

Grid Code Requirements for Current Sourced DC links Paper by NGET

Introduction

NGET has recently become aware of an inconsistency between the requirements of the Grid Code Connection Conditions and the recommendations of two GCRP working groups. The inconsistency relates to the requirements for current sourced DC links to maintain a reactive power transfer within a range. This paper describes the inconsistency, explains the history that has resulted in it, and recommends that the Grid Code is amended to remove it. The existing and proposed Grid Code wordings are included in Appendix A.

Background

A GCRP working group, established to consider the Grid Code requirements for DC links, reported to the GCRP in November 2002. One of the recommendations of this group was that, for current sourced DC links, the reactive power transfer must remain within the reactive range specified in the Bilateral Agreement rather than the Grid Code. The attached is a link to the working group report. The relevant proposed condition is CC.6.5.2.
https://www.nationalgrid.com/NR/rdonlyres/956D1788-5CFC-4ECB-ADAE-F6097258F162/2142/pp02_31.pdf

The GCRP noted that the Generic Provisions working group had at this time been initiated and recommended that the work of the HVDC working group was passed over to this group to take forward (section 5.3 of the GCRP minutes)
<https://www.nationalgrid.com/NR/rdonlyres/041E9A5B-DC4F-498F-AAED-F49D30F171C5/2758/021121pm.pdf>).

The 22nd May 2003 GCRP report of the Generic Provisions working group states in paragraph 12 and appendix 3 that the Grid Code requirements applicable to current sourced DC converters should be based on the recommendations of the DC links working group. This is reflected in the subsequent Generic Provisions D/03 Report to the Authority dated 31st October 2003. In these proposals it is recommended that the tolerance on reactive power transfer is specified in the Bilateral Agreement for Non-Synchronous Generators and Power Park Modules as well as for DC Converters. The links to the May 2003 Generic Provisions GCRP working group report and the subsequent D/03 Report to the Authority are:
https://www.nationalgrid.com/NR/rdonlyres/7AEFB0B4-3AB5-4342-B7E4-29C5FDB88589/1986/GPWG_pp03_11.pdf

https://www.nationalgrid.com/NR/rdonlyres/E38D11B6-5019-44A9-BA9D-508E494F019B/7045/ReporttotheAuthorityD_03.pdf

Following subsequent Generic Provisions work on Power Park Modules requested by the Authority, which included discussions relating to wind turbine generators with manufacturers and developers, it was agreed that the proposals relating to reactive power transfer should be modified for Non-Synchronous Generators and Power Park Modules to explicitly state a tolerance in the Grid Code.

The wording currently in Grid Code CC.6.3.2 (b) was introduced as a result of this subsequent Generic Provisions work on Power Park Modules and included in the H/04 Report to the Authority dated 20th September 2004. It requires that current sourced DC links, as well as Power Park Modules and Non-Synchronous Generators, must be capable of maintaining zero transfer of reactive power within a tolerance explicitly stated in the Grid Code rather than in the Bilateral Agreement. It appears that the Grid Code wording was incorrectly updated to specify the tolerance requirement for current sourced DC links in line with the recommendations made for Power Park Modules rather than in line with the recommendations made for DC links by both the DC links and Generic Provisions working groups. Links to the paper and legal text of H/04 Report to the Authority are:
<https://www.nationalgrid.com/NR/rdonlyres/1AD6F0AB-F786-4256-ADD7-DD030F7209AE/6800/Authrepv11report.pdf>

<https://www.nationalgrid.com/NR/rdonlyres/18017111-E0B6-404E-B464-E57B2470ED03/6801/Authrepv11legaltext.pdf>

Recommendation

NGET considers that the recommendation on reactive transfer made by the DC links and Generic Provisions working groups and included in the D/03 Report to the Authority in connection with current sourced DC links remains appropriate. It is therefore recommended that the current wording of the Grid Code connection conditions is changed to reflect that recommendation. The proposed modification is described in Appendix A.

The GCRP is invited to discuss and agree this proposal and to agree to an industry consultation on it.

Appendix A – Proposed modifications to Grid Code wording

Existing text

The existing wording in the Grid Code Connection Conditions is:

CC.6.3.2 ...

- (b) Subject to paragraph (c) below, all **Non-Synchronous Generating Units, DC Converters and Power Park Modules** must be capable of maintaining zero transfer of **Reactive Power** at the **Grid Entry Point** (or **User System Entry Point** if **Embedded**) at all **Active Power** output levels under steady state voltage conditions. The steady state tolerance on **Reactive Power** transfer to and from the **GB Transmission System** expressed in MVar shall be no greater than 5% of the **Rated MW**.

Proposed text

It is proposed that the wording is changed as below. The changes are highlighted in red.

CC.6.3.2 ...

- (b) Subject to paragraph (c) below, all **Non-Synchronous Generating Units, DC Converters and Power Park Modules** must be capable of maintaining zero transfer of **Reactive Power** at the **Grid Entry Point** (or **User System Entry Point** if **Embedded**) at all **Active Power** output levels under steady state voltage conditions. **For Non-Synchronous Generating Units and Power Park Modules** the steady state tolerance on **Reactive Power** transfer to and from the **GB Transmission System** expressed in MVar shall be no greater than 5% of the **Rated MW**. **For DC Converters** the steady state tolerance on **Reactive Power** transfer to and from the **GB Transmission System** shall be specified in the **Bilateral Agreement**.