

Modification proposal:	Modification to the Grid Code: Protection Fault Clearance Time & Back-Up Protection (GC0023)		
Decision:	The Authority ¹ directs that the proposed modification to the Grid Code ² be made		
Target audience:	National Grid Electricity Transmission plc (NGET), Grid Code users and other interested parties		
Date of publication:	20 January 2016	Implementation date:	To be confirmed by NGET

Background

National Grid Electricity Transmission plc (NGET) is the System Operator (SO) for the National Electricity Transmission System (NETS). NGET is responsible for ensuring the stable and secure operation of the whole of the NETS. The Grid Code specifies the technical requirements for users connecting to, and using, the NETS.

The Grid Code Connection Conditions (CC) set out, amongst other things, the protection arrangements for plant and apparatus³ connected to the NETS. CC.6.2.2.2 sets out the protection arrangements for generating units and power stations. CC.6.2.3.1 sets out the protection arrangements for Network Operators and Non-embedded customers.

CC.6.2.2.2 and CC.6.2.3.1 detail the requirements for main and back-up protection for connections to the NETS. GC0023 (the "modification proposal") relates to changes primarily in relation to the back-up protection settings for fault clearance time. CC.6.2.2.2 currently requires these fault clearance times to be 800ms in England and Wales and 300ms in Scotland. NGET has highlighted this as an area of concern that may cause issues of discrimination with the transmission owner's feeder remote end back-up protection, typically set at 500ms. Discrimination relates to the order in which protection devices operate. Protection systems are designed so that there are different levels of backup protection so that, if one device fails to operate for a fault, then another device further upstream of the fault will operate. Where there is a failure in discrimination it can mean that a protection device is bypassed due to a settings conflict. This results in more of the network being disconnected than necessary and could lead to customers or generators unnecessarily being taken off supply.

NGET is seeking to clarify the protection timings for generator back-up protection and to clarify the point of connection to the NETS for network operators or non-embedded customers. Along with these two changes, GC0023 also seeks to make a number of minor typographical corrections, terminology and glossary changes.

The modification proposal

The issues addressed by GC0023 were raised with the Grid Code Review Panel (GCRP) in November 2007. A workshop was convened to further clarify the requirements in March 2009. Subsequent to this, a survey of existing generators that posed a potential risk to the transmission system was carried out. Draft legal text for changes to the Grid Code was then presented to the GCRP in October 2013 and again in March 2015. The proposal was progressed through industry consultation in August 2015. NGET notes that bringing the Grid Code into line with its best practice approach to protection requirements has lacked urgency. This was because a survey was needed to be carried out first to assess sites that posed a potential risk to the transmission system, once done NGET carried out

¹ The terms 'the Authority', 'Ofgem' and 'we' are used interchangeably in this document. Ofgem is the Office of the Gas and Electricity Markets.

² This document is notice of the reasons for this decision as required by section 49A of the Electricity Act 1989.

³ As defined in the Grid Code.

the necessary actions to eliminate the risks. It was necessary to demonstrate successful implementation and completion of remedial works for existing connections, both of which have now been done.

The main issue GC0023 seeks to address relates to CC.6.2.2.2.2 (b) which is designed to ensure that generators directly connected to the transmission network provide back-up protection for the detection of un-cleared faults on the transmission network. NGET's role in managing Grid Code compliance for existing generators and new generators highlighted potentially inadequate discrimination between the transmission owner's and generator's back-up protection systems. It was also unclear why the back-up protection fault clearance time requirements were different in England and Wales (800ms) compared with Scotland (300ms). The modification proposal changes all timings for new connections to 300ms regardless of location whilst maintaining the original settings for existing connections.

Additionally CC.6.2.2.2.2 (b) does not adequately make clear:

- That the back-up protection has to be separate from the main protection function;
- That the function should be supported by a separate current transformer; and
- Under what circumstances the function may be provided as part of the main protection.

The modification proposal clarifies all of the above bullet points applicable to CC.6.2.2.2.2 (b).

CC.6.2.3.1.1 (a) required more clarification on the requirements for the distribution network operators and non-embedded users connecting to the NETS.

GC0023 also identified two minor Grid Code terminology/typographical deficiencies. The first issue is the use of "faster/slower" as the terms used to describe fault clearance times in CC.6.2.2.2.2 and CC.6.2.3.1.1, which is incorrect. The standard industry wide terms for this are "shorter/longer". In addition, it was noted that the unit for clearance time is currently written as **mS** (milli-Siemens) rather than **ms** (milli-seconds). GC0023 aims to rectify these errors.

GC0023 sought to address the above issues by providing clarity on the protection settings and the point of connection for network operators and non-embedded users. This has resulted in additional and amended legal text in CC.6.2.2.2.1, CC.6.2.2.2.2 and CC.6.2.3.1.1 (a), and in the Grid Code Glossary and Definitions.

The August 2015 industry consultation resulted in five responses. Four were in favour of GC0023 with a number of proposed changes to legal text suggested that were adopted in the final drafting. One response did not support the proposal, noting some points of contention. NGET details in the GC0023 final report that, during the consultation process, clarification was given to the objecting respondent regarding its points of contention. Subsequently, it was agreed that there had been a misinterpretation of the proposal by the respondent and it withdrew its objection.

NGET's recommendation

NGET issued its GC0023 final report to us on 1 December 2015. The final report recommends approval of the legal text changes in Annex 1 of the report. NGET considers that the proposal sets out a clearer requirement for back-up settings and removes any confusion or ambiguity in this area. The proposal also addresses typographical and terminology errors. The proposed legal text was refined in light of consultation responses.

NGET considers that the proposal will better facilitate Grid Code Objectives (i) and (iii) as it will permit the operation of an efficient transmission system by removing confusion within the Grid Code in facilitating the operation of protection systems.

Our decision

We have considered the issues raised by the modification proposal and the Final Report dated 1 December 2015. We have considered and taken into account the responses to NGET's consultation on the modification proposal which are included in the Final Report.⁴ We have concluded that -

- implementation of the modification proposal will better facilitate the achievement of the objectives of the Grid Code;⁵ and
- approving the modification is consistent with our principal objective and statutory duties.⁶

Reasons for our decision

We consider this modification proposal will better facilitate Grid Code objectives (i) and (iii), and has a neutral impact on objectives (ii) and (iv).

Objective (i) 'to permit the development, maintenance and operation of an efficient, co-ordinated and economical system for the transmission of electricity'

The modification proposal focuses on aspects of the Grid Code that ensure generators and networks connected to the transmission system do so in a co-ordinated manner with regards to protection settings. The Grid Code as written gave rise to concerns around protection discrimination and the potential for inappropriate operation of protection systems under certain circumstances. The modification proposal has changed the protection settings and added clarity to areas that gave rise to these concerns. By addressing these concerns and changing the protection settings in the Grid Code we believe that the modification proposal better meets the aims of this Grid Code objective.

Objective (iii) 'subject to sub-paragraphs (i) and (ii), to promote the security and efficiency of the electricity generation, transmission and distribution systems in the national electricity transmission system operator area taken as a whole'

NGET explained the potential issue arising from inappropriate discrimination of back-up protection systems. By correcting the error in protection discrimination, the modification proposal directly improves the operational security of the system.

By ensuring that protection systems operate together in an appropriate and co-ordinated manner, the modification proposal assists in maintaining the correct operation of the system.

We agree that correcting the protection settings through the modification proposal will better facilitate this Grid Code objective.

Decision notice

⁴ Grid Code proposals, final reports and representations can be viewed on NGET's website at: <http://www2.nationalgrid.com/UK/Industry-information/Electricity-codes/Grid-code/Modifications/>

⁵ As set out in Standard Condition C14(1)(b) of NGET's Transmission Licence, available at: <https://epr.ofgem.gov.uk/>

⁶ The Authority's statutory duties are wider than matters which NGET must take into consideration and are detailed mainly in the Electricity Act 1989 as amended.

In accordance with Standard Condition C14 of NGET's Transmission Licence, we approve Grid Code modification GC0023 '*Protection Fault Clearance Time & Back-Up Protection*'.

We direct that GC0023 is implemented on a date to be confirmed by NGET.

Gareth Evans – Head of Profession – Engineering

Signed on behalf of the Authority and authorised for that purpose