

**Offshore Grid Code Subgroup  
2<sup>nd</sup> Meeting 13/02/2007**

**Notes of Meeting**

**1. Venue**

National Grid office, Northampton 13<sup>th</sup> February 2007

**2. Present**

John Greasley (JG)	National Grid (Chair)
Nasser Tleis (NT)	National Grid
Joe Duddy (JD)	Renewable Energy Systems (on behalf of Centrica)
Bridget Morgan (BM)	Ofgem
Hamish Dallachy (HD)	SPT
Graeme Vincent (GV)	CE-Electric
Chandra Trikha (CT)	SSE
Paul Newton (PN)	E.ON
Robert Longden (RL)	Airtricity
Peter Jones (PJ)	ABB
Goran Strbac (GS)	DTI Centre for Distributed Generation and Sustainable Electrical Energy
Balarko Chandhuri (BC)	DTI Centre for Distributed Generation and Sustainable Electrical Energy
Ham Hamzah (HH)	RWE
Philip Baker (PB)	DTI
John Morris (JM)	British Energy
Duncan Hughes (DH)	National Grid (Technical Secretary)

**3. Notes**

**3.1 Introduction**

JG explains to the group Ofgem's intention to stand down the Offshore Transmission Expert Group (OTEG). JG / BM confirm that the objectives and timescales for the Grid Code subgroup will remain unchanged however the group's deliverables will now be supplied to OTEG's replacement.

JG states he has been unable to complete actions regarding raising centrally held assumptions register and the classification of island bound generator connecting to the MITS due to OTEG being stood down. The actions will be carried over until a replacement body is in place.

JM queries if the Grid Code subgroup will now report to the Grid Code Review Panel (GCRP) and if GCRP governance process will need to be followed. BM states that the Energy Act allows the Secretary of State to authorise changes to the Grid Code, with respect to offshore transmission networks, therefore this group is not required to report to the GCRP. BM also confirms that the Ofgem / DTI project board may be used in OTEG's stead and that the Grid Code subgroup may report to this body.

HH asks whether the scope of the Grid Code subgroup includes agreeing technical standards for equipment to be installed at both the Offshore Grid Entry Point and Onshore Grid Entry Point. The group discuss various issues associated with this questions including; how technical standards are currently applied onshore and how developers ensure they meet a Transmission Owner's technical standards. The group agree that defining technical standards for Offshore Transmission Networks is out-with the scope of this group and that this should be

added to the assumptions register. JG also agrees to raise the issue with Ofgem / DTI in order to confirm which group is dealing with these issues.

**Action 1** – Duncan Hughes to add assumption that Grid Code subgroup is not dealing with plant and equipment technical standards to assumption register.

**Action 2** – John Greasley to raise, with Ofgem / DTI, issue of who is dealing with technical standards and feedback to Grid Code subgroup.

CT asks if the STC committee are being kept informed of the work carried out by the Grid Code subgroup and whether they require representation in the group. JG explains to the group that he has presented the Grid Code subgroup Terms of Reference to the GCRP and will do the same for the STC committee.

**Action 3** – John Greasley to inform STC committee of Grid Code subgroup progress and provide visibility of Terms of Reference.

### 3.2 Term of Reference (ToR)

The Terms of Reference document was updated with comments agreed at the first Grid Code subgroup meeting and re-issued to all parties. JG invites any further comments:

- BM requests a footnote explaining reference to G/06 work.
- Group agree change to ToR objective regarding disproportionate increase in operational costs for the onshore transmission and distribution networks.
- Group request the addition of version numbers and dates for future issues of all documents.
- Group agree change to ToR objective outlining the Grid Code subgroup's scope to recommend changes and modifications to the Grid Code.
- Group agree to clarify objectives relating to capital and operational costs.

**Action 4** – John Greasley / Duncan Hughes to update Terms of Reference document as agreed and circulate to the group.

**Action 5** – John Greasley to submit Terms of Reference to Ofgem for approval and obtain clarification of reporting lines.

### 3.3 Assumptions Document

The assumptions document prepared by National Grid and the existing assumption register used by the GB SQSS subgroup were updated following the first Grid Code subgroup meeting (25/01/2007). JG invites any further comments from the group. The group agree some minor wording and formatting changes to the document.

The group agree that the assumptions register should be maintained as a live document and updated when necessary.

**Action 6** – Duncan Hughes to circulate updated Assumptions Document and Assumptions Register.

### 3.4 Connection Conditions

As agreed at the previous meeting, NT and DH give a presentation detailing the results of AC load-flow studies carried out by National Grid in order to illustrate the effects of placing a reactive capability requirement at different points in the offshore transmission network. An equivalent network representing a 200MW wind farm with both 25km and 100km offshore transmission network cables was used. The studies examined placing reactive capability

requirements of 0.95 lagging, 0.95 leading and unity power factor at both the Offshore Grid Entry Point and Onshore Grid Entry Point. NT highlights that this was still work in progress and no firm conclusions could be drawn at this stage.

The main findings of these studies were as follows:

- Placing reactive requirements at the Offshore Grid Entry Point provides a limited reactive capability at the Onshore Grid Entry Point. However, certain studies showed voltage issues throughout the offshore transmission network and over loading of the high voltage cable due to excess MVA<sub>r</sub> flow.
- Placing reactive requirements at the Onshore Grid Entry Point required, in some cases, the addition of large reactive devices. However, voltage profiles in the network were improved.
- Use of a 100km cable lead to very high voltage and MVA<sub>r</sub> flows being observed in the network due to the high capacitive gain of the cable.

NT explained to the group that these studies did not take in to account the behaviour of different wind turbine technologies.

JD observes that placing the reactive capability requirement at the Offshore Grid Entry Point provides a reactive range at the Onshore Grid Entry Point (although not +0.95 to -0.95)

The group also agree that studies must be carried out using larger scale Offshore Generators. GS agrees to provide information to National Grid regarding data used by the GB SQSS subgroup for large Offshore Generators.

The group agree that confirmation is required of where the Onshore Grid Entry Point will be (either at 132kV or 400kV).

It is noted that further National Grid studies will take into account loading of the offshore transmission network cable and voltage limits at the offshore platform busbars.

GS indicates that funding has been received from the DTI in order to undertake work to support this group. GS gives presentation of DTI Centre for Distributed Generation and Sustainable Electrical Energy work on Reactive Power and Voltage Consideration in AC Offshore Networks. This presentation details the results of studies examining placement of reactive compensation onshore and offshore in order to maximise the MW capacity of a given cable.

The group noted that further study work is required to arrive at final conclusions and recommendations. GS and NT agree to liaise in order to define the scope and purpose of further studies.

**Action 7** – Nasser Tleis and Goran Strbac to discuss further study work required.

JD states that under current onshore arrangements (one party) a developer has the ability to design the optimum technical and economic solution. The group agree that under the two party offshore arrangements it would be desirable to attempt to preserve this capability to ensure that neither the Offshore Generator nor Offshore Transmission Owner is subject to unnecessary costs.

JD asks for National Grid's view on the proposed two party arrangement regarding reactive capability requirements for offshore transmission networks. NT states that, in line with the Terms of Reference, the current onshore Grid Code would be extended to offshore transmission networks. Therefore National Grid would expect an equivalent reactive capability of +/- 0.95 power factor at the Onshore Grid Entry Point.

JD suggests that, when defining further studies required, the group focus on the functional requirements of the offshore transmission network i.e.

- Maximise the MW capacity of the submarine cable.
- Maintain voltage control standards in the offshore transmission network (whatever these may be).
- Satisfy National Grid's reactive capability requirements.

PJ suggests that the studies should attempt to arrive at the most economic solution and then examine how this applies to the Offshore Generator / Offshore Transmission Owner boundaries.

NT suggests that the additional studies may initially build on GS's work but add an inductive and capacitive reactive capability at the Offshore then Onshore Grid Entry Points.

PN states that the studies will have to consider any equipment the generator would have to install in order to meet any fault ride through requirements.

PJ states that the group must be careful to ensure that there is no discrimination between requirements for offshore networks using AC links and those using DC technology.

### 3.5 Fault Ride Through

NT discussed National Grid's thoughts on fault ride through (FRT) requirements for offshore generators. Regarding offshore HVAC, two main options were considered; applying existing Grid Code requirements directly (i.e. generator must ride through zero volts at grid entry point), or the formulation of an equivalent requirement being placed at the Offshore Grid Entry Point.

NT explains that 2<sup>nd</sup> option would be based on the equivalent voltage dip seen at the Offshore Grid Entry Point for a fault on the MITS. It is proposed that this requirement could be for a generator to ride through a fault causing 15% of nominal voltage to be seen at the Offshore Grid Entry Point. This proposal would be in line with previous Grid Code consultation H/04 work and guidance from WTG manufacturers. NT also outlines potential advantages to developers and manufacturers of this proposal including the removal of uncertainty over requirements and the ability to type test turbine technology.

The group agree to provide feedback on National Grid's proposals and suggest any other possible options regarding FRT requirements.

**Action 8** – All parties to provide feedback and suggestions on FRT to Duncan Hughes.

NT outlines National Grid's thoughts on FRT requirements for offshore transmission networks using HVDC links. NT explains a requirement based on voltage dip at the Offshore Grid Entry Point cannot be applied to HVDC links. It may, however, be possible to devise an equivalent requirement based on 'load rejection' that is equivalent to the voltage dip / duration requirements proposed for HVAC at the offshore Grid Entry Point.

NT notes that further understanding is required of how HVDC systems behave under fault conditions.

**Action 9** - All members of the group are invited to provide any information or comments on the proposed options.

### 3.6 Classification of Offshore Generators

NT explains National Grid's proposals for classification of offshore generators to ensure that all sizes are captured by Grid Code requirements. The first proposal involves redefining the existing thresholds for small, medium and large power stations as applied to offshore generation. The second proposal involves defining in the Grid Code a new term Offshore

Generator that is clear and consistent with the new definition of Offshore TO for offshore electricity transmission. This would include all offshore generation regardless of size.

BM asks that the group consider how this may affect existing 132kV connected onshore generation and Licence Exempt Embedded Medium Power Stations (LEEMPS).

**4. Any Other Business**

None

**4. Time and Date of Next Meeting**

The group provisionally agree to meet again on 20<sup>th</sup> March 2007, venue TBC.