Appendix 1

Study Conclusion for Embedded Generation in the South Wales and South West

This Statement of Works studies the overall reduction in demand due to embedded generation connecting to Western Power Distribution's (WPD) network in the South Wales and South West. This reduction has been modelled for both the preconnection case (1/12/2014) and the post-connection case (31/03/2015) using the demand and fault level data supplied to National Grid by WPD.

Voltage studies

Using the data supplied, we have calculated the total of 110.7 MW and 22.7 MVAr load reduction for the South Wales and South West regions. This may differ to your expected value as we have been unable to model every BSP in the submission due to a small number of discrepancies between our model and your submissions. We are working with your Primary System Design Teams to resolve these and should conclude these remaining studies within the next few weeks.

Studies show that this load reduction increases the voltages on National Grid's existing 400kV and 275kV Transmission System, adding to the already known high voltage problems in this region of the network. Any further reduction in demand will serve to increase the degree of this non-compliance. We therefore need to work collaboratively to agree a strategy to combat the problems of embedded generation and demand reduction in this area.

The table below shows the equivalent reactive compensation required in the region to bring the post-connection voltages down to their pre-connection levels. There are a number of solutions that could be employed including installing shunt reactors on the Distribution or Transmission System or by applying an appropriate choice of generator power factor. National Grid will need to work with Western Power Distribution to agree the most efficient and economic solutions.

Region	P demand reduction	Q demand reduction	Equivalent reactive compensation needed
South West and South Wales	110.7 MW	22.7 MVAr	35 MVAr

Thermal studies:

Studies have not identified any reverse flows on Supergrid Transformers due to changes in demand, therefore, the sites are thermally compliant.

Fault levels:

After running a sample of fault level studies we estimated a maximum local increase in fault level of 2% due to the new connections. Having consulted our latest National Fault Level Survey we identified the following sites where further studies will be necessary and will need to be progresses through Project Progression.

- Iron Acton 132kV
- Taunton 132kV
- Indian Queens 132kV
- Exeter Main 132kV

The remaining sites have sufficient Fault Level headroom.