Comments on Andrew Roscoe's data - Part 2

Introduction

This data is a follow on from my initial comments.

SGRE Item 1.5.

Following a review of the SGRE comments for item 1.5 the following change to the Definition of **Active Control Based Power** is proposed, see below.

This includes allowing for a GBGF- I plant to produce AC power components within the Engineering Recommendation P28 limits for the correct operation of the GBGF- I plant.

There are many loads on the AC grid that import / export active power at high levels on a frequent basis that are acceptable to the AC Grid because they comply with the Engineering Recommendation P28 limits.

As an example this includes Cyclo-converter plant that produces the sub-harmonic active power changes in the 0.01 Hz to 50 Hz range that comply with the Engineering Recommendation P28 Issue 2 2018 flicker emission limits Figure B.1.1.

There are also no limits on what control features that a GBF- I plant can use and define as ECC.6.3.19.3 (vii) that states:

"each **User** or **Non-CUSC Party** can use their own design, that may be very different to the Figures ECC.6.3.19.3.2 (a) or ECC.6.3.19.3.2 (b), but should contain all relevant functions."

The bandwidth requirements have been considered in four ways:

1. The Figure 8.8.1 in the associated Enstore document Enstore's updated guide for "**GB Grid Forming Converters – V-004**" shows a predicted response of a 5 Hz system.
2. The bandwidth requirements were also the reason for the upper and lower NFP gain plot frequency limits, also included in the same Enstore document.
3. The use of which was introduced to have a viable frequency response from fully rated energy systems, also shown in the same Enstore document.
4. The use of **Control Based Real Droop Power** that is now called **Active Frequency Response Power**.

These details are too specific to be included in the Grid Code. The expert group for the **Best Practice Guide** should be starting very soon and these are key topics to be included in the guide.

Active Control Based Power	Is the **Active Power** output supplied by a **Grid Forming Plant** through controlled means (be it manual or automatic) in the positive phase sequence Root Mean Square **Active Power** or **Reactive Power** produced at fundamental **System Frequency** by the control system of a **Grid Forming Unit** For **GBGF-I Plant** this is equivalent to that of a **Synchronous Generating Unit** with a traditional governor coupled to its prime mover. **Active Control Based Power** includes **Active Power** changes that results from a change to the **Grid Forming Plant Owners** available set points that have a 5 Hz limit on the bandwidth of the provided response. **Active Control Based Power** also includes **Active Power** components produced by the normal operation of a **Grid Forming Plant** that comply with the **Engineering Recommendation** P28 limits. These **Active Power** components do not have a 5 Hz limit on the bandwidth of the provided response. **Active Control Based Power** does not include **Active Power** components proportional to **System Frequency**, slip or deviation that provide damping power to emulate the natural damping function provided by a real **Synchronous Generating Unit**.

SGRE Item 1.6.

Agreed.