



Offshore Cable Repair Vessel & Universal Joint

Network Innovation Competition
Project Progress Report

December 2014 - June 2015

ABBREVIATIONS USED

ACMA	Atlantic Cable Maintenance Agreement
CfD	Contract for Difference
DP2	Dynamic Positioning Class 2
ENA	Electricity Network Association
FES	Future Energy Scenarios
GMSL	Global Marine Systems Ltd
GW	Gigawatt
IPR	Intellectual Property Rights
kV	Kilovolt
LCNI	Low Carbon Networks Innovation [conference]
MBR	Minimum Bending Radius
NIC	Network Innovation Competition
OFTO	Offshore Transmission Owner
PPR	Project Progress Report
SDRC	Successful Delivery Reward Criterion
SME	Small or Medium-sized Enterprise
XLPE	Cross-Linked PolyEthylene

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1. EXECUTIVE SUMMARY

This section should be able to stand alone and provide a picture of the progress of the Project in the period to all interested parties not involved in the Project. The Funding Licensee should describe the general progress of the Project, including details of any delays or problems encountered; any notable milestones or deliverables achieved in the period and details of any Dissemination activities carried out in the period.

This is the first 6-monthly report from this project. It describes the start-up stages of the project, with contractual arrangements being put in place, information being gathered, stakeholders being consulted, and analysis being presented to allay stakeholder concerns.

The project is unique in that it is the first NIC project – or industry innovation project of any type – to be undertaken by an offshore transmission owner. The successful start-up of the project has therefore required innovations in the way that the project is structured, and a bespoke form of contract has had to be used in order to be compatible with the unique structural and financial features of offshore transmission owners.

1.1 Project Overview

The project comprises two elements that act synergistically (i.e. implementing the two elements together gives benefits that exceed the sum of the benefits of each element on its own). These elements are:

- i) The conversion of an existing telecom cable repair vessel – the *Wave Sentinel* – so that it can repair power cables as well as telecom cables. The vessel, which has its home port in Portland, Dorset, is contracted to the Atlantic Cable Maintenance Agreement (ACMA): this allows agreement members to access the vessel much more rapidly (and at a much lower cost) than is currently the case for power cable repairs. The project envisages that power cable owners will access the vessel through becoming members of ACMA, and the confirmation of suitable means for doing so is a precondition for the project to proceed beyond its initial phase.
- ii) Development of a “universal” joint capable of connecting all cables of the type used by OFTOs¹. This would involve selection of a suitable (and already tested) onshore joint body², devising suitable waterproofing and mechanical protection arrangements for the offshore

¹ i.e. XLPE insulation, 132-155kV nominal voltage, 300mm² to 1000mm² copper conductor. Despite the “universal” title the actual aim is to connect all useful combinations of installed and spare cable. Thus, for instance, the smallest and largest sizes of cable might not be compatible as it is expected that an intermediate-size spare cable would be available to repair a fault on the smallest cable size.

² For cables of the type used by OFTOs offshore joints are always based on the same type of joint body as onshore joints: only the waterproofing and mechanical protection arrangements are unique to the offshore environment.

environment, and undertaking an extensive series of tests to verify that the joint meets the relevant international standards for offshore joints.

The benefits of the project to consumers will arise through:

- i) Increased availability of low-carbon power due to a reduction in the length of time for which some or all of an offshore wind farm's output is unavailable as a result of the failure of an export cable.
- ii) Cheaper offshore wind power – that is to say a lower strike price in contracts for difference (CfDs). This lower price would come about because the wind farm will be able to count on exporting more power over its life (due to faster repairs), because prospective OFTOs will face lower repair costs which will be passed-through in lower bids, and because faster repairs will allow the wind farm to select cheaper designs (e.g. fewer higher-capacity cables) for their power export systems.
- iii) Cheaper power from interconnectors. Ofgem's analysis for the "cap and floor" regime shows very substantial consumer benefits from interconnectors. These benefits are reduced if an interconnector is out of service due to a cable fault. More rapid repair of interconnector faults therefore increases the benefits to consumers.
- iv) Reduced system constraints. Offshore transmission cable is being increasingly used to carry power within Britain, in particular onshore wind power from remote areas in Scotland and from Scotland to England/Wales. If such a link were to fail it would lead to significant system congestion costs during periods of high wind as generation that normally exports through the faulty cable is "constrained off". By ensuring that repairs are undertaken as rapidly as possible the quantity of such costs for consumers can be minimised.

1.2 Progress to date – milestones and deliverables

The Key Achievements of this reporting period have been as follows:

- i) Agreeing the GMSL-OFTO contract.
- ii) Successfully responding to ACMA questions in relation to power cable fault rates and repair times, based on quantitative research into both areas which resulted in a confirmation letter issued by ACMA on 8th June 2015 (attached in Appendix 1) confirming that owners of UK transmission cables will be able to access ACMA on the same terms as the current members.

- iii) Following a research and various discussions with Transmission Owners, identifying minimum bending radius (MBR) as the key factor driving the design of vessel conversion work, and researching the MBR requirements of existing and new cable projects, along with the capabilities of installation vessels.
- iv) Meetings with potential joint developers. These have helped to encourage potential contractors, and have provided a detailed picture of proposed technologies and commercial arrangements.
- v) Meetings with all British transmission companies and various companies operating within the offshore energy insurance market, and obtaining their feedback on the concept and letters of support.

1.3 Risks and issues

The complexity of agreeing a contract with a project financed OFTO, and the necessity of obtaining approval from the OFTO's lender's lawyers delayed signature of the OFTO-GMSL contract, with some knock-on impact on other areas. However, this is not expected to impact on overall project timescales. In addition, time and effort invested in the negotiation process resulted in cost pressures being felt particularly in the areas of labour and advisory services. Consequently, it is proposed that TC Ormonde OFTO Limited brings forward a contingency amount of £20.5k, which represents 5% of the original £410k, which will be returned to the contingency line at the main stage of the project. This is because the increased time invested in drafting of the GMSL Initial Agreement shall result in a reduced time and effort needed for negotiation of the main phase agreement.

An analysis of key project risks in comparison to the risk register presented in the original funding application showed that five out of 24 risks had reduced, one had been retired altogether while none had increased in severity.

Furthermore the project business case has strengthened since the original funding application because of the following:

- i) There has been no change in the approved estimated project costs.
- ii) The estimated benefits have increased as a result of the inclusion of non-OFTO cables in the cost-benefit case at the request of the expert panel.

- iii) The offshore wind industry has grown more strongly than had been anticipated: at least 5.3GW of new offshore wind is now contracted and due to enter service by 2020, compared to an assumption of 2.4GW in the original analysis. This has the effect of further increasing project benefits.

However, there remains a question mark around the income from the interest accruing on the NIC Project Bank Account which is lower than the income assumed by the Authority at the award of the Funding. This is because the Licensee has been unable to secure a commercial interest rate assumed by the Authority.

1.4 Learning & Dissemination

The key learning outcomes from the current reporting period are as follows:

- i) The OFTO-GMSL contract represents the first ever time that an OFTO has entered into a contract to support an innovation activity. It therefore represents an important step forward in understanding how OFTOs can be used as vehicles for innovation.
- ii) At the request of ACMA, information has been assembled on power cable fault rates and repair times, and these have been compared to telecom cables.
- iii) In order to provide a design basis for the vessel modifications, a document has been prepared which gathers and summarises the research that has been undertaken and feedback received into the minimum bending radius (MBR) requirements and capabilities of cables and vessels.
- iv) Our programme of site meetings with potential joint development subcontractors has provided a valuable database of technical and commercial information concerning this market.

The various processes for engagement with stakeholders represent the primary mechanism for the external dissemination of information concerning the project. Additional dissemination processes include marketing presentations (e.g. at conferences) by project participants, including GMSL and ACMA, and responses provided by project participants to direct approaches by offshore wind farm developers.

2. PROJECT MANAGER'S REPORT

The Project manager's report should be a more detailed version of the executive summary. This section should describe the progress made in the reporting period. Any key issues, deliverables or events should be drawn out and described in detail; referring where necessary to other sections of PPR. This section should also provide an outlook onto the next reporting period. It should describe any key issues or concerns which the Project manager considers will be a major challenge in the next reporting period.

2.1 Initiation, Mobilisation and Governance

The Offshore Cable Repair Vessel & Universal Joint project is being undertaken by TC Ormonde OFTO Ltd., an Offshore Transmission Owner (OFTO).

In contrast to the onshore transmission owners, which own complete networks within a geographic area, an OFTO owns a single transmission asset - in the case of TC Ormonde OFTO Ltd this asset is the cables and substations that connect the Ormonde offshore wind farm. OFTOs are intended as special purpose companies that hold their single asset, receive the revenues associated with this asset, and place contracts for operation and maintenance, repair and insurance. The activities of OFTOs are further limited by the way that they are financed: the project finance approach which allows them to achieve low cost of capital and low tariffs also involves agreements with lenders that greatly reduce their flexibility when it comes to engaging in new areas of work.

TC Ormonde OFTO Ltd has no staff. Instead all asset management is undertaken by Transmission Capital Partners³, who undertake this same asset management role for a portfolio of OFTOs. It is understood that some onshore transmission owners use service companies that are similar in concept. This arrangement, however, does not impact on project costs: to ensure that costs are independent of the OFTO structure, all costs associated with the management of this NIC project are clearly allocated to the project and charged at the rates agreed by Ofgem in TC Ormonde OFTO Ltd's Basis of Charging Statement.

As noted above, the financing of TC Ormonde OFTO Ltd involves agreements with lenders that greatly reduce the financial flexibility of the OFTO. The lenders provide funding to the OFTO on the basis of it being a single-purpose company whose sole activity is the ownership of a single transmission asset, and it is therefore unacceptable for the OFTO to be exposed to any risks above those associated with ownership of its single asset. For this reason the project has adopted a structure where there is a single prime contractor (Global Marine Systems Ltd, GMSL) who is the best placed party to carry the key risks associated with the project.

³ In particular by Transmission Capital Services Ltd, the asset-management arm of Transmission Capital Partners, and its various subcontractors.

The need for these key risks to be carried by GMSL arose from the fact that the TC Ormonde OFTO Ltd's risk level must be unaffected by its participation in the project. This in turn made the contract negotiations between GMSL and TC Ormonde OFTO Ltd slightly more protracted. Furthermore the contract needed to be reviewed and approved by the lawyers acting for the lenders to the OFTO. These factors delayed the agreement of the contract until 18th June 2015. The contract, now in its agreed form, covers the initial phase of the project, but contains substantially all of the terms that would be required for the main phase contract that will replace it.

Notwithstanding this delay, considerable progress has been made in several areas of the project, and GMSL's willingness to commence work in these areas ahead of contract signature is noted and appreciated.

2.2 Engagement with ACMA

The project envisages the conversion of a telecom cable repair vessel, the *Wave Sentinel*, which is currently contracted to the Atlantic Cable Maintenance Agreement (ACMA). A critical factor for the project, and a precondition to progress beyond the initial phase, was that ACMA must agree to allow British transmission companies to join on the same terms as the existing members from the telecoms industry.

A campaign of ACMA engagement has been undertaken over the past 6 months, comprising:

- i) Initial discussions with selected ACMA members, which suggested that the key issue was fault rates. In particular there was concern that the fault rate (i.e. faults per year per 1000 km of installed cable) could be higher for power cables than for telecom cables. Since the fees for ACMA membership are based primarily on cable length, this would imply that power cables would in effect be receiving a subsidy from telecoms cables to the extent that they would be paying less per repair.
- ii) In response to this concern a presentation was given to the ACMA Contract Management Group in January 2015. This calculated the fault rate for operational power cables based on British and international experience, and compared it to the fault rate for telecoms cables. It concluded that the fault rates were broadly similar, with power cables having a somewhat lower fault rate than telecom cables installed in water depths less than 1km, and a higher fault rate than telecom cables installed in water depths greater than 1km.
- iii) The ACMA Contract Management Group did however raise a second issue: whether the time required to undertake a repair was higher for power cables than for telecom cables. If

this was the case then it would mean that power cable repairs would cost more than telecom cable repairs, a difference not fully reflected in the charges levied on the cable owners as much of this charge is pro-rata to cable length.

- iv) In response to this an analysis was undertaken which calculated the average repair time (from arrival of the repair vessel on site to re-energisation of the cable) for a large sample of power cable repairs.
- v) This analysis was presented to the ACMA Management Committee in April 2015. This showed that although power cable repairs do indeed take longer than telecom cable repairs (due to the power cable joints being more complex and labour intensive to assemble), for power cables in or near Britain this effect is cancelled out by the proximity of the repair to the *Wave Sentinel's* home port at Portland, which reduces the time that the *Wave Sentinel* will require to get to and from the repair site.

Following the positive response by almost all ACMA members at the ACMA Management Committee meeting in April, the chairman of ACMA has issued a letter to confirm that ACMA will allow new members to join it on the same terms as the existing members from the telecom industry.

Outlook for next report period.

Notwithstanding the satisfaction of the initial condition in relation to ACMA approval, a good stakeholder relationship with ACMA remains important for the delivery of the project. Engagement with ACMA will therefore continue and a further ACMA meeting in July 2015 provides an opportunity, if required, to respond to any remaining issues.

2.3 Vessel modification design work

In order to develop the vessel design and cost estimate to the level required at the end of the initial phase, GMSL intends to use a mixture of in-house staff and an offshore engineering specialist company. Although the bulk of GMSL's formal procurement process for the offshore engineering company will start after signature of the OFTO-GMSL contract, considerable work had been undertaken prior to this:

- i) Following the project direction, GMSL reviewed the proposed vessel modifications in light of the view expressed by Ofgem and the expert panel during the bid assessment process that the vessel should be designed so as to accommodate not only the type of cables used by wind farm connections, but also current and future interconnectors and offshore cables owned by "onshore" transmission owners.

- ii) This review examined various cable parameters (e.g. weight, maximum tension and crush resistance) and concluded that the most important parameter driving the cost of the vessel conversion work was the minimum bending radius (MBR) of the cable. This drives the sizing of the stern sheaves, the deck layout, the sizing of the quadrant and the sizing of the storage turntable⁴.
- iii) Research was undertaken to find the largest MBR for British cables in service or on order, and it was found that the cables owned by existing OFTOs have lower MBRs than several of the cables that have been ordered for future offshore wind farms and one of the cables ordered by onshore transmission owners.
- iv) In addition research was undertaken into the MBR capabilities of cable installation vessels – on the basis that this will set a limit on future cables and shows installers’ expectations for future cables.
- v) Based on this information a design basis document has been created that will inform the process to design the vessel conversion works.
- vi) Main steps in the procurement process have been agreed with GMSL and the review of GMSL’s standard procurement process is almost complete.

Outlook for next period

In the next period the specialist offshore engineer will be appointed by GMSL and it is expected that their study will be largely complete by the end of this period.

2.4 Selection of joint development subcontractor

The development of the “universal” joint is to be subcontracted by GMSL. Similarly to the offshore engineering specialist company GMSL has started the procurement activities for this role, though the bulk of the formal procurement process will be undertaken once the contract is fully signed. Once again considerable preparatory work had been undertaken in relation to the “universal joint”:

- i) Meetings were held with seven⁵ potential joint development subcontractors at their technical facilities. These meetings discussed the technical aspects of the concepts being considered by these companies, the commercial aspects of any contract with GMSL, and

⁴ The storage turntable is sized by the MBR value when the cable is not in tension, this is lower than the MBR when the cable is under tension.

⁵ These seven companies have expressed an interest in the joint development role, as have several others. It should be noted that these companies do not have any particular “prequalification” status and it is intended that the tender will be open to additional companies.

the nature of any long-term role the subcontractor might play in support of their jointing technology.

- ii) It was found that the number of companies wishing to undertake this role was substantially greater than had been the case in the summer of 2014 when the original funding application was being prepared. It was also clear that several companies had undertaken work on their own, refining their technical concepts and forming alliances to deliver the development work should they be selected. This level of interest and competition is regarded as highly encouraging.
- iii) These meetings have allowed the project to better understand the needs of potential joint development subcontractors prior to issuing the invitation to tender.

Outlook for next period

In the next period the joint development contractor will be selected. This will include selection of the preferred joint technical concept, arrangements for testing, and arrangements for post-delivery support.

2.5 Stakeholder engagement

The Project Direction assigns a high priority to stakeholder engagement, with the following being required for the initial phase of the project:

- i) The project must demonstrate appropriate engagement with the three onshore transmission owners and all OFTOs that had licences at the date of the Project Direction. The engagement must show that the specification of the vessel modifications and “universal” joint have been discussed, that feedback has been obtained, and how this feedback has been included in the specifications (or why it was not feasible to incorporate the feedback). Plans for ongoing engagement during the main phase of the project must also be set out.
- ii) The project must also take all reasonable steps to secure the support of OFTOs, their agreement in principle to the terms for accessing the products⁶, and their agreement to provide access to necessary technical data⁷.
- iii) The project must provide evidence that ACMA members agree to British transmission companies jointing the agreement (see 2.2 above).

⁶ i.e. the terms for ACMA membership.

⁷ i.e. cable technical parameters and/or samples of spare cables.

- iv) The project must demonstrate engagement with insurance providers.
- v) The project must demonstrate engagement with cable manufacturers and show that use of the universal joint will not impact on the warranty cover of unaffected sections of cable.

To date meetings have taken place with all transmission companies listed in the Project Direction. Feedback from these companies has been positive, with a strong recognition of the high costs and long delays associated with current cable repair approaches, and support for the concept of using ACMA.

Feedback from OFTOs has provided the following key points that the project is seeking to incorporate:

- i) The *Wave Sentinel* is not capable of operating in shallow waters (nominally waters less than 10m). Whilst the majority of OFTO cable is in deeper waters, a substantial proportion is in shallow waters and therefore inaccessible to the vessel⁸. OFTOs were keen to understand how the ACMA agreement worked in relation to shallow water repairs. The project has agreed to explain to all potential users how the ACMA agreement works for shallow water repairs, and we will seek to ensure that it can be used to best effect.
- ii) It was noted that the number of occasions on which the universal joint is used may be low in early years, when many projects will still have access to repair joints provided when their cable was first built⁹. Ensuring that jointers have sufficiently current experience in the early years is therefore a concern. Prospective joint development subcontractors have proposed various solutions to this issue, and we will ensure that the quality of solution proposed will be a key criterion for selecting the joint development subcontractor.
- iii) The OFTO community is eager to understand how the benefits sharing mechanism will work in practice after its development.
- iv) Notwithstanding the above concerns the OFTOs owned by Blue Transmission and Transmission Capital Partners have agreed to support the project by providing TC Ormonde OFTO Limited with their letters of support. Those OFTOs have also declared to assist TC Ormonde OFTO Limited with future developments of the project. Greater Gabbard OFTO Plc has provided verbal support for the universal joint part of the project, but further discussions are necessary to explain the benefits of ACMA arrangement before Greater Gabbard OFTO Plc can decide to commit to that part of the project. The respective letters of support received from Blue Transmission and Transmission Capital Partners are

⁸ Of the repairs that have been undertaken on operational UK offshore transmission cables, approximately 80% have been in depths of more than 10m. The remaining repairs were in shallow waters and needed to be undertaken from anchored flat-bottomed barges.

⁹ Over time we would expect universal joint use to increase as more cables are installed.

attached in Appendix 2.

Feedback from the “onshore” transmission owners has provided two additional points that the project is seeking to incorporate:

- i) In contrast to OFTO cables where warranties are limited, onshore TOs tend to prefer stronger warranty terms¹⁰. Additional effort is therefore required to understand the impact on these warranties.
- ii) Some of the cables owned and ordered by onshore transmission owners are larger in physical size than those owned by OFTOs. As a result the ability of the modified vessel to take larger cables is important for this class of user. This is dealt with further in section 2.3.

Discussions with cable manufacturers has to date been limited to meetings with manufacturers who have expressed an interest in undertaking the joint development work. This area will be explored more fully in the next reporting period. In addition, further discussions with the onshore transmission owners will be held in the next reporting in order to address the warranty and cable size concerns.

The project has met with three major offshore energy insurers, namely [REDACTED], who provided very positive feedback, approving the concept and confirming that they would expect reductions in insurance premium resulting from the insureds’ access to the repair vessel through ACMA. Both insurers provided the project with their letters of support which are attached in Appendix 3. In addition, [REDACTED], the largest insurance broker in the UK offshore wind market also expressed their strong support to the project and their letter of support is attached in Appendix 4. .

Outlook for next period

In the next period work will continue on all aspects of stakeholder engagement. In addition to the continuation of work in the areas described above we will start to develop proposals for benefit sharing and will discuss these with the other OFTOs¹¹.

3. BUSINESS CASE UPDATE

The Funding Licensee should note any developments or events which might affect the benefits to be gained from the NIC Project. Where possible the Funding Licensee should quantify the changes these developments or events have made to the Project benefits compared to those outlined in the full submission proposal.

¹⁰ OFTO warranties are typically split between manufacturers and installers, they are often shorter than those required by onshore TOs, and only part of the warranty period will remain by the time of asset transfer. Indeed no existing OFTOs will have any cable warranty by the expected date of project completion.

¹¹ To date only informal discussions have taken place between OFTOs in relation to benefit sharing.

The project business case, as put forward in our funding application, is based on an assessment of the relative costs and benefits of the proposed project. Since then:

- i) There has been no change in the approved estimated project costs.
- ii) The estimated benefits have increased as a result of the inclusion of non-OFTO cables in the cost-benefit case at the request of the expert panel. This factor has been strengthened further by the progress being made by interconnector projects thanks to the Ofgem's confirmation of "cap and floor" arrangements.
- iii) The offshore wind industry has grown more strongly than had been anticipated in the original analysis, which was based on National Grid's Future Energy Scenarios (FES). The 2014 FES's central estimate was that by 2020 an additional 2.4GW of offshore wind would be in service, on top of the existing offshore wind fleet¹². The current situation, however, is that 5.3GW of additional generation has already either placed orders or has secured a Contract for Difference (CfD) agreement.

Overall, therefore, the cost benefit case for the project is substantially stronger than was indicated in the funding application.

4. PROGRESS AGAINST PLAN

This section should summarise the progress of the Project in the previous six month period. It should describe any issues of note that were faced in the reporting period, and how these issues were managed. Key achievements/notable events should be highlighted. The Funding Licensee should briefly describe key planned activities for the next reporting period. This should include any issues the Funding Licensee envisages facing in the next reporting period.

Overall the project is progressing to plan, and is currently on-track to achieve the first successful delivery reward criteria, the completion of the initial phase in or before the required date of September 2016 (see Section 7 for more detail on the SDRCs).

It is noted that the Gantt chart submitted with the funding application underestimated the time required for OFTO-GMSL contract to be put in place. The unexpectedly long time for this item is due to the financial structure of OFTOs, and in particular the need for all aspects of the contract to be agreed by the lender's solicitors (see 2.1 above). In addition the funding application also incorrectly assumed that it would be possible for GMSL to undertake its own procurement processes prior to finalisation of the OFTO-GMSL contract. Despite these variances, the project is progressing to plan since:

¹² Based on the central "slow progression" scenario presented in the FES and used in the project cost benefit analysis.

- i) The work that has already been undertaken in relation to the joint development subcontractor role (see 2.4) will reduce the time required for tendering and selection of a company for this role.
- ii) The work that has already been undertaken on the design basis for the vessel engineering (see 2.3) will reduce the time required for the engineering of the vessel modification.
- iii) The target date for the end of the initial phase has moved back by more than 5 months (from April to Sept 2016)¹³.

The Key Achievements of this reporting period have been as follows:

- i) Agreement of the GMSL-OFTO contract following approvals by the lender's legal advisor. This represents the first ever time that an OFTO has entered into a contract to support an innovation activity.
- ii) Successfully responding to ACMA questions in relation to power cable fault rates and repair times, based on quantitative research into both areas and receipt of ACMA approval for OFTOs to join ACMA on the same terms as existing members.
- iii) Identifying minimum bending radius (MBR) as the key factor driving the design of the vessel conversion work, and researching the MBR requirements of existing and new cable projects, along with the capabilities of installation vessels.
- iv) Meetings with potential joint developers. These helped to encourage potential contractors (including a large number of SMEs), and helped to provide a detailed picture of proposed technologies and commercial arrangements: this in turn will allow an acceleration of the joint developer tendering process.
- v) Meetings with all British transmission companies as well as with various major companies operating in the offshore energy insurance market, and obtaining their positive feedback on the concept.

For the next reporting period the following Key Activities are envisaged:

¹³ This adjustment was primarily to reflect the introduction by Ofgem of additional preconditions for the completion of the initial phase (see 2.2 and 2.5 above). It should be noted that work on these preconditions has not been impacted by the delay to agreeing the GMSL-OFTO contract and that good progress has been made.

- i) Tendering for, and appointment of, the joint development subcontractor.
- ii) Tendering for the offshore engineering specialist, appointment of this company and their preparation (alongside GMSL in-house resources) of design drawings ready for examination by a marine classification society.
- iii) Continued engagement with ACMA and potential users. General engagement with manufacturers.
- iv) Development of concept(s) for benefit sharing.

5. PROGRESS AGAINST BUDGET

The Funding Licensee should report on expenditure against each line in the Project Budget, detailing where they are against where they expected to be at this stage in the Project. The Funding Licensee should explain any projected variance in excess of five per cent against each line.

The table below summarises the budget (as set out in the Project Direction, full submission text and spreadsheet) and compares it with actual expenditure in this reporting period. Please note that since the table below includes all incurred and committed costs, its total value will be higher than the costs apparent from the bank statement, which only includes paid invoices.

Table 1: Project Costs to Date

Cost Category	Total budget	Phase 1 budget	Spend to date	Forecast spend for Phase 1	Comment
GMSL contract	£8,889k	£320k	£70k	£320k	The expenditure is the milestone payment to GMSL on contract signature
Labour	£420k	£50k	£46.8k	£50k	Charges at the rates agreed in the Basis of Charging Statement
Travel	£20k	£4k	£1k	£4k	
Other advisors	£150k	£36k	£30k	£36k	Legal costs associated with the OFTO-GMSL contract and technical advice during the procurement process

Contingency	£850k	-	n/a	£20.5k	This additional expenditure shall cover the increased labour (+£5.5k) and advisory costs (+£15k) which will be returned from savings achieved in the next stage of the project.
TOTAL	£10,329k	£410k	£147.8k	£430.5k	

6. BANK ACCOUNT

The Funding Licensee should provide a bank statement or statements detailing the transactions of the Project Bank Account for the reporting period.

Please see confidential Appendix 5. Please note that since the bank statement only reflects paid invoices, costs will appear to be less than in the Progress Against Budget section above which reflects costs that have been incurred and/or committed by the project. The Funding Licensee can only access the funds once the OFTO-GMSL contract has been fully executed.

7. SUCCESSFUL DELIVERY REWARD CRITERIA

The Funding Licensee should provide a brief narrative against each of the SDRCs set out in their Project Direction. The narrative should describe progress towards the SDRCs and any challenges the Funding Licensee may face in the next reporting period.

Table 2 below summarises Table 4 of the Project Direction and indicates the current status of the project in relation to each criteria.

Table 2: Successful Delivery Reward Criteria

Criteria	Description	Evidence	Status
Complete Initial Phase	Complete initial phase and make go / no-go decision on whether to proceed with main phase by September 2016 ¹⁴	<ul style="list-style-type: none"> Contract with GMSL for main phase ACMA approval (or decision not to proceed) 	Ahead of target
Vessel modifications	Complete modifications to the Wave Sentinel necessary for power cable repairs by September 2017.	<ul style="list-style-type: none"> Complete DP2 trials 	On target
Universal Joint	Complete testing of joints by June 2018	<ul style="list-style-type: none"> Witnessed test reports (electrical and mechanical tests, and sea trial) 	On target
Complete Project	Project close report by July 2018	<ul style="list-style-type: none"> Report issued 	On target

At present only the first SDRC has activities underway that direct lead to its achievement: the remaining SDRCs relate to activities in the main part of the project that – by definition – will not start until the first SDRC is achieved.

As noted previously, in the current reporting period the key challenge has been to agree the OFTO-GMSL contract in a form suitable for TC Ormonde OFTO Ltd's status as a project financed entity, and to obtain approval for this agreement from the lender's lawyer.

In the next reporting period the largest challenges are expected to be the selection of the joint development subcontractor and the development and discussion of concepts for benefit sharing.

8. LEARNING OUTCOMES

The Funding Licensee should briefly describe the main learning outcomes from the reporting period. It should update Ofgem on how it has disseminated the learning they generated as part of

¹⁴ The Project Direction sets out a process to adjust this date if this becomes necessary as a result of the requirements specified in Condition 11 of the Project Direction.

the Project over the last six months.

8.1 Summary of key learning

The key learning outcomes from the current reporting period are as follows:

- i) As noted previously, the OFTO-GMSL contract represents the first ever time that an OFTO has agreed to enter into a contract to support an innovation activity. It therefore represents an important step forward in understanding how OFTOs can be used as vehicles for innovation.
- ii) At the request of ACMA information has been assembled on power cable fault rates and repair times, and these have been compared to telecom cables. The information learned from this research and analysis has been presented to ACMA members and is available (on request) to any British transmission company.
- iii) In order to provide a design basis for the vessel modifications, a document has been prepared which gathers and summarises the research that has been undertaken into the minimum bending radius (MBR) requirements and capabilities of cables and vessels. As this document includes cable and vessel data provided in confidence it is not intended to make it generally available. However the conclusions will be incorporated (with data suitably anonymised if necessary) into the project final report.
- iv) Our programme of site meetings with potential joint development subcontractors has provided a valuable database of technical and commercial information concerning this market. As GMSL is to shortly commence tendering in this market it is not appropriate to make this data available at present, but key conclusions (anonymised if necessary) will be included in the project final report.

8.2 External dissemination activities

The various processes for engagement with stakeholders (ACMA, potential users, insurers and manufacturers) set out in Section 2 above represent the primary mechanism for the external dissemination of information concerning the project, including those key learning outcomes where immediate dissemination is appropriate.

Additional processes that ensure a wider dissemination of information concerning the project include:

- i) Marketing presentations (e.g. at conferences) by project participants, including GMSL and

ACMA. These have helped to increase knowledge of the project in the wider offshore and renewable sectors, with considerable positive feedback from potential users.

- ii) Responses provided by market participants to direct approaches by offshore wind farm developers, including major players in the British offshore wind sector such as DONG and Statoil. These companies may not be direct users of the repair facilities, since the assets they build are passed to OFTOs shortly after completion, but the speed of repair is an important input into their project designs. In addition, the speed of repair will provide the offshore wind generators with the major benefits by reducing the downtime of transmission networks and therefore increasing the amount of energy transmitted to the grid.

During the next reporting period the external dissemination activities set out above are expected to continue and be supplemented by the project giving a presentation at the LCNI conference in November. This conference – which is specifically intended to facilitate the dissemination of information from projects funded by the Low Carbon Networks and NIC programmes – is organised by the Energy Networks Association (ENA), which the Transmission Capital Partners OFTOs participate in through the ENA OFTO Forum.

8.3 Internal dissemination activities

Internal dissemination of the project's key learning outcomes is facilitated through monthly project meetings attended by the technical and commercial managers responsible for operations, maintenance, insurance, warranties and repair on all of the OFTO's managed by Transmission Capital Partners.

9. INTELLECTUAL PROPERTY RIGHTS

The Funding Licensee should report any relevant IPR that has been generated or registered during the reporting period along with details of who owns the IPR and any royalties which have resulted. The Funding Licensee must also report any relevant IPR that is forecast to be registered in the next reporting period.

No IPR has been registered during this reporting period.

10. RISK MANAGEMENT

The Funding Licensee should report on the risks highlighted in the Full Submission pro forma, plus any other risks that have arisen in the reporting period. The Funding Licensee should describe how it is managing the risks it has highlighted and how it is learning from the management of these risks.

Table 3 below describes the key project risks (as presented and described further in Appendix 7 to the

original funding application). For each risk the original funding application calculated inherent and residual risk ratings (i.e. before and after the application of mitigating factors and actions), with each risk rating being calculated as the product of the risk impact¹⁵ and risk probability¹⁶. The risk rating can vary between a minimum of 1 and a maximum of 25, and it is normal in such schemes for a risk rating of 15 or higher (after mitigations) to be considered unacceptable.

The risk register contains some 24 risks, with risk ratings (after mitigations) being as high as 9. The additional information that has been gathered to date has allowed five of these risk ratings to be reduced from the level indicated in the original funding application, while one of the risks has been retired altogether. The remaining risks remain unchanged; none have increased in severity.

Table 3: Risk Register – Changes / Updates

Risk description	Mitigating factors and actions	Mitigated risk rating (Impact x Likelihood)	Update, changes since funding application
Fundamental technical flaw in concept	<ul style="list-style-type: none"> No new technologies. Joint bodies proven onshore. Independent reviews of technical feasibility 	4 (was 5; probability reduced)	Discussions with users, potential subcontractors and technical specialists have identified no “show-stoppers”.
Wave Sentinel damaged during conversion	<ul style="list-style-type: none"> Ensure high safety standards Insurance to cover cost of repairs 	3 (unchanged)	No new information
Unable to agree contract with GMSL	n/a	Nil (Risk retired)	Contract now agreed for initial phase, incorporates main terms needed for main work phase.
Cost overrun in vessel conversion cost	<ul style="list-style-type: none"> Costs independently validated Contingency amount provided 	6 (unchanged)	No new information
Cost overrun in joint development and testing	<ul style="list-style-type: none"> Costs independently validated Contingency amount provided 	6 (unchanged)	No new information
Joints fail test	<ul style="list-style-type: none"> Budget for multiple sequential tests allow for recovery from a failure. 	6 (unchanged)	Have confirmed that all joint developers will use a joint body already tested

¹⁵ On a scale of 1 to 5, where 1 is manageable and 5 is critical, i.e. expected to lead to failure of project.

¹⁶ On a scale of 1 to 5, where 1 is very remote and 5 is almost certain.

	<ul style="list-style-type: none"> • Joints have already passed tests for onshore duty. 		for onshore service.
Vessel fails trials	<ul style="list-style-type: none"> • Early design verification • Remedial work under fixed price or within contingency. • Programme slack available. 	6 (unchanged)	No new information
GMSL financial distress / bankruptcy	Letter of credit from GMSL may be called to reclaim funding provided should costs be disallowed in this type of circumstance.	3 (unchanged)	Letter of credit mitigation now contractually agreed. Risk of timescales impact from GMSL distress remains, hence risk level unchanged.
Jointing subcontractor financial distress	<ul style="list-style-type: none"> • Several capable companies. • Designs based on off-the-shelf onshore joints. • Default IPR rules. So subcontract can be moved if necessary. 	4 (was 6; probability reduced)	Since Ofgem approved funding, a number of larger and more creditworthy companies have expressed an interest in this role.
ACMA disbands	GMSL would seek to establish a commercially equivalent private cable repair service to replace ACMA. Otherwise compensation.	3 (unchanged)	No new information
ACMA members vote against doing cable repairs	<ul style="list-style-type: none"> • Chair of ACMA has discussed with main members. • ACMA vote at initial stage (<4% cost at risk) 	4 (was 5; probability reduced)	Several presentations to ACMA members and positive response. See section 2.
ACMA prices increase substantially	Unlikely given ACMA stability. Possible to claim compensation if ACMA membership becomes unattractive.	6 (unchanged)	No new information
Wave Sentinel does not remain in ACMA	<ul style="list-style-type: none"> • Compensation payable should vessel leave. • Creates incentive on GMSL to ensure that it remains. 	9 (unchanged)	No new information
Slow adoption of Solution due to lack of awareness of benefits	GMSL/ACMA have already started “marketing” of services	2 (was 3; probability reduced)	Have met with British transmission companies, and some major offshore wind developers. Positive feedback (see section 8)
Slow adoption of Solution for commercial reasons	Using ACMA means that the cost and time for a repair will be much better than can be obtained using	3 (unchanged)	No new information

	current approach. Therefore strong commercial incentive to join.		
Delays obtaining suitably trained jointers to assist making for universal joint	Long term call off contract with joint development subcontractor	6 (unchanged)	No new information
Universal joint developer demands high fees for trained jointers and/or training services	Long term call off contract with joint development subcontractor is to use a firm indexed price.	3 (unchanged)	No new information
Delays obtaining marine licences for repair work reduce benefit of project	Ensure “ahead of need” marine licences for repair are put in place while project is underway.	3 (unchanged)	There is a possibility for each OFTO to have a generic licence for cable repair issued by MMO ahead of such a repair
Delays locating faults reduce benefit of project	The offshore transmission industry is gaining experience with a portfolio of fault location techniques.	3 (unchanged)	Transmission Capital Partners have recently employed a new fault location technique (distributed acoustic sensor) with great success
Benefits assumed in cost-benefit analysis do not emerge at level expected	Very conservative assumptions used in cost-benefit, so probability of undershooting is extremely low, and potential volume of undershoot is similarly lowered.	4 (unchanged)	Indications that benefits have increased since original funding application – see section 3.
Other OFTOs or insurers are unhappy with risks associated with universal joint, reducing use	Joint is tested to Cigre standards, with multiple tests covering a range of possible combinations. Although there is arguably a non-compliance with the Cigre requirement for “system” tests this is mitigated by ensuring the tests cover the worst case conditions.	6 (was 8; probability reduced)	Positive feedback from OFTOs and insurers (see section 8), but need to ensure jointers have suitably recent experience.
Delays in vessel conversion	<ul style="list-style-type: none"> Experienced project management. Programme slack 	4 (unchanged)	No new information
Delays in joint design/fabrication/testing	<ul style="list-style-type: none"> Experienced project management. Programme slack 	6 (unchanged)	No new information

Universal joint not suitable for all future windfarm export cables	Acknowledge that universal joint cannot expect to deal with all potential future cable types. Cost-benefit analysis is conservatively based on the joint being usable for just 20% of new cables 2015-2030.	5 (unchanged)	See section 3
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11. OTHER

Any other information the Funding Licensee wishes to include in the report which it considers will be of use to Ofgem in understanding the progress of the Project and performance against the SDRC.

None

12. ACCURACY ASSURANCE STATEMENT

The Funding Licensee should outline the steps it has taken to ensure that information contained in the report is accurate. In addition to these steps, we require a Senior Manager responsible for NIC Projects of the Funding Licensee to sign off the PPR. This sign off must state that he/she confirms that processes in place and steps taken to prepare the PPR are sufficiently robust and that the information provided is accurate and complete.

To ensure that the information contained in this report is accurate and completed, the following steps have been taken, the report has been:

- Prepared by the Project Manager.
- Reviewed by the Project Team.
- Approved by the relevant Senior Manager.

As a member of the Board of Directors of Transmission Capital Services (TCS), and the Senior Manager responsible for this project, I confirm that the processes in place and steps taken to prepare this project progress report are sufficiently robust and that the information provided is accurate and complete.



Chris Veal

19 June 2015

13. APPENDIX 1 – CONFIRMATION LETTER PROVIDED BY ACMA

14. APPENDIX 2 – LETTERS OF SUPPORT PROVIDED BY THE OFTOS

15. APPENDIX 3 – LETTERS OF SUPPORT FROM [REDACTED]

16. APPENDIX 4 – LETTER OF SUPPORT FROM 

17. APPENDIX 5 – BANK STATEMENT (CONFIDENTIAL)