

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	11
Question date	20-08-2013	Answer date	21-08-2013
Submission section question relates to	Technical Description of project		
Topic	Section 3.4		
Question	Please explain how the figure of an incremental capacity of at least 50MW on the B6 boundary with VISOR shown in Table 3.1 has been derived.		
Notes on question			
Answer	<p>50MW is a conservative minimum success target and relates to a 1% improvement in the planned B6 stability limit. This is believed as being easily achievable given the existing operational safety margin ranges between 100-500MW depending on network operating conditions.</p> <p>50MW is also the level of capacity required to achieve a similar value for money of VISOR compared to Series Compensation against the cost of the project.</p> <p>The stability investigations planned to be undertaken in WP2 and WP3 have the objective to quantify this value in a robust fashion.</p> <p>These conservative targets are however supported by literature review and initial simulations - There are two areas of activity that are targeted at improving the utilisation of the B6 transmission:</p> <ol style="list-style-type: none"> 1. By reducing measurement uncertainty 2. By investigating the application of network power angle (derived from PMU's) as a more appropriate and effective control parameter for the stability limited B6 transmission boundary. 		

Measurement uncertainty

It is noted in the Literature Survey that typical improvement in measurement uncertainty is:

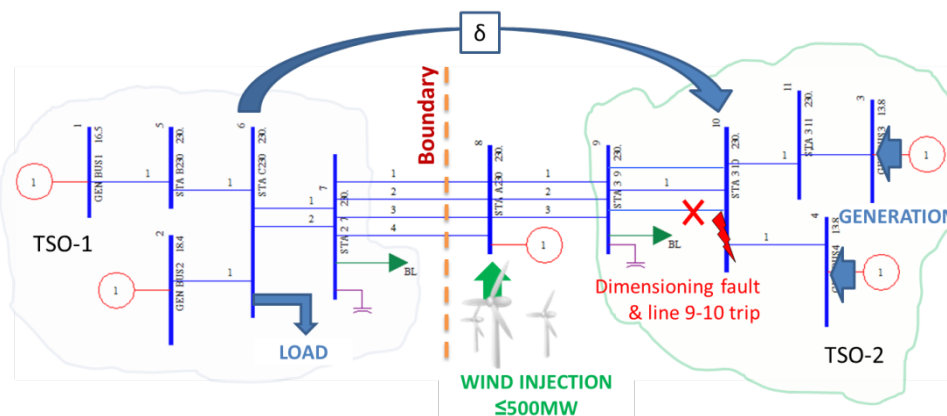
"voltage phase angle max improvement 1.4% (in 118 bus system, 1.6% av. error using conventional SE, 0.47% with PMU at every 10th bus, 0.21% with PMU at every bus)"

Assuming conservatively that the measurement uncertainty is reduced by 1%, and given that transient stability limit is around 3500MW, this reduction in uncertainty equates to 35MW.

Angle constraints

Some experiments were carried out on a transient stability system with wind injection in the corridor, as illustrated in the diagram below. The experimental model broadly reflects the B6 boundary constraint, in that there is a transient stability limitation and power flow influenced by injection of wind between the centres of inertia. In this experimental model, it was found that the Active Power limit was 3223 MW, and depending on the scenario, definition by an angle difference threshold equated to power transfers between 3223MW and 3462MW, ie up to 239MW relief. This relief is variable, and in general higher when the wind injection is higher, which tends to be when it is most needed.

As the experiments were applied to a simple model, there are further details to be assessed based on the full model and business practices for defining constraints. We therefore take a conservative assumption that 50MW increase is achievable.



Attachments

Verbal
Clarifications
(Consultants
)