

Network Innovation Competition Full Submission

Supplementary Answer Form

Tick if this answer is Confidential: ☐

Tick if this answer has been provided verbally: ☐

Project code:	SSEEN01	Question Number	19
Question date	3 September 2013	Answer date	5 September 2013
Submission section question relates to	Section 2		
Topic	Project description		
Question	Please describe the planned purpose of the facility in the short, medium and long term. How will the RTDS be used prior to, during, and after the 4-year operational period?		
Notes on question			
Answer	<p>The MTTE will begin to develop benefits and learning from an early stage.</p> <ul style="list-style-type: none"> • Short Term - in the short term, the MTTE will be used to develop models of the GB systems and carry out a range of studies using the RTS. As the number of HVDC schemes in GB increases, and with the addition of more complex HVDC schemes (multi-terminal, multi-infeed, converters in proximity and multi-vendor), together with more active controlled devices on the network, the potential for adverse control interactions will increase significantly. This is expected to require the use of time domain simulation including real time simulation to understand and de-risk their control interactions. The MTTE and RTS will have the capability to deliver this type of study. Initially HVDC equipment will be modelled using generic models, however, as the projects progress it is anticipated that the "generic" HVDC models will be replaced by the specific manufacturers' models of the HVDC systems. • Medium Term - In the medium term, replica panels will be connected during testing to validate the previous studies and give a more realistic set of outcomes. This will include pre-commissioning works to identify any potential adverse interactions with other network components. As the number of HVDC schemes increases it will be necessary to ensure the interoperability between different vendors equipment. The use of replica panels provides a robust method of testing these interactions. The arrival of replica control panels allows the MTTE to begin to deliver operational 		

training for TO staff.

- **Long Term** - The MTTE will continue to deliver operational training and support for the TOs as the number of HVDC systems increases. It will also be able to deliver the studies and learning to allow the TOs to optimise the performance of these systems, for example this could include testing updates in operational software will we tested prior to commissioning on live DC system.

The Management team at MTTE will be tasked with looking at the long term business plan for the MTTE. This will include options for operating beyond the NIC funding period. The long term future of the MTTE will be influenced by a number of factors including:

- The number and scale of HVDC projects being progressed on the GB network;
- Number of equipment vendors in the market especially new entrants;
- Technology developments in HVDC; and
- Development and changes in the Regulatory environment.

Subject to all of these factors there a number of scenarios which could be envisaged for the long term future of the MTTE, these include:

- The continued operation of the MTTE facility to deliver ongoing benefits to customers (for which there are a variety of funding/operating models) [which we believe is the most likely scenario];
- The MTTE being sold as a 'going-concern' for HVDC research (e.g. to academia, a research organisation, specialist consultancy or manufacturer), with funds being returned to customers; or
- The MTTE being decommissioned, extracting value from the assets to be returned to customers.

The final decision will be taken to ensure best value for Transmission customers. The management team will need to make the most appropriate decision well in advance of the end of the NIC funded period in order to ensure best value for customers.

Use of the RTS

- **Prior** to the commissioning of the MTTE facility, the project intends to purchase an RTS to enable our academic consortium to start to developing the models required by the MTTE, including for example: reviewing and validating existing HVDC system models to identify gaps and developing improved models of key HVDC components where required. Furthermore, we recognise that the MTTE facility will require core dedicated staff who have expertise in RTS modelling, this pre-commissioning RTS work will enable expertise to be developed in this area.
- **During** the NIC funded operation of the MTTE. The heart of the MTTE will be the Real Time Simulator (RTS). The RTS is purpose built to allow

	<p>the MTTE to investigate the effects of disturbances on power system equipment and networks to prevent outages or complete failure. The RTS will work in continuous, sustained real time and can thus solve power system equations fast enough to realistically represent conditions in the actual network. Because the solution is real time, the simulator can be connected directly to replica power system control and protective relay equipment. The RTS would be used to: simulate the AC network (as a reduced equivalent model), simulate LCC, VSC and VSC MMC Converters, simulate multi-terminal schemes (with 3, 4 or 5 terminals), simulating SVC (TCR + TSC) and STATCOM devices, simulate wind turbine generators, and simulate the complex interactions between these devices in electric proximity [for further details please refer to Appendix IV of the Full Submission].</p> <ul style="list-style-type: none"> • After the NIC funded operation of the MTTE, the use of the RTS will depend on the agreed future use of the MTTE facility, ranging for selling the RTS equipment to return money to customer, through to continued operation of the MTTE (which we believe is the more likely scenario).
Attachments	N/A
Verbal Clarifications (Consultants)	N/A