project.**^[12] It evaluated technologies for reducing emissions and fuel consumption which are suitable or show potential to be used in offshore wind vessels safely. This study has the potential for significant savings for SOWF due to its far-offshore location and the number of vessels required during O&M.^{xliiv}

- 5.46 **Innogy is involved in the OWA Wind Farm Control Trials project, which aims to demonstrate new control strategies to improve energy yield and reduce operational and maintenance (O&M) costs** across the innogy portfolio, and could be implemented on SOWF. ^{[12] xlv}
- 5.47 **The innogy Innovation Hub drives technology transformation and deployment at innogy.** Ucair, a start-up with a drone-based service platform, was launched by the Hub. ^[12] This can reduce OPEX on offshore wind inspections and reduces safety risks for technicians. ^{[EV114] xlvii}
- A. **Innogy’s Digital Transformation Team plans to develop new digitisation projects and embed existing projects into innogy’s offshore wind portfolio, including on SOWF.** ^[12] For the digital@grid project, grid companies worked collaboratively on innovations which resulted in optimised maintenance and servicing of transformers using “big data” analytics. Another project, “Advanced grid planning”, oversaw the development of a navigation tool which uses algorithms to calculate the optimal distances for cables to be laid. The outcome of the project “Digital tools for field forces” was a phone switch-app which technicians can use to communicate directly with the control system. ^[EV195]
- A. **SOWFL will benefit from innogy’s digital transformation projects, including the Combined Data Streams (CDS) and the Mobile Inspection App (L.I.S.A.).** ^{[12] [EV082, EV083, EV168]} CDS adds artificial intelligence to operational data and identifies failure patterns to inform predictive maintenance strategies. This allows efficient maintenance planning to take place before failures occur and reduces downtime of turbines, therefore reducing operational expenditure. CDS is being trialled at Gwynt y Môr with the aim of being used on all innogy’s offshore wind projects, including SOWF. [REDACTED]
- 5.48 **In October 2018, innogy and Shell invested \$10 million (around £7.7 million ^{xlviii}) in an innovative company, Akselos.** The technology simulates digital twins of large mechanical assets and is the first to be compatible with the “Internet of Things” and digital solutions such as big data analytics and machine learning. It is 1,000 times faster and more accurate than the industry standard when modeling large-scale assets such as the up-to 200 turbines planned at SOWF. It will offer operators real-time access to the condition of the asset, as well moving towards predictive maintenance. ^{xlviii}
- 5.49 **SOWFL has explored a series of innovative O&M strategies.** ^[12] The assessment identified several innovative solutions including exploring the viability of an artificial island. Other options assessed include operating an SOV with just-in-time logistics, a full life time charter of an SOV (which could result in up to 10 per cent day rate saving) or a SOWFL-owned SOV (removing the vessel operators margin and save around 5 per cent to 10 per cent of the total charter rate over the lifetime). ^[EV129, EV137]
The options within SOWFL’s O&M strategy align with the OWIH’s priority of “Fixed offshore bases and

motherships” to maximise operational performance. OWIH identified this innovation as having a medium potential to reduce LCOE.

5.50 **SOWFL will explore opportunities in O&M R&D as part of the Operations and Maintenance Centre of Excellence (OMCE)**, a £2 million collaboration between OREC and the University of Hull.^[12] SOWFL will explore opportunities including: how the research outcomes of the first six OMCE projects are relevant to SOWF; providing input on scoping of future R&D projects; signposting SMEs which may require support for funding; aligning engagement with the OWIH to identify priority research areas for OMCE; and considering additional funding for research projects. [REDACTED]

5.51 **SOWFL will supply data as part of the OREC and TCE SPARTA (System Performance, Availability and Reliability Trend Analysis) project**, depending on approval by any future shareholders.^[12] This will identify operational improvements and cost reduction opportunities. Innogy already submits data for [REDACTED]

Health and safety

5.52 **Innogy is committed to health and safety innovation.**^[12] Through its membership of G+ Global Offshore Wind Health and Safety Organisation, innogy, for example, led a manual handling and ergonomics study to reduce lost-time incidents and is also working with Ørsted on an audit of small vessel management guidelines. Innogy was the first developer to have dedicated UK offshore emergency response units (at Gywnnt y Môr and, due to its success, now also at Galloper), which received a RenewableUK award. SOWFL will continue this best practice.^[16] [EV064, EV123, EV124, EV199]

5.53 **Innogy was involved in three health and safety trials** through its involvement in Forewind and the development of SOWF, including the practice run-through approach, the ‘human-free’ met mast installation and an aerial approach to offshore inspections.^{[12,16][EV193]}

Financing, project management and lessons learned

5.54 **Innogy has completed a comprehensive internal exercise** [REDACTED]
[REDACTED]
[REDACTED] ensuring that lessons learned are implemented across projects, including SOWF.

5.55 [REDACTED]
[REDACTED]

5.56 [REDACTED]
[REDACTED]

[REDACTED]

5.57 **Innogy is continuously improving, and sharing knowledge and lessons learned.** [EV158, EV100, EV190]

- A. **New Ways of Working (NWoW) is innogy's transformation programme for continuous improvement.** [15,16] Innogy's parent company invested over [REDACTED] with the expected benefits of over [REDACTED] from 2019 onwards. By implementing NWoW, SOWFL will improve efficiency in project development and the ensuring project phases. [EV159, EV160]
- B. **In 2018, innogy launched Offshore Project Excellence (OPE). OPE adheres to ISO 21500 and provides the framework for standardising processes and continuing best practice.** [15,16] Triton Knoll and SOWFL were aligned and inducted on OPE in 2018. [EV057, EV133]
- C. **Innogy has developed a process for capturing and sharing lessons learned.** [16] As of August 2018, over 230 offshore wind-specific lessons were held in the database and a further 190 are in review. 12 workshops were held by Galloper in 2017 and 2018. SOWFL will continue innogy best practice and hold lessons learned workshops. [EV052, EV096, EV147, EV154, EV172]
- D. **The innogy Idea Lab, is a collaboration platform where employees share and discuss innovative ideas.** [15,16] [EV085, EV098] Topics are aligned to innogy's strategic innovation areas.

5.58 **Innogy is committed to capturing lessons learned in collaboration with suppliers.** As a result, ideas for innovative ways of working in manufacture, installation and O&M are identified and passed to future projects, such as SOWF. Innogy also innovates in how it does business with its suppliers to improve project delivery by closer working relationships. [16] [REDACTED]

[REDACTED] SOWFL will continue this best practice and as a result has already implemented a [REDACTED]

5.59 **SOWFL has shared key offshore wind innovation challenges with Teesside organisations (Innovate Tees Valley, Teesside University and Materials Processing Institute).** [16] Innogy will continue to develop its relationships with these organisations to ensure that local companies understand the challenges in advance of SOWF's Meet the Buyer events where they will have the opportunity to propose innovations to SOWFL Tier 1 suppliers. [EV032]

6 Skills

6.1 **Innogy is involved at every stage in the lifecycle of UK offshore wind projects which incentivises the company to have a strong track record in developing and maintaining the internal and external skills necessary to deliver projects.** SOWFL benefits from a significant innogy UK east coast presence with Galloper, Triton Knoll and Greater Gabbard which are all implementing their own skills development plans. This heritage, alongside corporate skills development programmes, will be built upon and enhanced through the development and construction of SOWF.

Opportunity for highly skilled, long-term job creation by SOWF

6.2 **Job creation resulting from innogy's projects benefit regions that have typically experienced economic deprivation through loss of traditional industries and resulted in outward migration of highly skilled workers.**^[S1] Investments by innogy have resulted in significant job creation: Greater Gabbard created 100 long-term roles during operation; Gwynt y Môr created 700 roles during construction and 100 during operation; Galloper created 700 roles during construction and 60 local roles during operation.^[EV023]

6.3 **The consent application made for SOWF in 2014 included an assessment of job creation.** For a single 1.2 GW project on the Dogger Bank, it concluded that during the construction phase, SOWF could create between 1,680 and 2,630 UK direct and indirect FTEs annually. SOWFL's latest modelling shows that during operation, it has the potential to create around 140 annual UK direct FTEs.^{[S1] [EV045]} Job creation from SOWF will support targets planned through the forthcoming Sector Deal, which aims to support the creation of 27,000 jobs by 2030. It also has the potential to contribute significantly to the 25,000 additional jobs target set out in *Tees Valley Strategic Economic Plan: The Industrial Strategy for Tees Valley 2016-2026*.^{liii} In the last 40 years, the Tees Valley economy has experienced major economic re-structuring resulting in loss of employment in some traditional manufacturing activities.

6.4 **SOWFL will make regular assessments of the requirements, developing initiatives and working with the supply chain to ensure the necessary, high-quality skills required are developed and maintained for the lifetime of the SOWF project.**^{[S2] [EV045, EV023, EV099]}

Assessment of skills required for SOWF

6.5 **SOWFL has developed its skills strategy including a preliminary pre-contract gap analysis.**^[S1.S2] The skills strategy provides a plan to build on best practice and develop skills required for the project and for the benefit of the wider industry. Its implementation will maintain innogy's reputation as a champion for developing skills, building on the best practice of Galloper and Triton Knoll.^[EV044, EV148, EV070] The strategy includes:

- A. A detailed review of the types of job roles and skills required for the project building on a preliminary pre-contract gap analysis based on real-life skills shortages experienced on Galloper. (Para. 6.6)
 - B. A review of the Teesside skills landscape to develop an understanding of educational organisations and courses, training facilities and existing skills initiatives (Para. 6.12) ^[EV063]
 - C. The actions for SOWFL to implement, which form the key commitments in this SCP, in order to mitigate against the risk of skills shortages, reducing the risk and cost to the project. (Para. 6.7, 6.8, 6.9, 6.10, 6.11, 6.13, 6.14, 6.15 and 6.16)
- 6.6 **In October and November 2018, SOWFL organised workshops to inform a preliminary gap analysis to understand the skills shortages experienced on Galloper and Triton Knoll.** ^[S2,S6] It covered internal and supply chain skills shortages, competition with other offshore wind projects and industries, and potential actions to mitigate the risk of future skills shortages. [REDACTED]
- [REDACTED]
- [REDACTED] A key lesson was the development of a robust resourcing plan and the use of an experienced internal Resourcing Manager. SOWFL will organise further workshops to continue to inform its skills gap analysis at appropriate stages to learn from the construction of Triton Knoll. This will allow SOWFL to proactively target recognised high-priority skills shortages in advance of SOWF’s construction. [REDACTED]
- 6.7 **SOWFL commits to undertaking a comprehensive skills audit to provide a detailed assessment of the project’s skills requirements and take action to bridge high priority skills gaps.** ^[S1,S2] SOWFL undertook a preliminary review of the types of job roles and skills required by the project but will complete a more detailed analysis in order to understand required skills from the supply chain. The detailed audit will begin once Tier 1 contracts have been placed and a decision on the construction and O&M bases has been made. ^[EV043] It will assess the roles that the project needs, the ability of the local labour market to meet these needs and an assessment of the actions needed to bridge any skills shortages. It will have particular focus on the skills required for the operation of the HVDC transmission, due to the potential for SOWFL to be the UK’s first HVDC project. The exercise will play a valuable role in continuing to inform the SOWF skills strategy, which will develop as the project progresses to ensure there is a robust plan in place to develop and maintain the skills necessary for the lifetime of the project. It will also further support how SOWFL can work with local authorities, training providers and skills organisations seeking to maximise the local offshore wind skills base. SOWFL will work with Triton Knoll as it undertakes a skills audit in 2019. Together, an appropriate methodology will be developed so the skills audits for both projects can be aligned and compared. Triton Knoll will share the outputs so that SOWFL is aware of the latest market skills shortages.

6.8 **SOWFL will review the quantitative skills requirements, as part of the skills audit,** to establish whether the competition from other projects could limit certain availability. SOWFL will identify high priority mitigations and re-evaluate its strategy at key project milestones. Through its involvement in skills working groups, innogy could work with other developers to jointly take action. ^[S1,S2]

Actions by SOWFL to engage apprentices and provide upskilling opportunities

6.9 **SOWFL will implement an apprenticeship programme, particularly covering high priority roles where there are identified skills shortages.** ^{[S4,S5] [EV043]} The current budget would support [REDACTED] [REDACTED] with the ambition to extend the programme based on its success. The programme model will be based on a review of apprenticeship standards and a comparison of apprenticeships and providers. It will boost local employment and, depending on the programme model selected, will support local apprenticeship providers. Innogy has a strong track record in developing apprentices and SOWFL's programme is likely to draw on initiatives underway or planned by innogy's other offshore wind projects. SOWFL recognises the importance of apprenticeships for the benefit of its own projects and for the wider industry and is therefore also encouraging the use of apprenticeships by its suppliers. ^[EV094]

A. **Innogy's Wind Turbine Apprenticeship Programme was created with Grwp Llandrillo Menai in North Wales to generate skilled technicians that can meet the future needs of innogy and the wider renewables industry.** ^[S3,S4,S5] EV027] The programme has been recognised by several awards including; RenewableUK Apprentice of the Year 2014; Grwp Llandrillo Menai Apprentice of the Year 2015 (against over 2,000 apprentices); Wales Green Energy Awards for Skills and Training 2015; and Apprenticeship Awards Cymru Work-Based Learning Assessor and Tutor of the Year 2016. Apprentices act as ambassadors, promoting STEM in local schools and career fairs. At least half of the apprenticeship posts after training are located in coastal and rural areas, where opportunities for such skilled engineering jobs have historically been limited ^{liv, lv, lvi}

6.10 **SOWFL will work with Tees Valley Careers (TVC) and other relevant organisations to identify opportunities for workers with transferrable skills from parallel sectors, such as up-skilling and re-training.** For example, in 2018, Greater Gabbard became involved in the East of England Offshore Wind Skills Centre with 3Sun Group and East Coast College. It aims to reduce financial barriers to 60 workers training to work in the offshore wind industry by funding 3 and 12 week courses. ^[S3,S4]

Actions by SOWFL to promote local STEM skills development and awareness opportunities

6.11 **SOWFL commits to supporting local skills organisations to promote STEM subjects and encourage a wider pool of skilled workers entering the offshore wind industry.** ^{[S3] [EV043]} Innogy knows the benefits this activity brings and follows best practice, as evidenced on other projects:

- A. **Galloper launched the East Coast Energy Internship scheme established by The Royal Academy of Engineering**, The Ogden Trust and Suffolk County Council, to provide students with a meaningful placement that utilises and enhances their STEM skills in a business environment. It has also provided summer internships to several students.^{[S3,S4] [EV076] lvii, lviii, lix} In 2018, SOWFL provided the opportunity for an innogy summer work experience student to contribute to the project and as the project progresses, will facilitate further dedicated placements.
- B. **Galloper aimed to maximise local employment opportunities** and to assess local training needs and training delivery mechanisms through an MOU with Suffolk County Council and Suffolk Coastal District Council.^[EV072] Once SOWF's O&M base is decided, SOWFL will liaise with local councils to participate in similar initiatives. This is in addition to the work SOWFL will undertake with TVC. (Para. 6.13)
- C. **Triton Knoll supported the Humber University Technical College** open day and is a 3-year sponsor of its electrical workshop. In its first 6 months, Triton Knoll set students an activity to help them understand a specific challenge the offshore wind sector faces.^{[S3,S4,S6] [EV146]} SOWFL will work with Teesside University (Para. 6.14) and look to develop a relationship with other educational institutions in the proximity of the O&M base once decided.
- D. **Innogy, through the Forewind consortium, placed a significant focus on raising skills awareness during the early development of SOWF.** Innogy invested around £80,000 (a quarter of the total) in "Champions for Wind" (CFW) between 2012 and 2015 to raise awareness among 12 -14 year olds of the career opportunities, qualifications and experience required in offshore wind. In 2012, the programme doubled the number of champion by inducting a further 10 teachers in the Teesside area. A third cohort was established in 2013. The evaluation report indicated that pupils' knowledge of offshore wind, the Dogger Bank offshore wind farms and related careers significantly increased after the programme. CFW was a finalist in the 2013 Humber Renewables Awards. One particular focus area was gender balance in STEM subjects.^{[S3,S4] [EV007, EV054]}
- 6.12 **SOWFL has reviewed the Teesside skills development infrastructure to gain an understanding of relevant organisations and courses, training and apprentice schemes, STEM organisations, existing skills initiatives, and events.**^[S4] This built on the Forewind Spotlight on Teesside Report. Therefore, SOWFL has the necessary understanding to be able to invest in established initiatives and provide immediate impact. Working with local organisations with embedded initiatives allows SOWFL to reach a wider regional audience than it could manage alone. It considered this within its strategy which resulted in actions for SOWFL to work with TVC and Teesside University. (Para. 6.13 and 6.14)^[EV043]
- 6.13 **To follow innogy best practice to support local skills development, SOWFL will work with TVC to set out potential future initiatives and engagement to address skills shortages and quality.**^[S3,S6] The commitment to work with TVC is dependent on both parties agreeing how they can work together

through an MOU. Both parties have expressed their interest in signing an MOU since engagement began in June 2018. A meeting is scheduled in February 2019 to specifically explore: ^[EV024]

- How to influence and encourage the choice of STEM subjects at GCSE and A Level
- Facilitating industry training for teachers and supporting TVC in assessing career information and providing teachers with material (similar to that developed for CFW)
- Becoming an Enterprise Advisor and encouraging SOWFL STEM Ambassadors
- Attending the Tees Valley Skills and STEM Event
- Providing input to 'Inspire Our Future' strategy, which includes tasks to introduce a skills advisory panel to form a clearer understanding of skills requirements and influence training provision for people aged over 16
- Working together to identify industries with parallel skills and exploring opportunities to up-skill workers for the offshore wind industry (Para. 6.10)

Encouraging a wide high-quality pool of skilled STEM talent will help mitigate against the risk of SOWFL experiencing skills shortages on the project, and across the wider offshore wind industry. TVC is the main regional careers access point responsible for supporting schools and colleges across the region and, as such, will be a key partner in accessing pupils.

6.14 SOWFL will seek to work with Teesside University to set out potential future initiatives and engagement to address skills shortages and skills quality. ^{[S3,S6] [EV043]}

Interacting with students allows innogy to influence and encourage students already engaged in STEM and other relevant subjects to adopt offshore wind as their industry of choice to mitigate against skills competition from other industries. SOWFL signed an NDA with Teesside University and, in meetings during 2018, explored potential activities. The commitment is dependent on both parties agreeing an MOU. Both parties have expressed their interest in signing an MOU, and a scheduled meeting in February 2019 will specifically explore: ^[EV003, EV019]

- Sponsoring and running competitions and challenges for students
- Briefing students on the job opportunities across the lifecycle of SOWF and the skills required
- Supporting further offshore wind research by identifying coursework, thesis or PhD topics
- Promoting innogy's international graduate programme direct to students
- Attending careers fairs. SOWFL would expect its Tier 1 suppliers to attend and support such events

6.15 The skills strategy work identified local events to attend at which SOWFL can have the greatest impact. ^{[S3,S6] [EV043]}

Targeting attendance at specific local events like this follows innogy best practice. For example innogy attended the Institute of Civil Engineers 200 Year Anniversary Event 2018,

Interactive Careers and Skills Festival 2017, and Galloper was the headline sponsor of the Tendring Careers Fair 2018. ^[EV004, EV167] lx

6.16 **SOWFL will host at least two dedicated supply chain and skills events.** These will play a valuable role in enabling suppliers and new entrants to engage with SOWFL and its Tier 1 suppliers to understand what skills they require to be successful in contract award and delivery. (Para. 4.25)

6.17 **SOWFL encourages students and graduates to consider careers in renewables.** ^[S3] In 2018, SOWFL provided opportunities for six New Talents (NTs) (Para.6.25) to work on the project. ^[EV049] At the NOF Conference 2018, SOWFL invited the attendance of three Future Regeneration of Grangetown (FROG) students to allow them to learn about the industry and engage with future potential employers. ^[EV171]

Requirements of SOWF’s supply chain

6.18 **Innogy sets a high-level of importance on equal employment opportunities,** inclusion and diversity and expects these principles to be followed by its suppliers. ^[EV199]

6.19 **SOWFL will commit to supporting its suppliers to fulfil innogy and BEIS’ SCP requirements.** ^[S1-S6] All Tier 1 bidders are asked to produce a SSCP that complies with innogy’s skills requirements (which encompass BEIS’s SCP criteria). As part of the procurement process SOWFL will ask for tenderers to consider skills solutions in their proposals and submit a Value Outcomes Report detailing how many jobs are expected to be sustained or created as a result of the contract and how many apprentices and trainees are expected to be engaged. We will also request information on HR policies to understand the suppliers’ diversity and inclusion requirements. At meetings with suppliers, skills will be a standing agenda item. ^[EV187]

6.20 **SOWFL recognises the opportunity for the project and wider industry to benefit from building UK competency in HVDC skills.** [REDACTED]

[REDACTED]

Highlights of SSCPs submitted to date include:

- A. [REDACTED]

B. [Redacted]

C. [Redacted]

6.21 **SOWFL received [Redacted] SSCPs from [Redacted] suppliers. Highlights are:**

A. [Redacted]

B. [Redacted]

C. [Redacted]

Actions by innogy and SOWFL to develop the required internal skills

6.22 **SOWFL will benefit from the skills developed and shared from previous innogy projects.**^[S3,S6] Nearly all of the SOWFL project team have worked on other offshore wind projects, for innogy or other companies. Innogy has an experienced offshore wind team and encourages its employees to work across projects, across markets and with joint venture partners.

6.23 **SOWFL’s team members have access to innogy’s training and skills resources which will equip them to successfully deliver the project.** The resources improve competences, and are supported by effective processes, tools and systems and training opportunities.^[S3,S4] Personal skills development is linked to performance indicators within the offshore strategy and therefore incentivize and enable individual SOWFL team members to contribute to innogy’s success.

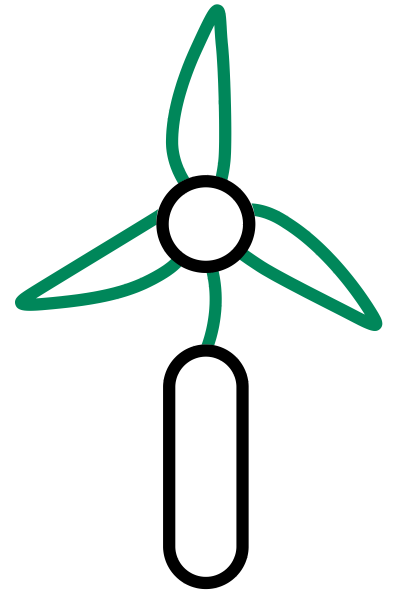
6.24 **Innogy develops the skills required for its digital transformation through training opportunities and by holding idea contests.**^[S3,S4] Innogy held a Digital Day in March 2018 for 200 employees and offers

30 professional development courses as part of its digital programme. Innogy employees working on SOWFL have access to these and are encouraged to complete relevant courses as part of their personal development. The SOWFL team can train in lean and agile working as part of the transformation. ^[EV149]

- 6.25 **Innogy runs graduate, student and trainee courses to encourage skills into the offshore business, including its group graduate programme, New Talent (NTs)**^[S3,S4] ^[EV169] ^{lxi} Innogy first ran its NTs programme in 2018, and recruited 10 graduates in business areas such as Project Services and O&M. Innogy helps its NTs to have as much exposure to the industry as possible and has supported NTs' work on SOWFL (Para. 6.17). Innogy recruited a further 10 NTs in 2019 and, given the success of NTs working on SOWFL in 2018, will very likely bring new skills and fresh ideas to SOWFL during 2019. ^{lxii, lxiii}

Actions by innogy to share best practice and disseminate information to the wider industry

- 6.26 **SOWFL benefits from the wider role that innogy plays in learning and sharing best practice via industry working groups.** SOWFL will continue to use relevant forums to share its learnings and contribute to the wider industry.
- A. **Innogy will be a leading and active member of the forthcoming Sector Deal People and Skills Group** which it has requested to join when established. Innogy provided input into the baseline OWIC skills survey and attended the Apprentice event in November 2018. ^[S3,S4,S6] Innogy has agreed to the OWIC skills initiatives proposed as part of the forthcoming Sector Deal which includes an ambition of employing at least 40 per cent women across the industry by 2030. OWIC will retain an HR professional and initiate working groups across the sector. ^[EV002, EV015]
 - B. **SOWFL's parent company is a member of the National Skills Academy for Power**, an employer-led centre of excellence. The Centre and its members work with governments and regulators to find solutions to the energy industry's skills challenges. ^[S6] ^{lxiv}
 - C. **It was a founding member of the RenewableUK Skills Group, with the remit to ensure that the necessary skills and experience exists to meet the industries' current and future needs.** ^[S6] Innogy supported research into employment trends, an apprenticeship framework and associated qualifications, and helped in the production of an industry careers guides.
- 6.27 **In 2017, innogy worked with OREC to improve operational effectiveness through the multi-skilling of control room staff at Gywnt y Môr.** ^[S3,S4,S6] The study resulted in a set of recommended actions to refine the approach of the O&M team. This included implementing early effective training plans and building practical skills through the use of mentors, work-shadowing and training. SOWFL will review the recommendations and implement them where possible to ensure lessons from innogy's operational projects are embedded. ^[EV140]



Sofia Offshore Wind Farm Limited
Windmill Hill Business Park
Whitehill Way
Swindon
Wiltshire SN5 6PB
T: +44 (0)8456 720 090
www.innogy.com/sofia

Registered office:
Sofia Offshore Wind Farm Limited
Windmill Hill Business Park
Whitehill Way
Swindon
Wiltshire SN5 6PB
Registered in England and Wales no: 07791964