EU Connection Network Codes – RFG 2.0 / DCC 2.0 / HVDC 2.0 - Update

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Background

- As part of the Energy Third Package when the UK was a member of the European Union, the Connection Network Codes (ie Requirements for Generators (RfG 1.0), Demand Connection Code (DCC 1.0) and HVDC Network Code 1.0 were implemented into the Grid Code via Grid Code modifications GC0100, GC0101, GC0102 and GC0104.
- These documents define the technical requirements for Generators and Demand connecting to the Total System.
- ENTSO-E are now updating the Connection Network Codes and proposing amendments to the Requirements for Generators (RfG 2.0), Demand Connection Code (DCC 2.0) and HVDC 2.0 Network Code
- For RfG 2.0 and DCC 2.0, the consultation closed last year
- For HVDC 2.0, a consultation is currently in progress
- **As we are no longer an EU Member State, these amendments will NOT apply in GB however we have taken the opportunity to review the changes and have responded to the RfG 2.0 and DCC 2.0 Consultations and will respond to the HVDC 2.0 Consultation**

Status

Code	Consultation Period	Status
RfG 2.0	17 July – 25th September 2023	ESO responded to the Consultations in addition to briefing Ofgem / DESNZ
DCC 2.0	17 July – 25th September 2023	ESO responded to the Consultations in addition to briefing Ofgem / DESNZ
HVDC 2.0	17th June – 8th September 2024	ESO have briefed Ofgem/ DESNZ and propose to respond to the Consultation

High Level RfG 2.0 Proposals

- RfG 2.0 is expected to come into force in circa 2025
- Scope of application is very difficult to understand – ie who it applies to
- Includes requirements for Electricity Storage
- The proposals do not appear to allow aggregation of different technologies into one power park module
- Grid Forming is Mandatory for all Type C and D Power Park Modules (with a three year implementation period – expected 2028) including smaller Power Park Modules (eg Type B) connecting via a 110kV feeder
- V2G Electric Vehicles (ie those which can import and export to and from the Grid) are now within scope including their charging networks
- Criteria around significant modernisation included
- Significant Rate of Change of Frequency withstand limits defined
- Fault Ride Through extended to Type A Power Generating Modules
- High Voltage Ride Through included
- Reinforcement to modelling and simulation requirements covering both RMS and EMT studies
- Power Oscillation Damping required for Type C and D Power Park Modules
- No specific tests or Compliance simulations for Grid Forming

High Level DCC 2.0 Proposals

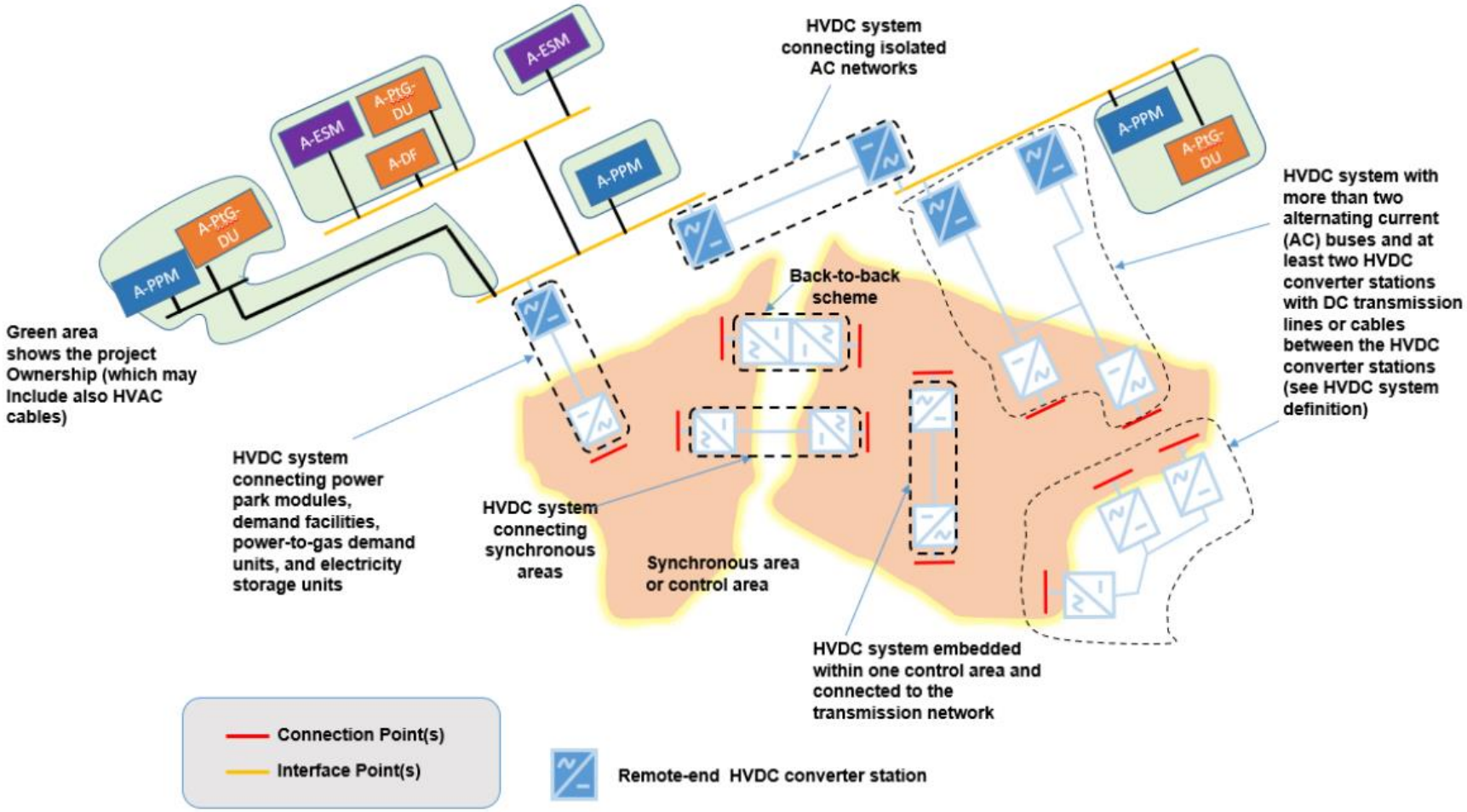
- DCC 2.0 is expected to come into force in circa 2025
- Scope of application is difficult to understand – ie who it applies to
- V1G Electric Vehicles (ie those which can only import from the Grid) are now within scope including their charging networks
- Specific technical requirements added for V1G Electric Vehicles, Heat Pumps and Power to Gas Demand (eg hydrogen electrolysers) these include:-
  - Rate of change of Frequency Requirements
  - Fault Ride Through
  - Limited Frequency Sensitive Mode – Under Frequency
- New compliance requirements added in respect of V1G Electric Vehicles, Heat Pumps and Power to Gas Demand
- Clarifications added to Low Frequency Demand Disconnection Schemes
- Voltage ranges changed

HVDC 2.0 Key Findings

- HVDC 2.0 is expected to come into force in circa 2025 and applies to DSOs as well as TSOs
- Covers a whole range of plant other than DC Connected Power Park Modules (see next slide)
- References to GB have been removed – as expected
- New criteria included on significant modernisation – these are quite onerous and could impact existing plant.
- New requirements added on Rates of Change of System Frequency withstand – these are quite onerous
- Grid Forming is not mandatory unless specified by the TSO
- New requirements included for Power to Gas Plants (eg Hydrogen Electrolysers) connected behind HVDC Systems, including power import reduction with falling frequency and fault ride through
- A lot of new detail has been added on simulation models
- There is a repeal section outlining that HVDC 1.0 will be repealed and replaced by HVDC 2.0
- Some changes to voltage ranges and frequency control settings

Scope of Plant covered under HVDC 2.0

A-PPM: Asynchronously connected Power Park Module
A-ESM: Asynchronously connected Electricity Storage Module
A-DF: Asynchronously connected Demand Facility
A-PtG DU: Asynchronously connected Power-to-Gas Demand Unit



Issues proposed for inclusion in the HVDC 2.0 ESO Consultation Response

- HVDC 2.0 introduces a new definition (in Europe) of “Interface Point” which is a term we have used in GB Codes for over 15 years and hence risks having one term with two different meanings
- It is unclear how the obligations would apply to one TSO which is an EU Member state against one which is a non EU Member state, noting that some requirements apply to remote end HVDC Converters / HVDC Systems (i.e. the GB-end of an interconnector)
- The impact on existing HVDC Systems could be significant noting that changes could require them to meet the requirements of HVDC 2.0 as the Criteria for “Significant Modernisation” is now defined (eg changes in MW output, Reactive Capability, plant changes etc) and % changes in MW output or reactive capability are not defined
- There are significant differences between the rate of change of frequency withstand capability between HVDC Systems, Plant connected behind HVDC Systems and those requirements specified in RfG 2.0 and DCC 2.0
- Although Grid Forming is not mandated, where it is specified by the TSO, there is a statement that notes – *“where inertia is provided, this function is to be coordinated with systems external to the HVDC System”* – ie does this mean the remote end System or synchronous area can be used as an infinite battery
- Where Grid Forming is specified, there are no specific tests or simulations for Grid Forming
- Although we are not member states, for those who are, there is a requirement to supply User’s data and for this to be made publicly available. There are concerns if this data is confidential

Summary

- The UK (and hence GB) are **NOT** bound by the EU Connection Network Codes and there is no intention (unless there a Government Policy change) for this to be the case
- Where a future Code Change is made (for example Grid Forming) then any change that is made to the GB Code would need to look at the EU Codes purely as part of the due diligence process of reflecting international best practice which is often a feature of the GB Code Governance process through the Terms of Reference.
- In GB, any changes to the Code will be made based on System need, **NOT** because they are mandated in Europe
- Manufacturers are competing on a global scale. As noted in GB, we are **NOT** bound by the EU requirements, however where there is a requirement for system need, then consistency of requirements, where it is applicable to do would result in cost savings for the end consumer (ie a manufacturer who develops a product to meet EU requirements would by default be able to meet GB requirements without any change to their plant as the GB requirements could be a subset of the EU requirements)
- Whilst the HVDC 2.0 code does not directly apply to GB Interconnectors in GB, they do indicate what EU expectations are and do to some degree set a bit of a precedent
- There are no plans to have a large tranche of future Code Mods as a result of these developments

Questions