

WAGCM6 - Grid Code Alternative Form

GC0141: Preferred permutation across all GC0141 “Sub-Modification” workstreams

Overview:

The Alternative has been raised to cover the proposers chosen permutation in relation to the elements that comprise the modification.

Details of the chosen permutation as attached and summarised below:

	Solution	Independent Engineer	Sharing for SSTI / SSCI	RMS & EMT Models	Fault Ride Through Definition & Retrospective Requirements	Compliance Repeat Plan	Enhanced FRT Studies	Torsional Data
Ben Marshall	WAGCM3	Requirement for IE within FSO duties.	ESO/TO host study environment with remote access	Specification of RMS & EMT model (fully encrypted)	Adds a time duration & retrospective requirements	Every 5 years Users submit compliance statement and DRC Schedules	Additional studies for complex connections agreed at start of process	All Users provide torsional data (retrospective)

No change from Baseline

Original Proposal

Alternative Option

Requirement for an Independent Engineer - Original proposal - but allocated to FSO duties

Sharing of SSTI/ SSCI Models – Original Proposal

Specification for RMS & EMT Models – Current Baseline

Fault Ride Through Definition and Retrospective Requirements – Current Baseline

Compliance Repeat Plan – Alternative Option 5a (Only changes to original baseline data to be submitted in order to achieve compliance)

Enhanced Fault Ride Through Studies – Original Proposal

Provision of Torsional Data for Older Plant – Original Proposal

Proposer: Ben Marshall, National HVDC Centre, also representing SSE Networks - Transmission

Contents

- What is the proposed alternative solution?
- What is the impact of this change?
- When will the change take place?
- Acronyms, key terms and reference material

What is the proposed alternative solution?

The alternative covers the proposers chosen elements of the modification, with some elements differing from the Original Proposal.

What is the difference between this and the Original Proposal?

Requirement for an Independent Engineer - Original proposal - but allocated to FSO duties

SSEN and the National HVDC centre consider that the Current Baseline offers insufficient assurance of completeness and relevance across the areas of analysis of non-classical areas of device interaction and implementation, such that it is helpful to draw out Independent Engineer duties and expectations to assist User and Company in reviewing information and processes relevant to a given projects compliance activity - noting the end responsibilities must remain with Company and User. To that end, given that the emergence of an FSO is confirmed, it is not clear to us why the undertaking of these IE duties may not be adopted within the FSO obligations, to pull on other experience within the industry as appropriate - this would avoid the complexity and cost associated with the original proposal.

However, we believe someone needs to do these activities to address the 9th August 2019 investigations - an IE within the FSO remit seeming the most equitable solution, given the E3C conclusions identifies a gap for the ESO to address - not specifically for a requirement for a new separately funded IE entity for Users to bear additional costs supporting which is not obviously the most efficient outcome. The workgroup has sought clarity on FSO duties - given many workgroup members have this same view that an FSO should do this and have in absence of clarity that it will, have adopted different votes on that topic.

We note various alternative proposals have sought for practical and efficiency reasons to limit the scale of project to which IE duties apply, or the circumstances they may apply, however technically these are grey areas given the cumulative risk that aggregations of smaller technologies can represent, and also grey concerning what a Limited Operational Notification would and would not capture, given the “chicken and egg” issue of not necessarily knowing what an IE would need to support at a LON without having the IE input ahead of that point to inform the User and Company discussion surrounding that stage.

Sharing of SSTI / SSCI Models – Original Proposal

The sharing of models is necessary to allow the relevant parties to perform appropriate analysis of SSTI and SSCI, and other interaction and compliance analysis. The Original would be most efficient, providing that necessary NDAs allow the exchange of models fit for purpose from the existing and developing Users on the system whose modelling is relevant to the new Users obligations in compliance study.

It is however SSEN and the National HVDC centres experience that the practicalities of obtaining and exchanging EMT models of sufficient detail and fitness for purpose are not insignificant - and that for IP and other reasons relating to the confidentiality of the models and operating assumptions within those models to be considered, this approach can become impractical across the wide range of OEMs and technologies that would need to align with the process in the original proposal.

SSEN and the National HVDC centre therefore support the creation of “host network environments” where TO and ESO models of offline or real-time where required can be

physically supported with remote or segregated User access. This echoes an approach applied to a range of interaction and interoperability studies now being conducted internationally - for example the AEMO approach in Australia, which allow the user to connect their confidential model to an equally confidential set of network and other user model operating assumptions allowing compliance to be demonstrated. The approach also has the value of a more efficient dialogue surrounding operating condition assumptions, such that initial assumptions can be tested and updated more efficiently within that environment as analysis progresses, rather than set at the beginning and then influenced by a less complete understanding of how those assumptions affect the overall analysis. SSEN and the National HVDC centre believe it is appropriate to maintain the option of these “hosted network environments” being utilised where other options are not viable. The technologies associated with these are mature and available today.

Specification for RMS & EMT Models – Current Baseline

The Original Proposal in the views of SSEN and the National HVDC Centre represents a significant step forward in establishing a common and shared understanding across the GB industry in the requirements for both RMS and EMT models. The Original Proposal will deliver benefits on all Grid Code objectives.

There are areas in which the scope of the original proposal has potential gaps - such as

- the flexibility to not present the protection effect within the EMT model (however must be explained and its function described) which risks incomplete analysis,
- the absence of frequency domain plots of the device and its operating points to support model verification and interaction analysis, which risks less efficient processes in these areas
- a capability to require Realtime models where appropriate within Bilateral agreements is welcome, but which would require further clarification at implementation stage
- standardised RMS modelling which whilst welcome in its simplicity, without additional complementary dynamic models reflective of EMT performance may be of limited planning value.

Notwithstanding these we are confident that this is a necessary first step and a sound basis upon which further developments will evolve over time which need to be progressed urgently.

Fault Ride Through Definition and Retrospective Requirements – Current Baseline

SSEN and the National HVDC centre supports the Original proposal given that Fault Ride Through whilst theoretically demonstrated in compliance simulations must represent a practical capability of generation across the range of operating conditions as described in Grid Code and SQSS to support sound planning and operation of the power system. We see the original proposal simply providing clarification of this principle which was also echoed in the E3C recommendations from the 9th August 2019 investigation. We note that a more comprehensive review under GC0155 is underway and may further develop FRT definitions and tests, however we see no barrier to an early implementation of the clarity to FRT under this original proposal, recognising it may subsequently be added to at a later point.

Compliance Repeat Plan – Alternative Option 5a (Only changes to original baseline data to be submitted in order to achieve compliance)

SSEN and the National HVDC centre support the original proposal in providing a mechanism for the tracking of the original compliance basis of the User system against incremental and cumulative change over its lifetime. The Original is however limited in its value beyond this as neither formal model updates reflecting this position nor analysis reflecting performance at what may be different connection conditions at that time, or anticipated ahead of the next statement (e.g. lower fault level, lower inertia) is required

within the statement being made. It is important we make some progress by adopting the principles of the repeat plan noting its substance may need to evolve over time in future modification as necessary to account for these other challenges being currently encountered in planning and operation of the evolving network.

Enhanced Fault Ride Through Studies – Original Proposal

The proposal will deliver benefits on all Grid Code objectives. SSEN and the National HVDC centre support the Original Proposal for Enhanced Fault Ride Through studies

Provision of Torsional Data for Older Plant – Original Proposal

SSEN and National HVDC supports the Original Proposal as all users should provide torsional data (where applicable) so SSTI studies can be performed in acceptable timescales - this is both beneficial to the connecting user in addressing what could otherwise be a barrier to efficient connection, and in aiding the management of the existing or new synchronous user risk over time should network topology and operating conditions evolve, given the evolution of the network would suggest more such analyses would need to be performed not less. We note the concern existing users to provide data may be mitigated via measurement and monitoring approaches, and we note that had time permitted the establishing of frequency domain impedance representation of user connection, in comparison with available data of synchronous generation – a method discussed within the [GSR017](#) modification of the SQSS to address similar TO studies of series compensation, would have provided the ability to limit the need for detailed data exchange only in situations where an established damping solution was required to be developed and demonstrated.

What is the impact of this change?

Proposer's Assessment against Grid Code Objectives	
Relevant Objective	Identified impact
(a) To permit the development, maintenance and operation of an efficient, coordinated and economical system for the transmission of electricity	Positive Supports sufficient transparent data exchange and additional compliance process clarity
(b) Facilitating effective competition in the generation and supply of electricity (and without limiting the foregoing, to facilitate the national electricity transmission system being made available to persons authorised to supply or generate electricity on terms which neither prevent nor restrict competition in the supply or generation of electricity);	Positive Avoids placing unnecessary costs or barriers to entry or risks on users connected or connecting
(c) Subject to sub-paragraphs (i) and (ii), to promote the security and efficiency of the electricity generation, transmission and distribution systems in the national	Positive Seeks to avoid scenarios where a lack

electricity transmission system operator area taken as a whole;	of data or compliance clarity affects the operation and planning of the transmission system
(d) To efficiently discharge the obligations imposed upon the licensee by this license and to comply with the Electricity Regulation and any relevant legally binding decisions of the European Commission and/or the Agency; and	Positive Allows a more effective and efficient compliance process
(e) To promote efficiency in the implementation and administration of the Grid Code arrangements	Positive Prioritises the priority changes needed urgently, recognising others may follow beyond that

When will this change take place?

Implementation date:

In line with GC0141

Implementation approach:

Acronyms, key terms and reference material

Acronym / key term	Meaning
BCA	Bilateral Connection Agreement - between a User and ESO
ECC	European Connection Conditions – part of Grid Code
PC	Planning Code – part of Grid Code
TO	Transmission Owner
NG ESO	National Grid Electricity System Operator

Reference material:

None.