Energy UK

The voice of the energy industry

European electricity network codes- FACTSHEET

January 2015

Introduction

The purpose of this document is to address a number of key questions related to EU electricity[1] network codes.
Apart from explaining what the European network codes are, why and how they are developed, this document outlines what each of the codes aims to achieve and how the interactions between various network codes work.
Finally, it briefly touches on the likely impact of the codes on the GB energy market.

1) What are the European network codes and why have they been developed?

The European network codes are intended to provide a set of harmonized rules for the operation of the gas and electricity sector in Europe. They will apply to parties operating in the European energy sector and govern all electricity and gas market transactions with a cross-border impact. The rationale for the codes is that wholesale market and network access arrangements need to be aligned across the 28 Member States if a competitive European market in electricity and gas is to emerge. There is strong political support for this objective – EU Heads of Government have set a target of end-2014 for completion of a single European energy market (though in practice considerable further work will be necessary to achieve this).

The process for establishing the European network codes is set out in the Third Energy Liberalisation Package[2] adopted in 2009. The Package aims to develop an integrated EU gas and electricity market to meet the important challenges faced by the energy sector in Europe. The network codes are intended to ensure the effective operation of electricity and gas transmission systems to meet Europe's trio of energy policy goals: ensuring the security of supply, promoting the decarbonisation of the energy sector and creating competitive, liquid markets which benefit customers.

[1] As specified in the title, this factsheet addresses only the EU **electricity** network codes, although they are being developed for the gas sector as well. For more information, please check http://www.entsog.eu/. The responses to questions 1 and 2 remain valid for the EU gas network codes as well.
[2] The EU Third Legislative Package consists of **two Directives**, one concerning common rules for the **internal market in gas** (2009/73/EC), one concerning common rules for the **internal market in electricity** 2009/72/EC) and **three Regulations**, one on conditions for access to the **natural gas transmission networks** ((EC) No 715/2009), one on conditions for access to the **network for cross-border exchange of electricity** ((EC) No 714/2009) and one on the establishment of the **Agency for the Cooperation of Energy Regulators ACER** ((EC) No 713/2009).

2) How they are developed?

The Third Liberalisation Package[3] sets out the areas in which network codes shall be developed and a process for drafting them. The scope is very broad - almost all aspects of wholesale market and network access arrangements are potentially covered.
The Third Package creates three new institutions at EU level: an Agency for the Cooperation of European Regulators (ACER), together with two European Networks of Transmission System Operators, one for electricity (ENTSO-E[4]) and one for gas (ENTSOG).
The European Commission, ACER and ENTSOs all play a specific role in the code development process, as illustrated below.

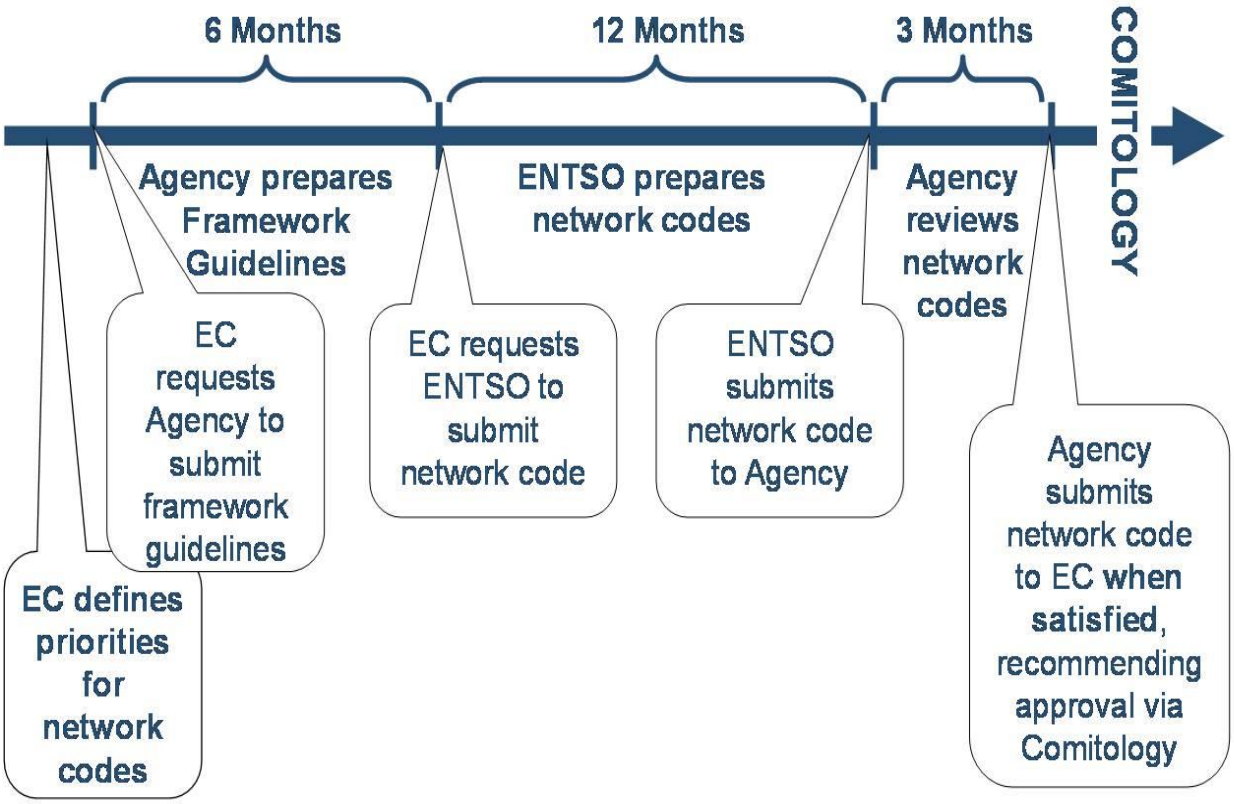


Figure 1*: Network code development process*
(source: ACER http://www.acer.europa.eu/Electricity/FG_and_network_codes/Pages/default.aspx)

The Commission first establishes a list of priorities and ACER then produces a high-level set of principles for each code, termed the "Framework Guidelines" (FWGL). The ENTSOs then have twelve months to draft a network code on a particular subject. The Commission, ACER and the ENTSOs are all required to consult stakeholders during the drafting process.
Once drafted, the network codes are submitted to ACER which assesses their compliance with the FWGL. When ACER is satisfied with the text, it submits the code to the Commission and recommends its adoption via "Comitology". Comitology is the standard process for agreeing EU secondary legislation and involves a committee of Member States chaired by the Commission. Only the Commission is able to propose European legislation and so it puts forward each code for adoption. The Commission is likely to follow the advice of ACER and the ENTSOs in most cases, but can also introduce its own amendments. It is worth noting that, although set timescales are imposed on the ACER and ENTSOs drafting process, there are no specific deadlines applicable to Comitology – discussions continue until a sufficient number of Member States accept the proposal.
When the code has been finally agreed in Comitology and has been scrutinised by the European Parliament, it becomes a binding and directly applicable piece of EU legislation. A period, generally between one and three years, is then allowed for Member States to implement the code at national level.

[3] And in particular Regulations (EC) No 714/2009 and (EC) No 715/2009.
[4] Or ENTSOG (European Network of Transmission System Operators for Gas) for the EU gas network codes.

3) *How many EU network codes are currently being developed and which areas do they cover?*

In electricity ten network codes are currently being developed covering **three** interrelated **areas**:

- **Grid connection related network codes** which provide a set of connection requirements for all parties connecting to transmission networks (including generators, demand customers and high-voltage direct-current - HVDC - connections).
  The connection codes provide a framework within with operational and market rules can be developed.

  There are **three network codes** from the grid connection area: Network Code on Requirements for Generators (NC RfG), Demand Connection Network Code (NC DCC) and Network Code on HVDC connections (NC HVDC).

- **System operation related network codes** which define common pan-European operation standards for the existing and future European electricity system in response to an increasing penetration of renewable energy generation and a greater interconnection between transmission systems in Europe.

  Four system operation network codes address the following issues: Operational Security (NC OS), Operational Planning and Scheduling (NC OPS), Load Frequency Control & Reserves (NC LFCR) and Emergency & Restoration (NC ER).

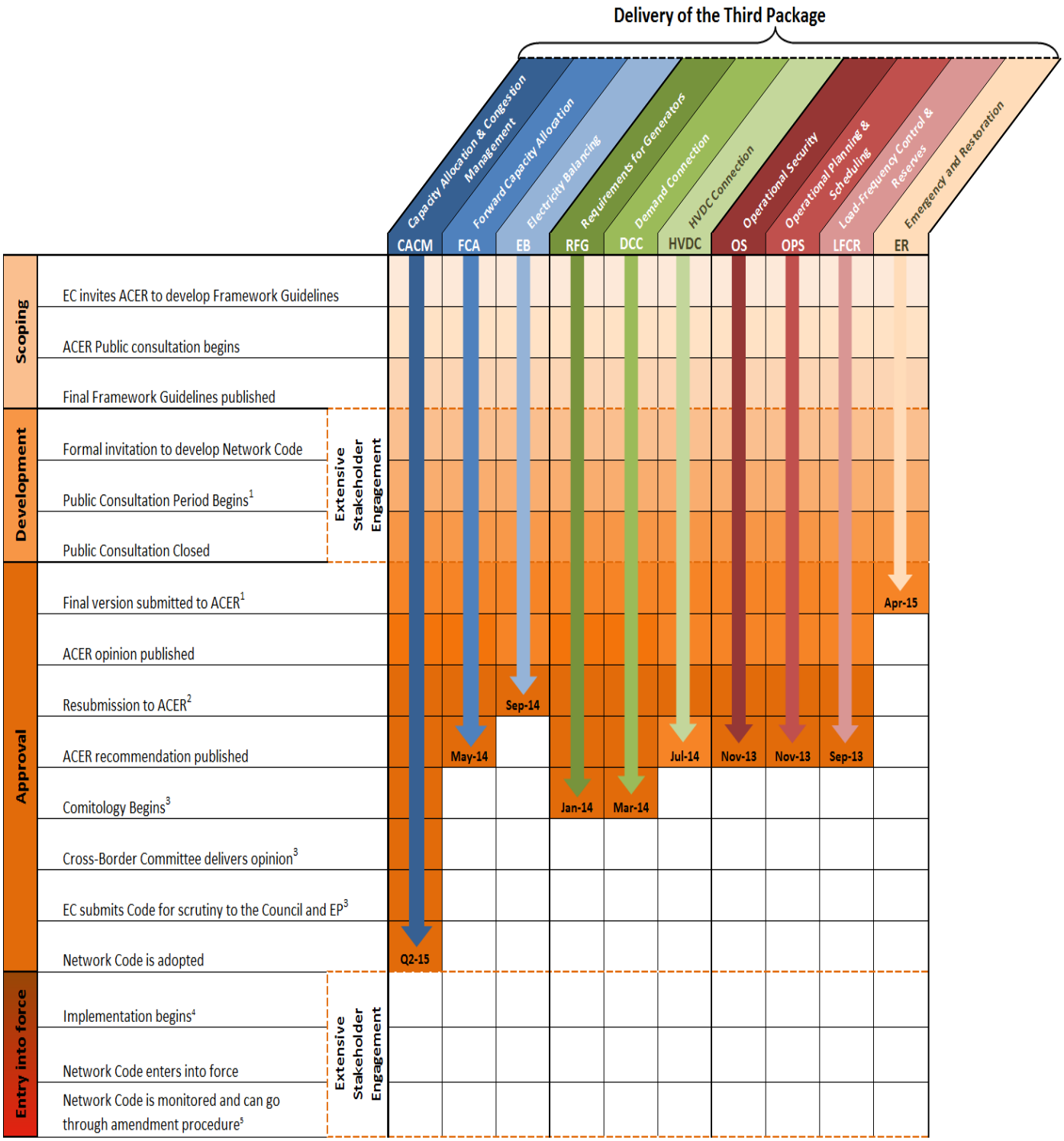
- **Market related codes** which outline the main features of a pan-European electricity market to promote effective competition, minimize risks for all parties and give incentives for market players to act in a way that supports an efficient operation of the system. They provide rules for calculating cross-border capacity and operating the markets in different timeframes.

  Three network codes from the market area focus on the Capacity Allocation & Congestion Management (NC CACM), Forward Capacity Allocation (NC FCA) and Electricity Balancing (NC EB).

4) *What is the latest state of play of each of them?*

The figure below presents the overall timeline for each of the ten network codes under development as of December 2014. Nine network codes have been submitted to ACER. Eight of them (NC RfG, NC CACM, NC DCC, NC LFCR, NC OS, NC OPS, NC FCA and HVDC[5]) have been approved by ACER. NC EB has been re-submitted to ACER in September 2014 and awaits final assessment by the European Regulators. Drafting of the NC ER is on-going until the end of March 2015.
NC CACM, RfG and DCC have entered the Comitology process and are now being discussed by the Member States' representatives sitting in the Electricity Cross Border Committee.
On 5 December 2014, the Regulation on Capacity Allocation and Congestion Management (CACM) was adopted by Member States in Comitology. CACM will now go through scrutiny from the European Parliament and Council. The definitive adoption of CACM is expected in early 2015. The formal adoption of the other network codes which entered the Comitology process should take place later in 2015.

[5] ACER's recommendation on the NC HVDC (No 04/2014) has been published on 29 July 2014 (and is available at the following link http://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Recommendations/ACER%20Recommendation%2004-2014.pdf).



Disclaimer: The purpose of this chart is to provide overall transparency of ENTSO-E's network code development. All forward-looking dates are provisional until confirmed. Stakeholders will be informed and invited to all confirmed events by means of official communication

1: In accordance with ENTSO-E's Network Code Development Process, an internal re/drafting and approval is done before public consultation and submission of the code to ACER.
2: In case ACER does not attach a recommendation to its opinion, ENTSO-E has the opportunity to resubmit the code
3: Changes in process may occur if the Regulatory Procedure with Scrutiny is replaced by the Delegated Acts Procedure for Network Codes validation
4: Some provisions are going through early implemenentation before this stage. Estimated implementation period vary from 18 months for NC OPS to 39 months for NC FCA. For NC EB, a 6 years phased introduction period is planned.
5: The amendment procedure is yet to be determined

Figure 2: Status of network codes under development- December 2014 (source: ENTSO-E [http://networkcodes.entsoe.eu/)](http://networkcodes.entsoe.eu/)

5) What is the purpose of each network code and how they interact?

The table[6] below provides an overview of all ten electricity network codes under development, including a description of their content and interactions with other network codes and areas.

Network code	Content	Interactions with other network codes/ areas
GRID CONNECTION RELATED NETWORK CODES		
Requirements for Generators (NC RfG)	Sets requirements which new generators connecting to the network (both distribution and transmission) – and existing generators (in very limited cases) - will need to meet, as well as responsibilities on TSOs and distribution network operators. **Contents**: • Requirements • Operational Notification Procedure for Connection • Compliance • Derogations	DCC- Balances demand and generation requirements and uses similar processes. HVDC- Reference to part of the RfG requiremenst for offshore HVDC connected generation. Coherence in proceses. OS- Technical requirements to strengthen coordination and system security. EB- Must ensure that RfG characteristics are reflected in products. ER- Must be consistent with certain capabilities provided in RfG (e.g. black-start, islanding, quick synchronisation automatic connection and disconnection).

[6] Table based on two documents available on ENTSO-E website: *"European Network Code Development: "The importance of network codes in delivering a secure, competitive and low carbon European electricity market"* and *"Introduction to Network Codes and the Links Between Codes"*. Both documents can be found here: https://www.entsoe.eu/major-projects/network-code-development/Pages/default.aspx

Demand Connection (NC DCC)	Sets requirements for new demand users and distribution network connections to the network, outlines basic demand side response capabilities for meeting Transmission System needs, as well as responsibilities on TSOs and distribution network operators. **Contents**: • Requirements • Operational Notification Procedure for Connection • Compliance • Derogations	**RfG/ HVDC- Balance** between demand and generation and coherence in processes. **LFCR- Impact of DSR** SFC (System Frequency Control) on system reserve calculations. **OS- Technical** requirements to strengthen coordination and enhance system security. **ER- Must be consistent** with certain capabilities provided in DCC (e.g. demand disconnection for system defence and demand reconnection). **EB- Demand Response** will be an even more needed building block in balancing products. **Ecodesign/ labelling Directive- Vehicle to** develop DSR requirements. **Cenelec M490**- on-going work to develop DSR standards.
HVDC (NC HVDC)	Sets requirements for HVDC connections and offshore DC connected generation. **Contents**: requirements for long distance DC connections, links between different synchronous	**RfG- Reference to part** of the RfG requirements for offshore HVDC

	area's and DC connected Power Park Modules such as offshore wind farms.	connected generation. Coherence in processes. DCC- Coherence in processes (operational notification, derogations …). OS- Technical requirements supporting frequency and voltage stability, system stability robustness and system security. LFCR- Impact of loss of powers (e.g. from an offshore wind farm) on system reserves. EB- Ensure balancing capabilities for reserve transactions across cross-border HVDC links where relevant.
SYSTEM OPERATION RELATED NETWORK CODES		
Operational Security (OS)	Sets common rules for ensuring the operational security of the pan European power system. **Contents:** • Operational Security Requirements • Testing and Investigation • Data Exchange • Training • Compliance • Staff Training	OPS- Is an extension of the OS code prior to real time. LFCR- Frequency control operations use the coordinated schedules from OPS. ER-Must be consistent with operation limits and data exchange framework from OS. RfG/DCC- Contain technical requirements to strengthen

		coordination and system security.
Operational Planning & Scheduling (OPS)	Sets requirements, ranging from the year ahead timeframe to real time, for assessing the adequacy and operational security of the interconnected power system and for planning outages required by TSOs and grid users when they have cross borders impacts on power flows. **Contents**: • Data for Operational Security Analysis in Operational Planning • Operational Security Analysis in Operational Planning • Outage Planning, Adequacy, Ancillary Services, Scheduling • ENTSO-E Operational Planning Data Environment	**OS**- extension of OS requirements prior to real time. **ER**- Must observe the agreements for coordinating operational security from OPS. **CACM**- An overlap with schedules in day ahead markets. **Market Codes**- Planning and scheduling cooperation will unlock transmission capacity in the forward, day ahead, intraday and- indirectly- balancing. **LFCR**- Frequency control operations: uses the coordinated schedules from the OPS.
Load Frequency Control & Reserves (LFCR)	Provides for the coordination and technical specification of load frequency control processes and specifies the levels of reserves (back-up) which TSOs need to hold and specifies where they need to be held. **Contents**: • Frequency Quality • Load Frequency Control Structure • Frequency Containment Reserves • Frequency Restoration Reserves • Replacement Reserves	**EB**- Specifies how the reserves determined under LFCR will be procured. **OS**- Frequency quality, deviation management, improves operational security. **OPS**- Frequency control operations:

	• Exchange and Sharing of Reserves • Co-operation with DSOs • Compliance	uses the coordinated schedules from OPS. ER- Uses the frequency limits specified in LFCR. DCC- Impact of DSR SFC (System Frequency Control) on system reserve calculations CACM- operational limits: have an impact on transmission capacity available for cross-border exchanges. HVDC- Impact of loss of power (e.g. from an offshore wind farm) on system reserves.
Emergency & Restoration (ER)	Provides a set of common requirements and principles to manage and coordinate system operation across Europe in Emergency, Blackout and System Restoration State. These requirements would aim at preventing the propagation or deterioration of an incident, in order to avoid a widespread disturbances or blackouts, as well as at ensuring efficient and rapid restoration from Emergency and Blackout System States. **Contents**: • System Defense Plan • Restoration Plan • Information exchanges and communication • Compliance and review • Market interaction	Builds on the rules, requirements and capabilities provided in: RfG- e.g. definition of Significant Grid User, requirements for: black-start, islanding, quick synchronization automatic connection & disconnection. DCC- e.g. definition of Significant Grid User, requirements for demand disconnection for system defense and demand reconnection. OS- e.g. system state, operational limits,

		system defense plan and data exchange framework. **OPS**- e.g. agreements for coordinating operational security. **LFCR**- e.g. frequency limits. Interacts with all the **Market Codes** due to the Market Interactions chapter.
MARKET RELATED NETWORK CODES		
Capacity Allocation & Congestion Management (CACM)	Creates the rules for operating pan-European day ahead and intraday markets, explains how capacity is calculated and explains how bidding zones will be defined. **Contents**: • Capacity Calculation • Bidding Zones • Day Ahead Markets • Intraday Markets • Remedial Actions • Firmness rules • Cost recovery	**OS/OPS**- build on the Common Grid Model in CACM. **FCA**- Bidding zones and capacity calculation are common. Structure is similar. **EB**- strong link with intraday markets and common capacity calculation, bidding zones and structure. **OPS**- Schedules are relevant in day ahead markets. **Transparency Regulation**- Vital to efficient market functioning.
Forward Capacity Allocation (FCA)	Sets rules for calculating and buying capacity in timescales before day ahead and for hedging price risk between bidding zones in long term timeframes. **Contents**: • Capacity Calculation for FCA	**CACM**- Similar processes and consistency with capacity calculation **MiFID**- Sets capital and organisational

	• Bidding Zones • The Forward Capacity Market • Single Platforms for Allocation and Secondary Trading • Allocation Rules • Firmness and Congestion Income Distribution	requirements for investment firms and market operators when dealing with financial instruments/ impact on TSOs and joint platforms. **Transparency Regulation**- Impacts on the information that is published.
Balancing (EB)	Sets rules to define the roles and responsibilities of TSOs and market parties to procure and exchange balancing products to balance the system from day ahead to real time in the most efficient way. It also includes financial principles for the payment of these services. **Contents**: • The Electricity Balancing System • Procurement of Balancing Reserves • Use, Allocation and Reservation of Cross Zonal Capacity for Balancing Reserves • Settlement • Balancing Algorithm Development • Reporting, Transitional Arrangements	LFCR- Strong link with LFCR (LFCR sets rules for the volume of reserves to be procured and EB creates rules for procuring them). CACM- Overlap with capacity calculation and links to intraday markets (which close before balancing opens) RfG/ DCC- Important that connection rules are reflected in products available on balancing markets.

Managing coherence between various network codes is a challenging task, given the impossibility to develop all of them simultaneously. This means that network codes are developed progressively over some time (circa three years). This also means that when some network codes have already been delivered to ACER or the Commission, some others are still at a drafting stage.
As well as managing the interactions between the various network codes, it is also important that the codes are consistent with wider elements of European energy policy and that, when considered together, all of these pieces of regulation create a set of robust, coherent and enforceable rules.
As such, the interactions need to be identified at an early stage and carefully managed.

6) What would be the impact of European network codes on the GB energy market?

The European electricity network codes are likely to introduce important changes in the design of wholesale electricity markets across Europe. Underlying the codes is a European Target Model for wholesale electricity markets, which places more emphasis on power exchange trading than is the case in the mainly bilateral GB market. This will probably require some adaptations in GB market

design. Moreover, decisions around, for example, bidding zones will influence the profitability of generator investment in different locations across Europe
Furthermore, the network codes are likely to change many of the existing industry commercial arrangements and could impose additional obligations or costs.
In order to help realize Europe's energy policy goals, the network codes need to be implemented and complied with across Europe. This will not be an easy task. In fact, the implementation of each network code requires a series of steps to be taken. This might be national decisions, the conclusion of regional arrangements or the creation of certain methodologies. All GB market participants, DSOs, TSOs, Ofgem etc. will be involved in that process and this work needs to be taken forward in a coordinated manner, with all interesting parties understanding what will be done when.

In the UK, the Joint European Standing Group (JESG), European Code Coordination Application Forum (ECCAFF), as well as the DECC/ Ofgem stakeholder group have been established to look at the implementation of the European network codes.
Monitoring the development of network codes and anticipating their outcome is an important, if challenging, task. Energy UK and its member companies will be taking an active role in the development of the codes.

The content of this note has been developed based on publically available information provided by ENTSO-E, ACER, the European Commission and National Grid (JESG).

For more information, please refer to:

- **ENTSO-E Network Codes Mini Website** http://networkcodes.entsoe.eu/
- **ENTSO-E website** https://www.entsoe.eu/major-projects/network-code-development/Pages/default.aspx
- **ACER website** http://www.acer.europa.eu/Electricity/FG_and_network_codes/Pages/default.aspx
- **EC website** http://ec.europa.eu/energy/gas_electricity/codes/codes_en.htm
- **JESG dedicated website** http://www2.nationalgrid.com/uk/industry-information/electricity-codes/standing-groups/joint-european-standing-group/