

# *Network Innovation Competition Full Submission*

## *Supplementary Answer Form*

Tick if this answer is Confidential: ☐

Tick if this answer has been provided verbally: ☐

Project code:	SPT EN 01	Question Number	24
Question date	03/09/2013	Answer date	05/09/2013
Submission section question relates to	Section 2.5		
Topic	Technical Description of project		
Question	Please explain how the project outcomes will be accommodated into the business processes adopted by the TOs and the GBSO associated with system planning and operation. What are the key areas of activity that are expected to change and how and when will these changes be implemented?		
Notes on question			
Answer	<p>VISOR project will <u>provide visibility of real time transmission system dynamics</u>. While the decision-making function is one of the aspirations for Wide Area Monitoring, Protection and Control (WAMPC), VISOR, at this stage, is <u>to baseline</u> the network and build evidences <u>to prepare</u> for any changes in the existing operational exercises.</p> <p>VISOR project will potentially contribute and have the direct impacts on the existing business processes upon its successful trial. In particular, the outcomes will feed into the <b><u>network understanding and transmission investment planning</u></b>, including Oscillation Alarm, Definition of Constraints, Network Model Validation, Generator Model Validation and Hybrid State Estimator.</p> <p><b>Oscillation Alarm &amp; Response procedures</b></p> <ol style="list-style-type: none"> <li>1. For low frequency alarm and response, the <b>operational</b> procedure associated with oscillation alarms will be revised to reflect the new locational information across the GB system made possible through VISOR. The <b>planning</b> procedure will involve the use of oscillation information for control system tuning, and identification of control malfunctions, and the procedure will involve notification to planners of significant deviations from the norm. Planning procedures will include guidance for interpreting and resolving dynamics issues.</li> <li>2. For high frequency SSO, the <b>operational</b> procedure will involve co-ordinated network switching/dispatch actions such as bypassing a</li> </ol>		

series capacitor or changing generator dispatch to change the effective impedance of the network. The **planning** procedures will include assessing emerging needs for SSO protection, reviewing SSO protection configuration, comparing observed torsional and network natural frequencies with normal behaviour and confirming or tuning the model.

The VISOR project will include drafting the procedures and engaging stakeholders for feedback on the proposed procedures. There will be consultation at various stages of the project to ensure that the presentation of information is accurate, timely and actionable for the end users, but the procedure documents will be drafted towards the end of the project.

Introduction of the procedures will be done as part of the roll-out of the technology, outside of VISOR.

#### **Definition of constraints including angle differences**

The procedure will involve a change to the planning procedure to enable definition of the constraints involving angle difference. Also, the operational procedure to guide operators in working within an angle difference is required, and relating angle behaviour with generation dispatch.

#### **Network Model Validation**

A procedure will be carried out under Work Package 2 (2.1) that derives an accurate measurement of the network impedance between all PMU measurement points and reconciles this with the impedance used in the network models used in planning and operational timescales.

A procedure will also track the impedance of the interconnector circuits between PMU measurement points to establish the variation in network impedance under different circuit loadings (conductor sags) and environmental conditions.

If the variation in impedance across the interconnector circuits is found to be significant, consideration will be given to the application of dynamic system impedance in the on-line stability analysis tools.

#### **Generator dynamic model validation**

The procedures are in the planning domain and will include an option for the use of phasor-based approaches for confirmation of the generator dynamic model. Conventional performance testing and dynamic model validation can still be used, but options to use WAMS-based approaches will be available (once proven) and acceptable by the TO/SO to reduce the time, effort and/or accuracy of the model validation process.

#### **Hybrid State Estimator**

The Hybrid State Estimator is of interest both to the TOs and the GBSO, and implementation of the approach will be aligned with EMS upgrades and/or replacement projects.

The GBSO is intending to upgrade the EMS in 2022 (as confirmed in the Ofgem Panel meeting on 27-Aug) .ScottishPower has also a plan to upgrade the EMS in the coming 3-5 years.

It should be noted that the project will guide policy for PMU placement and roll-out, which is a long-term decision, related to substation refurbishment programmes.

Attachments	
Verbal Clarifications  (Consultants )	