SHE Transmission

Modular Approach to Substation Construction: MASC (SSEN002)

Project Progress Report

Up-date 18th September 2015

June 2015

1) Executive Summary

Overview of MASC

SHE Transmission proposes to demonstrate and deploy a permanent substation design using a Modular Approach to Substation Construction (MASC). The current approach to substation construction differs little from that of 60 years ago: meanwhile many innovations in engineering could create a substation which is cheaper, faster to deploy and more suited to GB's low carbon future.

MASC seeks to prove the following benefits:

- Faster deployment: via maximising off-site construction and programming civil works concurrently with the factory build;
- Improved whole life asset value; using equipment that may operate more times between maintenance shut downs; in turn reducing the frequency of maintenance;
- Increased flexibility for network configuration; matching the generation capacity requirements, via extension or swapping elements out; and
- Reduced environmental impacts: smaller geographical footprint, minimal disruption to the local communities as a result of a reduced time on-site and more sympathetic visual appearance.

Progress within this Reporting Period

The MASC project has been focusing on actively engaging the Stakeholders to explore their opinions to help shape the MASC functional specification, which aligns with the first SDRC. SHE Transmissions has been discussing with and listening to our Stakeholders. The following Stakeholder events have occurred:

- Internal MASC dissemination meetings;
- Manufacturer Interviews;
- Utility Licensees and Consultants' Workshop;
- On-line survey for Planning Authorities; and
- Face-to-face interviews with Environmental and Community Groups.

The information being gathered from the Stakeholder engagement has been very informative. Further work is ongoing on the most efficient way to analyse and rank this information.

MASC Challenges

Finding a suitable trial location for the MASC solution has been identified as a high risk. To mitigate the associated risk, details of MASC are being discussed internally with the aim of identifying suitable new infrastructure developments that align with the MASC programme.

Communications

During this reporting period, information on MASC activities have been published on the following web sites:

Linkedin

- https://www.linkedin.com/grp/home?gid=8249399&goback=%2Egmr_8249399

SSE Power Distribution

- www.ssepd.co.uk/innovation

2) Project Manager's Report

Project Summary

The project is managed via six work packages. An update on the progress made on each work package during this reporting period is provided below:

2.1 Scoping Requirements

Stakeholder engagement has generated a large volume of information. Grouping this information is underway. The suggestions are being evaluated to assist the selection of future avenues of work.

2.2 Consent & Construction

Discussions are under way to identify a trial location for MASC. The progress of a new generator's planning application and their internal build strategy will influence the MASC delivery timescale.

2.3 Operation

This work package's main activities are planned to start April 2016. However Stakeholder feedback is being shared with the Operational Team.

2.4 Monitoring & Evaluation

This work package's main activities are planned to start April 2016. Investigation will be undertaken based on learning shared by Stakeholders on their experiences and concerns around monitoring.

2.5 Knowledge & Dissemination

Positive feedback was received on the structure of the Licensees and Consultants' workshop on the 21st April 2015.

A dissemination plan is being developed based on the preferences received from discussion with the Stakeholders.

2.6 Project Management & Governance

Monthly Steering Group meetings are scheduled and underway.

SDRCs

Work is presently underway to deliver the first SDRC. Key Stakeholders have been contacted to seek their input to help shape the MASC functional specification. The report is on track to be published on the 30th July 2015.

Stakeholders have expressed a positive interest in MASC and would like to receive further information over the course of the project.

Business Case Update

No changes have been made to the Business Case for the MASC, described in the NIC full submission document.

Summary

The project is in its early stages and progress has been steady, with good foundations being laid to ensure effective project delivery.

3) Progress Against Plan

Summary of Progress

Overall the project is progressing on plan and budget.

Risks

The location of a site for the deployment and monitoring of the MASC concept is a significant risk for the project. Since the original conception of the MASC NIC project, there has been regular interaction between the MASC project and other key teams within SHE Transmission to identify, assess and review potential sites for deployment.

As there are many uncertain elements associated with generation connections, we believe it is prudent to keep all potentially viable schemes under consideration to minimise the risk of a preferred scheme not progressing. The level of risk in terms of identifying the initial site has increased in light of the recent DECC announcements about future renewable energy subsidies. Following these announcements, we are currently reviewing our anticipated connections work for the foreseeable future across the whole of SHE Transmission's activities. As part of this, we are revisiting our initial assessment of the sites that are likely to be suitable for an initial application of the MASC concept based on their current status with regard to grid connection, planning consents and anticipated dependency on subsidies for the schemes to be viable. We expect to complete this review by September and will be able to provide a further update regarding site identification to Ofgem at this stage.

The focus over this reporting period has been:

- Initiating the internal processes to correctly manage the project;
- Stakeholder engagement activities, sharing SHE Transmissions aspiration for MASC and listening actively to opinions;
- Starting to analyse the Stakeholder information and quantify key areas to enable targeted research on the specific challenges MASC needs to overcome; and
- Identifying a suitable MASC trial location.

Key Activities in Next Reporting Period

The Key Activities between 20th June 2015 and 19th December 2015 planned are:

- Selection of two locations to progress the MASC Design;
- Selection of two Parties for the MASC Design Competition;
- Completing the 1st SDRC by 30th July 2015;
- Progressing external investigation on areas identified via Stakeholder discussions; and
- Developing a MASC website.

4) Progress Against Budget

The table below details the spend to date against the project budget for each cost category.

Cost Category	Total Budget	Spend to Date	Comment
Labour			
Project team resource costs	£1,373.51k	£91.05k	On Plan
Equipment			
Project team resource costs	£291.57k	£1.50k	On Plan
Contractors			
Project team resource costs	£617k	£10.00k	67% below plan *(refer to Note 1)*
IT			
IT Infrastructure	£244.66k	£0.0k	On Plan *(refer to Note 1)*
Travel & Expenses			
Travel & Expenses	£136.08k	£0.00k	On Plan
Total	**£3,262.83k**	**£101.05k**	*(refer to Note 2)*

Notes:

1) Spend associated with Contractors and IT has been approved but invoices not received.
2) Up to 30th April 2015, the project had spent £82.4k, and this has been processed through the Project Bank Account (shown in the bank statement). From 1st May 2015 to 5th June 2015 the project spent a further £18.65k (which has yet to be processed through the Project Bank Account) so the total project spend to 4th June 2015 is £101.05k.
3) Project Spend as extracted from the finance system (Harmony) on 4th June 2015.
4) There is no project budget nor project spend under the Cost Categories: IPR Costs, Payments to Users, Contingency and Decommissioning.

5) Bank Account

A copy of the current project bank account statement is provided in Appendix I.

6) SDRCs

An update on the Project's SDRCs is provided below.

MASC identified eight Successful Delivery Reward Criteria (SDRC) which span both the objectives and the lifecycle of the project.

The following table lists each SDRC in chronological order and details the project's progress towards their achievement.

SDRC	Due	Description	Evidence	Status
9.1	30/7/2015	**Stakeholder Engagement** A key milestone of MASC's success involves the outputs of engagement with key stakeholders groups, including: • Internal contact within SHE Transmission business areas; • External contact with other transmission and distribution License holders; • External dialogue with manufacturer and broader supply chain: and • External stakeholders such planning and other statutory bodies Work undertaken within this criterion will also seek to inform the development of the technical and functional aspects of the MASC Substation.	A report detailing the output from stakeholder engagement activities and their impact on MASC's functional specification requirements.	**On target**
9.2	15/01/2016	**MASC substation detailed design** The publication of the final, functional requirement document for the MASC project will require the identification of new equipment and associated requirements of operation and maintenance. The NIC funding will also support evaluation of new civil engineering practices and advance in aesthetics and environment that could factor into the final functional specification.	A report which will identify the key innovations that have been incorporated into the final technical specification	**On target**
9.3	31/10/2016	**Knowledge capture from off-site construction** At this stage, MASC components will be manufactured and tested in a factory environment. This stage offers invaluable opportunities to evaluate individual components, protection and control systems. Comparison between MASC off-site construction and commission testing (in a clean, controlled environment) with conventional on-site construction processes will be collated.	Written analysis of the progress towards complete system testing achieved during the factory stage and identification of cost savings.	**On target**
9.4	30/06/2017	**Knowledge capture from on-site installation** At this stage, the substation will be transported to site,	The MASC Project Team will produce an analysis document	**On target**

6) SDRCs

		with essential on-site construction completed. Key learning from this stage will validate outputs from stakeholder engagement.	which provides a clear assessment of the benefits of the project's approach in comparison to conventional methodology in installation of an air-insulated substation.	
9.5	29/09/2017	**Analysis of MASC on-site commissioning and energisation** NIC funding will be used where appropriate to deliver validatory on-site re-testing and commissioning when the substation is installed and energised. Verification of – on-site commissioning and energisation will also take place. This will be compared with the outputs from the factory commissioning tests.	A full report detailing the outputs and knowledge capture, including learning on the substation's behaviour during and following energisation	**On Target**
9.6	30/06/2018	**Operational Learning** The MASC solution is anticipated to challenge current operational and maintenance practices. Knowledge captured throughout a period of MASC operation will inform and validate key operational and maintenance theories	The MASC Project Team will publish a paper which summaries ways in which MASC solution elements challenge present day procedures. This paper will include mitigation against said challenges and highlight possible improvements.	**On Target**
9.7	18/12/2018	**MASC Performance Monitoring and Evaluation** Monitoring will be ongoing throughout the project's lifecycle. At this stage, valuable knowledge concerned with factory, transportation, installation and operational monitoring will be collated.	A summary report of the monitoring undertaken and the recommendations drawn out from analysis.	**On Target**
9.8	28/06/2019	**Project Closedown Report** At the end of the project, full evaluation and key learning points will be considered for inclusion in a comprehensive project closedown process. This will include learning gathered from knowledge events and the progress of the MASC substation during operation. This will also include details of the safety, operational and maintenance procedures developed for MASC through engagement with all other transmission and distribution licensees.	A detailed closedown report	**On Target**

Completed (SDRC met)	Emerging issue, remains on target	SDRC completed late
On target	Unresolved issue, off target	Not completed and late

7 Learning Outcomes

The following learning objectives have been set for the MASC project:

- **New Substation Requirement:** The detailed design requirements and functional specification produced in this project will be directly applicable to the roll-out of further modular substations.
- **Performance, Operability and Maintenance Requirements:** Additional monitoring and measurement of the new equipment during the operational phase to provide confidence that MASC is performing as anticipated.
- **Future Usage Options:** A suite of potential sites for future deployment of MASC will be developed during the project, highlighting the geographical and business scenarios which are most appropriate for use of the technology.
- **Supply Chain Capability**: Engage with suppliers to identify a range of solutions and innovative technologies applicable to modular substation design, deployment, operation and maintenance.

These learning objectives will be met as MASC progresses into the design phase through to site installation and final operation.

Learning during this reporting period

The 1st SDRC report which will be available for review from the 30th July 2015 will contain more information on the learning captured from the initial stakeholder engagement activities. These engagement activities have provided a large volume of information and notably there has been very positive support shown for the MASC trial.

The honesty of the stakeholders was very much appreciated and highlighted the need to build confidence amongst the industry that will operate the new MASC substation that the approach will perform at least as well as the traditional substation in terms of:

- Functionality/operational effectiveness;
- Health and safety;
- Everyday comfort e.g. warm and dry;
- Asset life;
- Ease and cost of asset management;
- Aesthetics;
- The environment; and,
- Ease of securing planning permission

IPR

No relevant IPR has been generated or registered during this reporting period.

8) Risk Management

Risk Management Plan

The project has a Project Risk Management Plan that describes how project risks are managed throughout the project.

The project risk register is regularly reviewed by the project team and the key project risks are highlighted and discussed at the monthly steering group meetings, where mitigating actions are agreed.

Risk Register

The current project Risk Register is provided in Appendix II.

9) Accuracy Assurance Statement

PPR Preparation Steps

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;
- Reviewed by the Steering Group; and
- Approved by the Project Director and Regulation.

Sign-off

As the senior manager responsible for the MASC project, I confirm that the processes in place and steps taken to prepare this PPR are sufficiently robust and that the information provided is accurate and complete.

Stewart A Reid

Future Networks Manager
Scottish Hydro Electric Transmission

18-9-15.

Date

Appendices

Appendix I

Project Bank Account Statement

Appendix II

Risk Register

Note: all the appendices are considered 'Confidential'