All-island Network Code Stakeholder Forum

22 October 2018

Belfast

CRU An Coimisiún um Rialáil Fóntas Commission for Regulation of Utilities

Utility Regulator ELECTRICITY GAS WATER

ESB NETWORKS

EIRGRID semo SONI

Agenda

Session 1: Network Codes update [10:30 – 12:00]

- RA overview
- TSO update
- DSO/DNO update
- Further information
- Q&A & Break

Session 2: Consultation topics and additional information [12:00 – 14:00]

- TSO update
- WSL presentations
- Open floor for questions
- Working lunch and one-to-ones
- AOB & Close

Practical info

- Fire alarm & exits
- Room capacity & temperature
- Break between sessions & lunch provided at meeting close
  - Please keep the noise down during breaks
- Q&As after session 1 & session 2
- Slides will be available online
- Feedback, additional questions & next meeting

Session 1

Network Codes update

Regulatory update on EU Network Codes and Guidelines

Why should you be interested?

- **Changes to connection standards** – Generator Connections, Demand connections, HVDC connections (Interconnectors/Offshore etc)

- **Changes to System Operations, Data Exchange requirements, Grid codes, Black start services, Emergency procedures -** System Operation, Emergency Restoration

- **Changes to Market Operations, Harmonised EU Platforms, Interconnector Flows -** Electricity Balancing, CACM, FCA

EU Network Codes and Guidelines

Connections

- Requirements for Generators (RfG)
- Demand Connection (DCC)
- High Voltage DC (HVDC)

Operational

- System Operation (SOGL)
- Emergency Restoration (ER)

Markets

- CACM- Capacity and Congestion Management
- Forwards and Liquidity (FCA)
- Balancing (EBGL)

Visibility of work underway

Stakeholder Fora – number per year- info published on SONI/EirGrid website

Consultations and Decision papers- located on TSO/DSO/ RA /EU websites

Stakeholders welcome to contact Network Operators and Regulators on specific issues

Visibility of work underway

TSOs

- SONI website
- EirGrid website

DSOs

- ESBN website
- NIE website

Regulatory Authorities

- CRU website
- UR website

All-EU Bodies

- ENTSO-E website
- CEER website
- ACER website

Visibility – changes to existing industry documents

- The EUNC requirements for RfG, DCC, HVDC will be incorporated into the **Grid Codes** and **Distribution Codes.**

- System Operation and Emergency Restoration will also drive changes to **Grid and Distribution Codes**, and **system operation processes**.

- Market codes have driven changes to SEM (CACM, FCA and I-SEM), and further changes likely to be necssary to **Trading and Settlement Code**, and **DS3 System Services** related to Electricity Balancing Guideline and Emergency Restoration implementation.

Decisions completed so far

Connection Code Decisions

- CRU Decision on Generator Classification as **Emerging Technology – RfG-** CRU Decision
- CRU Decision on **Derogation Criteria** – 3 separate decisions for **RfG, DCC and HVDC** 2017-2018 – CRU Decisions
- CRU Decision to **extend the existing generator classification timeline under RfG** – Oct 2018- CRU Information Paper
- UR Decision on **Derogation Criteria for RfG, DCC, and HVDC** 2017

System Operation Decisions

- CRU/UR Decision on a **Request for an Amendment (RfA) of the Load Frequency Control (LFC) Blocks proposal** (IE & NI) – SOGL – 2018 – UR Decision , CRU Decision
- CRU/All NRA EU Decision on a **RfA of the Key Organizational Requirements, Roles and Responsibilities proposal (KORRR)** – SOGL – 2018 – UR Decision , CRU Decision
- CRU/All NRA EU Approval of the **Common Grid Model Methodology (CGMM) v3** – SOGL- 2018 – CRU Decision
- UR/ All NRA EU Approval of the **Common Grid Model Methodology (CGMM) v3** – UR Decision

Upcoming Decisions (short & medium term)

Connection Codes

- CRU Decision on Proposal for General Application of RfG Requirements – **RfG (31st Oct 2018)**
- UR Decision on Proposal for General Application of RfG Requirements – **RfG (Nov 2018)**

- CRU Decision on Proposal for RfG Banding Thresholds – **RfG (31st Oct 2018)**
- UR Decision on Proposal for RfG Banding Thresholds – **RfG (Nov 2018)**

- CRU Decision on Proposal for General Application of DCC Requirements – **DCC – March 2019**
- UR Decision on Proposal for General Application of DCC Requirements – **DCC – March 2019**

- CRU Decision on Proposal for General Application of HVDC Requirements- **HVDC – May/June 2019**
- UR Decision on Proposal for General Application of HVDC Requirements- **HVDC – May/June 2019**

Upcoming Decisions (short & medium term)

System Operation and Emergency Restoration Codes

- CRU Decision on amended LFC Blocks proposal – **SOGL (Oct 2018)**
- UR Decision on amended LFC Blocks proposal – **SOGL (Oct 2018)**

- CRU/All NRAs EU Decision on the Relevance of Assets for Outage Coordination (RAOC) proposal – **SOGL – March 2019**
- UR/All NRAs EU Decision on the Relevance of Assets for Outage Coordination (RAOC) proposal – **SOGL- March 2019**

- All NRAs EU Decision on amended version of the KORRR proposal – **SOGL (Dec 2018)**
- All NRAs EU Decision on amended version of the KORRR proposal – **SOGL (Dec 2018)**

- CRU/UR Decision on the Synchronous Area Operational Agreements (SAOA) and the LFC Blocks Operational Agreements (LFC BOA) – **SOGL (currently out for consultation)**

- CRU/All NRAs EU Decision on Coordinated Security Analysis (CSA) methodology – **SOGL – (March 2019)**
- UR/All NRAs EU Decision on Coordinated Security Analysis (CSA) methodology – **SOGL – (March 2019)**

- CRU Emergency Restoration Decisions (further detail in TSO session) – **ER** (**May 2019)**
- UR Emergency Restoration Decisions (further detail in TSO session) - **ER (May 2019**)

Upcoming Decisions (short & medium term)

EBGL

All NRA Decisions

- Imbalance Netting Implementation Framework- Implementation Framework for platform for Manual Frequency restoration reserves (MARI)
- Implementation Framework for platform for Replacement Reserves (TERRE)
- Imbalance settlement Harmonisation
- Pricing Proposals – Balancing energy and cross-zonal capacity
- Activation Purposes of Balancing Energy Products

Decisions under CACM & FCA

- Majority of CACM Methodologies have been approved
- Around half of FCA Methodologies have been approved
- Recent Decisions:
  - **14 Sept 18** (CACM) <u>Coordinated Redispatching & Countertrading</u>
    - Requires some additional clarity and detail - REQUEST FOR AMENDMENT
  - **14 Sept 18** (CACM) <u>Redispatching and Countertrading Cost Sharing</u>
    - Requires some additional clarity and detail - REQUEST FOR AMENDMENT
  - **14 Sept 18** (CACM) <u>Day-Ahead Calculation of Scheduled Exchanges</u>
    - Requires further modification - REQUEST FOR AMENDMENT
  - **14 Sept 18** (CACM) <u>Intraday Calculation of Scheduled Exchanges</u>
    - Requires further modification - REQUEST FOR AMENDMENT

Decisions under CACM & FCA

- ...continued

  - (CACM) <u>Capacity Calculation of Regions</u>
    - TSOs submitted 2nd Request for Amendment on 6 April 2018
    - Amendment proposes the inclusion of other cables in several CCRs
    - Decision requested from ACER
  - (CACM) <u>Pricing of Intraday Capacity</u>
    - ACER decision pending
  - (FCA) <u>Congestion Income Distribution</u>
    - Submitted to Regulatory Authorities on 6 June 2018

RA summary

- Questions ?
- Please request workshops
- Watch out for consultations
- Engage at Grid Code/Distribution Code
- Please ensure your businesses are informed

Thank you

TSO update

CACM & FCA

Peter Campbell

Day-ahead & Intraday

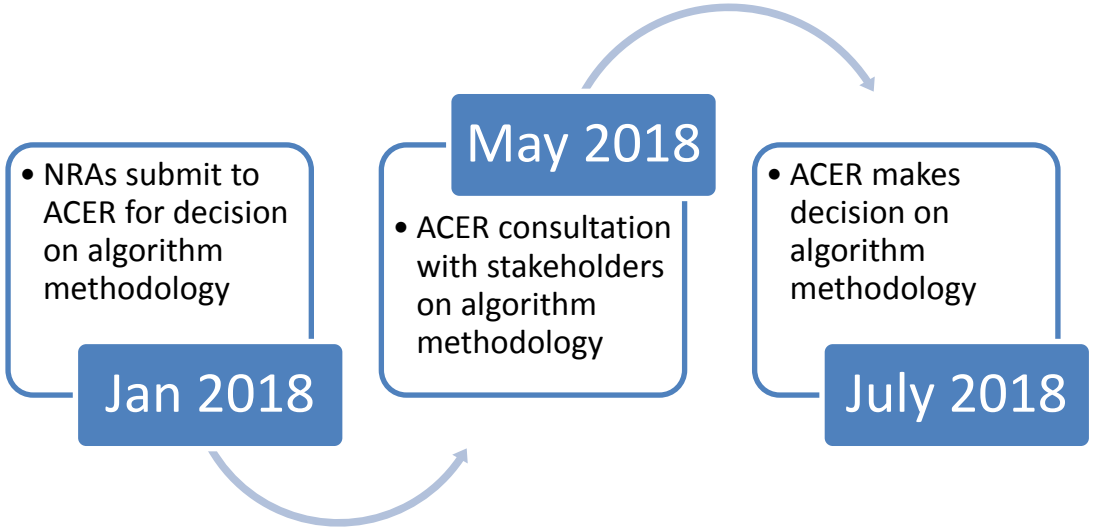
- With I-SEM go-live on 1st October, SEM is now fully integrated into the DA Multiregional Coupling (MRC) in Europe. A revised DAOA will be signed by all parties, including EirGrid/SONI in Q4 2018.

- EirGrid/SONI signed the IDOA in June but will not become operational in the Single Intraday Coupling (SIDC) until it joins XBID (i.e. in wave 3 at the earlie

- Work is now underway to develop a single, enduring governance structure for DA/ID coupling. EirGrid/SC is a member of the governance team, establishing th future governance arrangements.

From 1 October 2018

ACER decision on Algorithm Methodology



Main changes:

- Clarification on management of the algorithm performance with regard to the products and requirements;
- Introduction of explicit and shorter development deadlines
- Clarity on maximising economic welfare, scalability and repeatability of the algorithms;
- Transparency and monitoring of the performance of the algorithms within required standards;
- Change management and decision making processes to better reflect TSO/NEMO cooperation

Intraday Cross Zonal Capacity Pricing

In a world of growing intermittent renewables, intraday markets are increasingly needed to adjust closer to real-time.

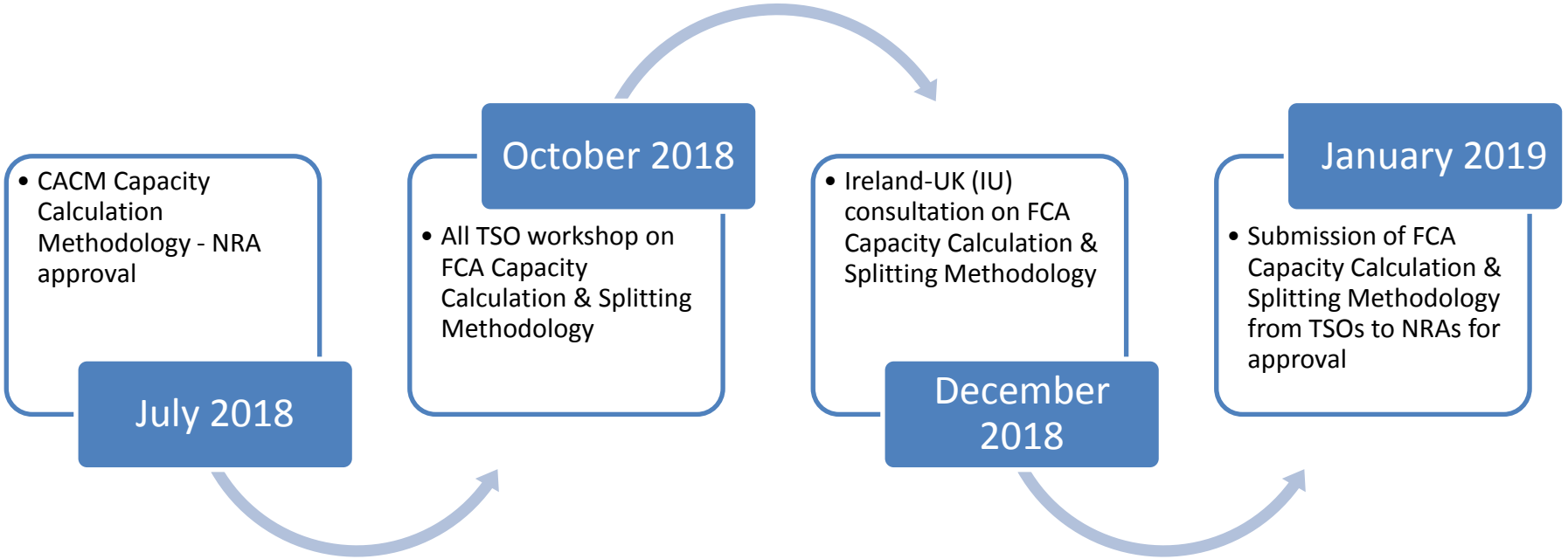
Intraday market coupling requires an efficient pricing and usage of transmission capacity – which is incompatible with continuous trading.

Objective: Explore possibilities to complement continuous intraday markets with EU-wide ID auctions, enabling an efficient pricing and usage of transmission capacity closer to real-time.

Intraday Cross Zonal Capacity Pricing

- All TSOs proposed having implicit auctions complementing continuous trading at the EU level
- NRAs decided to submit the proposal to ACER in July ‘18 for decision.
- ACER consultation is now open from 10 October until 30 October before making its decision in January 2019
- European Commission is undertaking a Study on the future electricity intraday market design
  - Stakeholders meeting on 27/09 in Brussels
  - Final report due in December 2018
- I-SEM has introduced implicit auctions as an interim intraday solution from 1st October and therefore already prices intraday capacity across the SEM-GB border

Long Term Capacity Calculation & Splitting



Electricity Balancing Guideline

John Young

What's it all about?

European Balancing Markets

- European platforms for exchange of **Standard Products**
- Implementation over several years (at least out to 2021)

Market & Settlement Harmonisation

- Harmonisation of gate closure time, pricing etc. for Standard Products
- Harmonisation of Imbalance Arrangements

£/€

Cross-border Capacity Reservation

- Opportunity for reservation of cross-border capacity for the use of balancing services

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ESB NETWORKS

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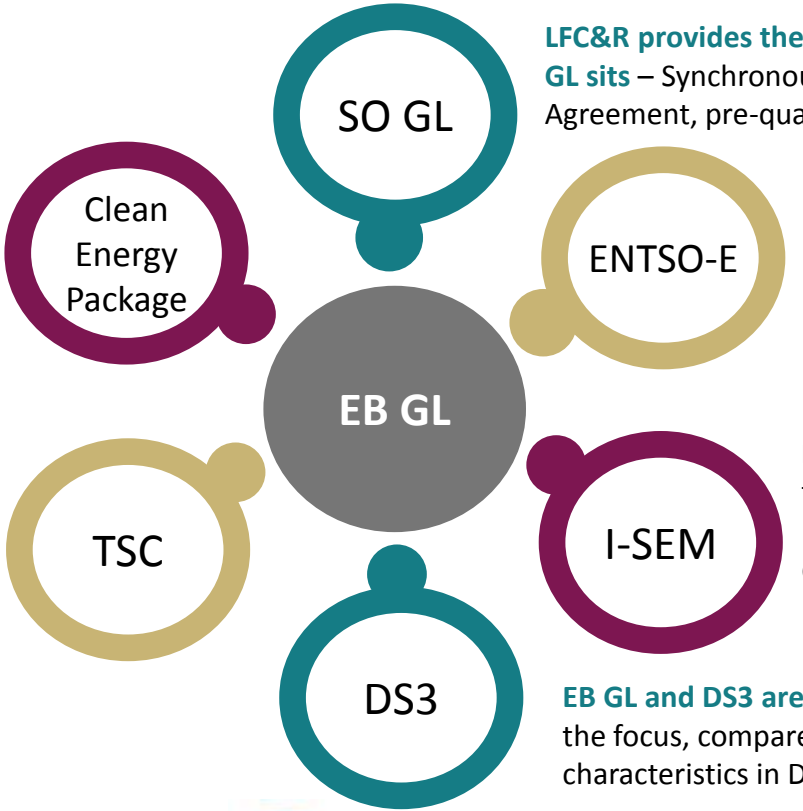
What are the (potential) interactions?

Concepts/requirements introduced in EB GL are built on in CEP – implementation and associated policy development will need to keep this in mind.

Approach to implementation will determine impact on TSC – any changes or additions to I-SEM likely to require some form of code change.



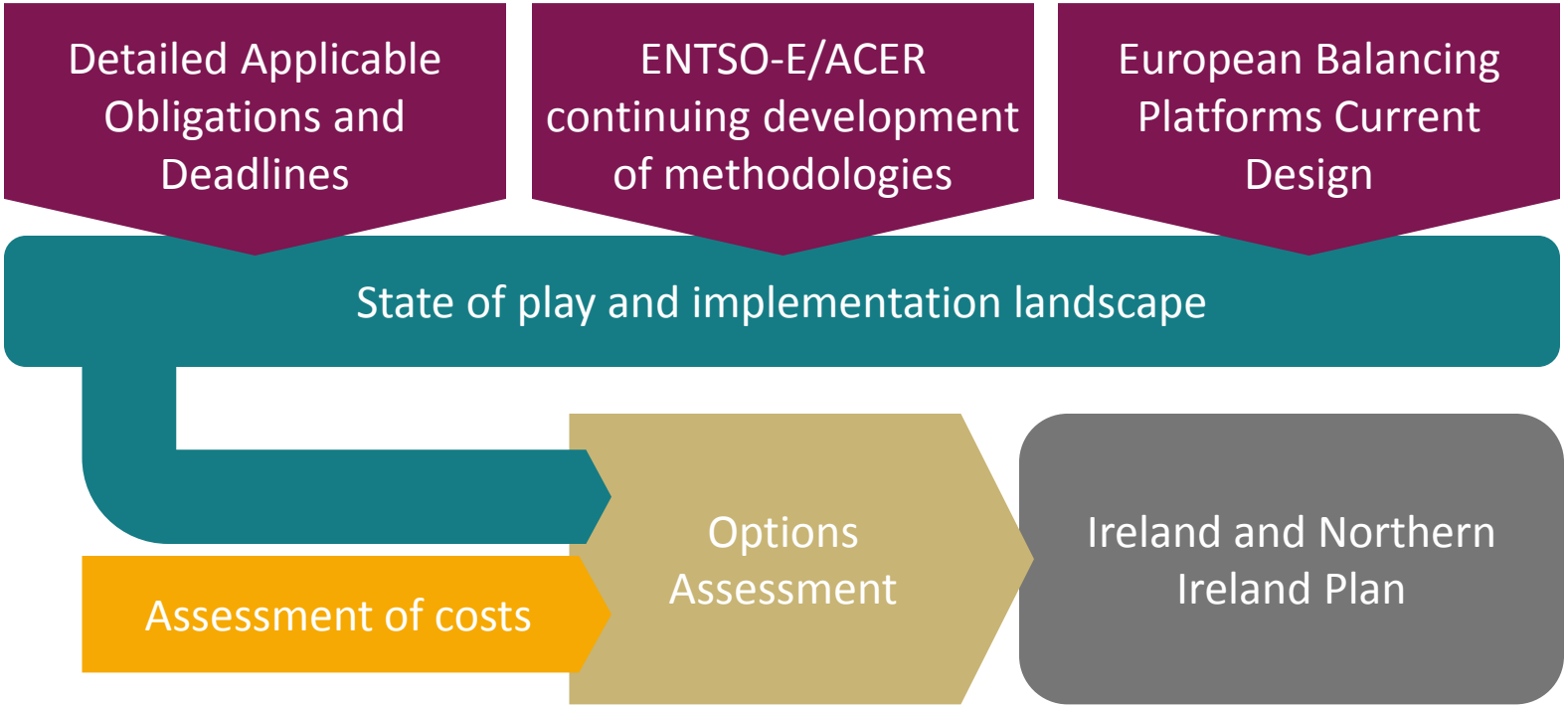
LFC&R provides the technical framework on which EB GL sits – Synchronous Area/LFC Block Operational Agreement, pre-qualification process, definitions etc.

EB GL does not provide full detail – significant implementation frameworks, methodologies, proposals (with legal standing) are under development.

European balancing platforms likely to build on/link into I-SEM. Exact mechanism for delivery will determine need for additional requirements and/or change.

EB GL and DS3 are different models – Energy activation the focus, compared to availability and incentivisation of characteristics in DS3. Extent of interactions not clear.

What's the plan?



DSO Update

Rachel O'Connor / Tony Hearne

ESB Networks : RFG

Requirements for Grid Connection of Generators

Introduces a common set of technical requirements for every ‘new’ generator connecting to the electricity network across Europe.

- A power generating facility owner that has not procured plant by ~~May 2018~~ 30th November 2018 and plans to connect generation to either the transmission or distribution electricity network is deemed “new”.

RfG recognises that the requirements of power systems in different synchronous areas is different due to the differing sizes. For this reason, the RfG provides that some of the requirements for general application are to be specified at national level.

Applies to generators which are considered significant (connection & <110 kV and max capacity of >0.8 kW).

Many of the requirements for general application exists in the existing D-Code..

ESB Networks : RFG

Currently 3 mods with CRU (Pre-RfG)

Mod 36 - 1 MW threshold for controllability and inclusion of PPMs, to cover Solar Farms and Batteries.

Mod 43 - Proposed Distribution Code structural changes to facilitate adoption of RfG.

Mod 44 - Declared Supply Voltage parameter, compliance with1.1pu requirements.

Transposition of RfG requirements into the D-Code

Although much preparatory work has been carried out to date, transposition can begin in earnest once mods have been approved.
It is important to ensure visibility of the requirements to generators from November 2018.
Until there is a full re-work of the D-Code it is inappropriate to circulate a separate document outlining RfG mandatory and exhaustive parameters. It is planned to use the D-code mailbox to liaise with generation customers seeking clarification on RfG standards.

ESB Networks : RFG

DCC11 to be re-named “Requirements For Power Park Modules” [PPMs] this will be sub-divided into sections for;

- General Requirements for PPMs
- Requirements for Type A PPMs
- Requirements for Type B PPMs
- Requirements for Type C PPMs
- Requirements for Type D PPMs

A new section DCC12 called “Requirements For Synchronous Power Generation Modules” [SPGMs] this will be sub-divided into sections for;

- General Requirements for SPGMs
- Requirements for Type A SPGMs
- Requirements for Type B SPGMs
- Requirements for Type C SPGMs
- Requirements for Type D SPGMs

ESB Networks : RFG

- Date of effect implemented through newly defined “Cohorts”
- New RfG Types adopted
- Existing Types re-defined as “Topologies”

Cohort		Date of Effect
1	Deemed Existing for certain EUNC Requirements for Generators provisions	
2	Deemed Existing for certain EUNC Demand Connection Code provisions	

Type	Description
A	Connection point <110 kV and max capacity >0.8 kW
B	Connection point <110 kV and max capacity ≥0.1 MW
C	Connection point <110 kV and max capacity ≥5 MW
D	Connection point ≥110 kV or max capacity ≥10 MW

Connection Type B

WFPSs are classed as being connection type B when connected at a **Distribution System** voltage (≤ 38 kV) to a dedicated **WFPS(s)** transmission station. There are no load **Customers** connected to the **DSO** operated 38/20/10kV busbar.

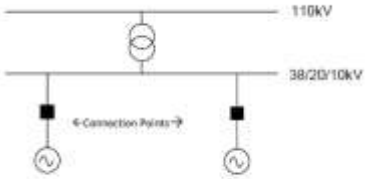


Figure 6

ESB Networks : RFG

- Content category indication
- Intention to provide subtle indication to reader of content that is:

1. New content driven by EUNC
2. Existing content changed by EUNC

DCC11.2.2 In addition to remaining connected to the **Distribution System**, the **WFPS** shall have the technical capability to provide the following functions:

a) During **Voltage Dips** the **Controllable WFPS** shall provide **Active Power** in proportion to retained voltage and maximise reactive current to the **Distribution System**, as set out in **DCC**11.2.2 (c). The provision of reactive current shall continue until the **Distribution System** voltage recovers to within the normal operational range of the **Distribution System**, voltage at which the **WFPS** is connected, as specified in Table 6A, or for at least 500ms, whichever is the sooner. The **Controllable WFPS** may use all or any available reactive sources, including installed statcoms or SVCs, when providing reactive support during **Voltage Dips**;

b) For **Voltage Dips** cleared within 140ms, the **Controllable WFPS** shall provide at least 90% of its maximum **Available Active Power** as quickly as the technology allows and in any event within 500ms of the voltage at the **Connection Point** recovering to the normal operating range, per Table 6A below, of the voltage level at which the **WFPS** is connected,. For longer duration **Voltage Dips**, the **Controllable WFPS** shall provide at least 90% of its maximum **Available Active Power** within 1 second of the voltage at the **Connection Point** recovering to the normal operating range for the voltage at which it is connected.

During and after faults, priority shall always be given to the **Active Power** response as defined in **DCC**11.2.2 (a) and **DCC**11.2.2 (b). The reactive current response of the **Controllable WFPS** shall attempt to control the voltage back

Sample – Do not take literally

ESB Networks : RFG

- Intention to carry out a sweep of RfG-D-Code to seek out any unseen areas of impact.
- Intention to have a first draft of RfG D-Code ready for consideration by the DCRP by end of 2018.

This assumes Approval of the mods described above……

And good winds behind us!!!

ESB Networks : DCC

Background

- DCC code established and in effect 7th September 2016
- Requirements come into effect three years after above date.
- Requirements on General Frequency, Voltage, Short Circuit Level, Reactive Power, Protection, Control, Power Quality, Demand disconnection and Demand reconnection
- Demand response services provided to system operators shall be distinguished based several categories

Applies to:

- New distribution systems, including new closed distribution systems
- New demand units used by a demand facility or a closed distribution system to provide demand response services to relevant system operators and relevant TSOs
- Existing facilities if cost benefit analysis deems it suitable

ESB Networks : DCC

Work completed:

Joint SO consultation on relevant parameters completed and closed August 2018

DSO parameters submitted to CRU for their consideration and approval September2018

Next:

CRU approval of parameters / Meetings with CRU as required

Progression of Distribution Code mods post approval of parameters by CRU

Timelines unconfirmed presently

ESB Networks : ER

Background

2017/2196 of 24 November 2017 establishing a network code on electricity emergency and restoration

Code fixes the processes that the TSO/DSO must follow when they face an incident on their grid.

Regulation deals with the establishment of ‘crisis scenarios plans’ both at regional and at national levels.

The Network Code on Emergency and Restoration deals with National System defence plans with consultation between countries.

Part of the System Operation Code Family – A number of overlaps with SOGL Code

ESB Networks : ER

Updates

Automatic under-frequency control scheme – due a review by TSO

Automatic scheme against voltage collapse – due review. Info in suitability of current setting also required from TSO

Availability of TSO's means, tools and facilities

- UPS has 15 mins backup at max loading, after which time additional diesel generation will be provided
- In addition, UPS Battery replacement programme underway in some locations

Testing of Tools & Facilities

- Ensuring programmes in place for maintenance & servicing

ESB Networks : ER

Updates

Activation of the re-energisation procedure

- Blue Alert / Black Start Document and Plans are progressing
- Blue start “dry-run” planned for near future

Communication Systems

- Currently do not employ 24hours backup as standard in ROI - TSO current requirement is 10 hours
- However, most locations were designed with contingency and many may be capable of 24 hours. Under assessment.

ESB Networks : ER

Next:

18th December 2018: Many TSO deliverables due, including

- Draft of the system defence plan
- SGUs as required under ER determined

18th December 2019:

- Implementation of System Defence Plan measures

ESB Networks : SOGL

Background

- 2017/1485 of 2nd August 2017 and came into force on 14th September 2017 establishing a Guideline on Electricity Transmission System Operation
- Network Operators or Users defined are TSOs, DSOs, CDSOs, SGUs & NEMOs
- Part of the System Operation Code Family: Overlaps within this code with all of the other 7 network codes, including Emergency Restoration [Regulation 2017/2196]

Methodologies which involve DSO

- Article 40: KORRR [Key Organisational Requirements, Roles & Responsibilities]
- Article 75: CSA[Co-Ordination of Security Analysis]
- Article 84: RAOC [Relevant Assets for Outage Co-ordination]

ESB Networks : SOGL

Updates: KORRR

Approved by TSOs: March 2018

Amendment request by NRAs: July 2018

We welcome the changes proposed in amendment; in particular:

- Continued use of language requiring agreement between TSOs and DSOs across all articles.
- Clarity around responsibilities for communication links being defined at national level
- Reduction in listed timeframe for notification of changes for all parties under Articles 8, 11 & 15 back to 3 months from 6 months.

Implementation processes in progress between DSO & TSO [More on this work stream in Part 2]

Processes for Data Exchange to be determined by March 2019

ESB Networks : SOGL

Updates: CSA & RAOC Methodologies

Approved by TSOs: Oct 2018

By 3 Months after approval [Dec 2018/Jan 2019, assuming no amendments]:

- Lists of relevant power generating modules and relevant demand facilities
- Lists of relevant grid elements

Observability Area to first be assessed qualitatively

By 1st July (2019, and every year afterwards)

- Update of the lists of relevant power generating modules and relevant demand facilities
- Update of the list of relevant grid elements

ESB Networks : SOGL

DSO Views

- We welcome a proportionate and balanced approach to Relevant Assets
- For ROI, scope of KORRR to be determined utilising Article 40.5
- To be proportionate, suitability of B,C & D Generators [under RFG] that are to be included is to be determined. CSAM & RAOCM employed.
- We recognise synergies between the CSA SGU List and the ER SGU List, the latter of which is to be available Dec 2018
- For Outage Planning, we recognise the flexibility in the SOGL allowing for adherence to alternative delivery dates if another synchronous area is not affected.

ESB Networks : SOGL

DSO Views

- For data exchange, we look to build and innovate upon processes and technologies that we already utilise
- For new processes, synergies and balance between compliance, requirements, suitability & costs
- We recognise the role that Data Exchange plays across all the Network Codes

Next

- Continue with KORRR & CSA/RAOC assessment & implementation to dates presented
- Identify amendments to ROI distribution code

Further information

Peter Campbell

Clean Energy Package

2011-2017	2018 – 2020 (CEP entry into force 2019)	2021-2023 (CEP implementation)
	CEP: New NCs drafting 2019: Cybersecurity (tbc); DSR (tbc); **Joint ENTSO-E – EU DSO NCs work**	**New NCs drafting:Non-frequency AS (tbc); Tariffs (tbc);** **Joint ENTSO-E – EU DSO NCs work**
	Digital tools & platforms (NC & CEP-related)	**Digital tools & platforms**
	CEP: RPP scenarios & methodologies, tools	**CEP RPP: scenarios & methodologies updates, new tools**
	CEP: Methodologies, registry and tools for capacity providers & CRM specifications	**Methodologies, registry and tools for capacity providers & CRM specifications**
8 NC & GL drafting finished by 2017	**8 NC/GL implementation & monitoring (incl. all-TSO), 8 NC/GLs amendments**	**8 NC/GL implementation & monitoring (incl. all-TSO), 8 NC/GLs amendments**
TYNDP, TEN-E guidelines 347/2013	**TYNDP & interlinked models with ENTSOG, TEN-E guidelines**	**TYNDP & interlinked models with ENTSOG, TEN-E guidelines**
Adequacy outlooks: MAF/Seasonal	**CEP pan-European adequacy assessments & seasonal outlooks**	**CEP pan-European adequacy assessments & seasonal outlooks**
RSC development	**CEP: RCC regions, methodologies, tools development**	**RCC implementation**
RDIC development, implementation and monitoring	**RDIC development, implementation and monitoring plans**	**RDIC development, implementation and monitoring plans**
Transparency Platform (Reg 543/2013)	**Enhanced Transparency Platform (Reg 543/2013) for all NCs**	**Enhanced Transparency Platform (Reg 543/2013)**
Other Reg: REMIT Regulation; ITC mechanism	Other Regulations: REMIT; ITC mechanism	Other Regulations: REMIT; ITC mechanism
Others mandated products: Annual Work programs; Annual reports;	Other mandated products: Annual Work programs; Annual reports; **Non-mandated products**	Others mandated products: Annual Work programs; Annual reports; **Non-mandated products**

Legend: Existing ENTSO-E mandates; continuous implementation/enhanced mandates; new CEP mandates;

CEP framework: new mandates for ENTSO-E and deadlines

EIF - mid-2019

- *Early implementation RPP;*
- *MAF;*
- *VOLL;*

Dec 2019 (6m after)

- **10 new methodologies (pan-EU adequacy, RPP)**
- 2 new methodologies, common rules, terms of operation of registry (XB & CMs)
- RSCs+ definition of regions, cooperation framework & potential new tasks (tbc)
- EU DSO entity cooperation mechanisms

mid-2020 (1y after)

- Set up & operation of registry for foreign generation capacity providers
- New NC drafting: cybersecurity (2019); DSR (2020)

mid-2021 (2 y after)

ENTSO-E – NCIP: Website

What's new?

- Enhanced ENTSO-E website to facilitate NC monitoring of deliverables released
- Status of Pan-European and regional NC implementation is now easy accessible

1 Go to **https://www.entsoe.eu/**

2 Click on **Network Codes** and select the **Code Family**

3 Scroll down to see the **Timeline** and the **Overview of each deliverable**

ENTSO-E – NCIP: Website

Functions

Integrated **Timeline**, which is automatically updated

List of deliverables for each code family

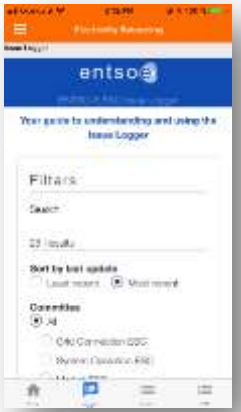
Status of each deliverable with corresponding **documents**

Description

- Showing NC Pan-European and regional deliverables **for each Code Family**
- **Time planning** for each NC **available**
- NC implementation **process incorporated**

ENTSO-E – NCIP: App

And all this information available in your pocket? **ENTSO-E App**



Consultations | Events | Network codes | Status of deliverables | Issue log | Action tracker | And way more

Available for iOS and Android…

Q&A

Session 2

Focus on Operations Codes and Connections Codes

EU Network Codes and Guidelines

Connections

- High Voltage DC
- Demand Connection
- Requirements for Generators

Operational

- System Operation (LCFR, OS, OPS)
- Emergency Restoration

Markets

- CACM- Capacity and Congestion Management
- Forwards and Liquidity
- Balancing

EirGrid and SONI approach to compliance

- EirGrid and SONI working from common resource pool
  - Common approach taken where possible
- Market Operations responsible for Market Codes
- Operations, Planning and Innovation responsible for delivery of Operations and Connections Codes
  - Focus of this session

EirGrid and SONI approach to compliance

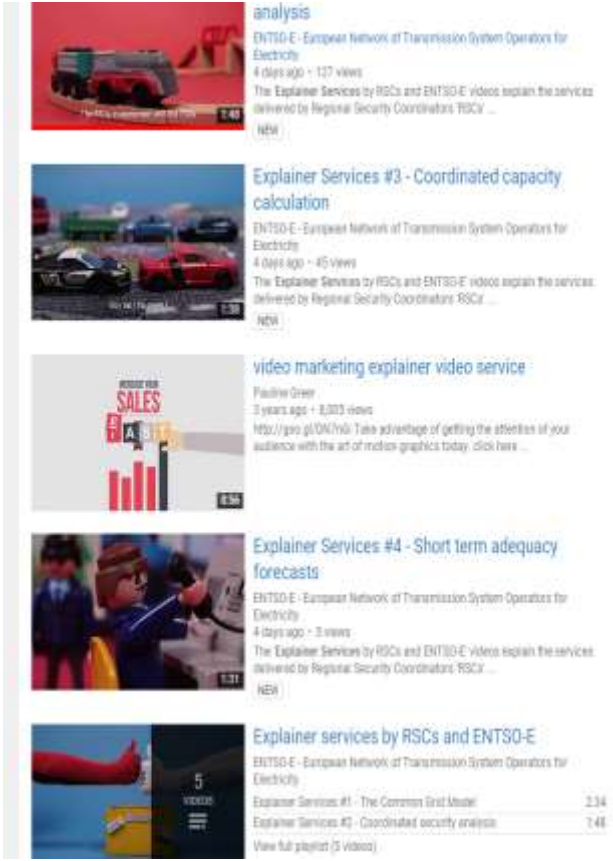
- Effective implementation requires application of scarce expert resources
- Potential impact on stakeholders is a primary consideration
  - EirGrid and SONI engagement with ENSOE during comitology
  - Minimal changes proposed and only where required (generally)
- Use and refer to existing processes where appropriate
  - Or modify slightly if needed
- What are other TSO's doing?
  - EirGrid / SONI collaborating closely with NGESO
  - We are members of key ENTSOE working groups

Connection Codes

- RfG
  - Parameters submitted to both RA's in May 2018
- DCC
  - Parameters submitted to both RA's in September 2018
- HVDC
  - Parameters to issue for consultation shortly
- Transposition to Grid Codes
  - Assessing Optimal approach for Grid Codes
    - Potential solutions presented at JGCRP on 18th Oct

Upcoming Workstreams

- SOGL (articles with deadlines)
  - SAOA(118), LFCBOA(119) – Alan Kennedy
  - Regional Operational Security Coordination (76)– Emma Morris
  - Regional Outage Coordination (85, 87) – Emma Morris
  - KORRR Data Exchange (40) – Éanna Farrell
- Emergency & Rest (articles with deadlines)
  - System Restoration Plans (23) – Alan Rogers
  - System Defence Plans (11) – Niall Maguire
  - Rules for Suspension and Restoration of Market Activities (36) – Seamus Power
  - Market Settlement Rules (39)– Seamus Power
- Connections Codes - HVDC – Tomás Mahony



Code Expert Engagement

- 5-15 minute presentation on previous slide by topic expert (Workstream Leads - WSLs)
- 1-2 minutes questions per presentation
- We will remain behind for some time – please approach relevant WSL's with your query
- Or approach myself or Peter on overall Market, Operations, or Connections related Codes
  - We are in no rush home
  - Unlikely to have this level of access to this pooled expertise again

SAOA/LFCBOA

Alan Kennedy

SAOA and LFCBOA

- Synchronous Area Operational Agreement
  - SOGL Art 118 lists all content
- Load-Frequency Control Block Operational Agreement
  - SOGL Art 119 lists all content
- Certain aspects require Public consultation and RA approval

SAOA and LFCBOA

- Now available for public consultation via EirGrid, SONI and ENTSO websites

  https://consultations.entsoe.eu/system-operations/ire_ni_saoa/
- Closes on 8 Nov 2018
- We would welcome your input

SAOA and LFCBOA Approach

- EirGrid and SONI already have publicly available documents that address many of the areas within SAOA and LFCBOA scope:
  - Grid Codes
  - Balancing Market Principles Statement
  - DS3
  - Operational Constraints Updates
  - System Operator Agreement

SAOA and LFCBOA Approach

- Certain issues are addressed within agreements and policies that are not publicly available:
  - Interconnector Operating Protocols
  - Internal TSO policies, procedures

SAOA and LFCBOA Approach

- Several aspects can be incorporated in Operational Constraints Update with immediate effect – e.g. interconnector ramp rate limits
- Others require formal documentation for public consumption – available by March 2019

LFC Structure

- Original EirGrid/SONI proposal submitted to RAs on 14 Dec 2017
  - 1 Synchronous Area
  - 1 LFC Block
  - 1 Monitoring Area
    - MA's are delineated by "Interconnectors" in SOGL
    - N-S has not been classed as an Interconnector since 2007

LFC Structure

- RAs requested an amendment for two Monitoring Areas, one for IE, one for NI.
- EirGrid and SONI already fulfil the associated obligations:
  - Calculate the N-S transfer
  - Monitor N-S in real time
- TSOs must classify N-S as an “Interconnector” for operational purposes only.

LFC Structure

- EirGrid and SONI submitted revised proposal in line with RA direction
- RAs decision is pending.

Regional Operational Security Coordination

Emma Morris

Overview

- Regional operational security coordination for Ireland/Northern Ireland/Great Britain region
- SOGL Articles 75-78

Obligation:

- All TSOs to develop methodology for coordinating regional operational security within 12 months of entry into force of SOGL
- Within three months of that approval each TSO to develop individual methodology

Need for regional operational security coordination:

- Important to understand threats to the system within region and how to alleviate them to ensure security of system

Regional operational security coordination

Ireland-Northern Ireland:

- Connected via AC interconnector therefore incident on one system can impact the other
- Regional operational security coordination already carried out:
  - Joint contingency analysis through a single EMS
  - WSAT provides dynamic stability assessment on an All Island basis
  - System Operator Agreement already in place

Regional operational security coordination

Ireland/Northern Ireland – Great Britain

- Connected via HVDC interconnector therefore two synchronous areas are largely insulated from the impact of network issues in the other synchronous area.
- Loss of Moyle or EWIC is worst case scenario and this is already accounted for in each TSO's operational security analysis.
- Regional operational security coordination already carried out
- Document our current policy in our methodology

Regional operational security coordination

- The required methodology will reflect the minimal requirement for regional coordination of operational security analysis.

- TSOs will include input from Coreso since they may wish to include the option for regional coordination of interconnections to alleviate internal constraints.

System Operation Guideline: Outage Coordination

Gill Nolan / Emma Fagan

22 October 2018

(Contact outageplanning@eirgrid.com)

Overview

- Outage Coordination : SOGL Articles 82 – 103
- Regional Outage Coordination for IE/NI/GB region
- Key objective is to maximise availability of assets
- ENTSO-E Explainer Service: https://youtu.be/zaaR99HB_s0
- Deliverables:
  - Methodology for assessing the relevance of generation, demand facilities and grid elements
    - All TSOs methodology with NRAs for approval
  - Establish (i) a list of relevant power generating modules and relevant demand facilities and (ii) a list of relevant grid elements
    - 3 months after approval of methodology: March 2019
  - Agree processes, including timelines, for developing and sharing annual availability plans for relevant assets.
  - Development and update of availability plans for relevant assets

Key Steps for Outage Coordination

Outage coordination for IE/NI/GB region involves the following:

1. Outage coordination between IE/NI and GB: HVDC Interconnectors
   - NGUK and EirGrid/SONI will work together to identify list of relevant assets
   - Outage coordination already occurs as per Interconnector Operator Protocols (IOCs)
   - Review, document and agree common process for outage coordination to fulfil SOGL obligations

2. TSOs coordination between Ireland and Northern Ireland for relevant assets
   - Identify list of relevant assets
   - Common management structures, platforms and tools.
   - Processes in place - Require review to ensure they align with required SOGL timelines

Key Steps for Outage Coordination

3. TSO/DSO: Outage coordination of relevant grid elements in (i) Northern Ireland and (ii) Ireland
   - TSOs and DSOs will work together to identify list of relevant assets
   - Grid Code and Outage Planning Processes in place should cover the majority of relevant assets
     - Require review to ensure they align with required SOGL timelines.
   - Where there are not currently processes in place, relevant TSO and DSO will work to develop these.

4. Ongoing availability planning for relevant assets as per the agreed timelines

Common Grid Model

Emma Morris

Overview

- What is a common grid model?
- Why do we need a common grid model?
- How does the common grid model work?

https://m.youtube.com/watch?v=0bm4hqINTyI

What is the Common Grid Model?

- A pan-European operational model of the electricity system with timeframes from one year out to intra-day
- Approved method for TSOs to communicate transmission system models to the Regional Security Coordinator (Coreso) and other TSOs.
- CGM workstream responsible for establishing organisational capability to deliver valid Individual Grid Models for Ireland/NI

Why do we need a Common Grid Model?

European Network Codes require TSOs to develop and submit forecasted representative models of their transmission systems in order to coordinate key processes

Use IGMs/CGMs for:

- Long and short term capacity calculations
- Outage planning (year, month, week, day ahead)
- Operational security analysis (year, month, week, day ahead)
- Grid planning and adequacy forecast

CGM is vital to maximise interconnector capacity:

Reduced interconnector capacity can frustrate energy markets since it may limit access to cheaper generation sources in another bidding zone

Why do we need a Common Grid Model?

- Protect against threats

  When transmission systems have multiple AC interconnections:
  - Power flow does not respect international borders
  - Planned or unplanned events in one jurisdiction may pose a threat in neighbouring jurisdictions
  - So it is important that TSOs can see threats that may originate from outside their control zone

- Maximise opportunities
  - A TSO may be facing an issue that could be resolved with the assistance of a neighbouring TSO
  - Again, visibility of key parts of the neighbouring TSO's network may be useful
  - Coordination of activities such as:
    - Security analysis
    - Outage coordination
    - Generation adequacy assessment

How does the Common Grid Model work?

1. TSOs forecast the near time status of their network using IGMs and supporting data

2. RSC/CCC aligns and merge the IGMs from across Europe to create CGMs

3. Regional Security Coordinators analyse the CGMs to calculate maximum cross border capacity for each interconnector

4. Subject to TSO validation, the calculated cross border capacity values are deployed in the electricity markets platforms

Benefits of the Common Grid Model

- Maximise interconnector flows
- Support market efficiency
- Integrate increasing amounts of renewables by managing variability
- Improve system security

KORRR

Key Organisational Requirements, Roles and Responsibilities

Éanna Farrell

KORRR

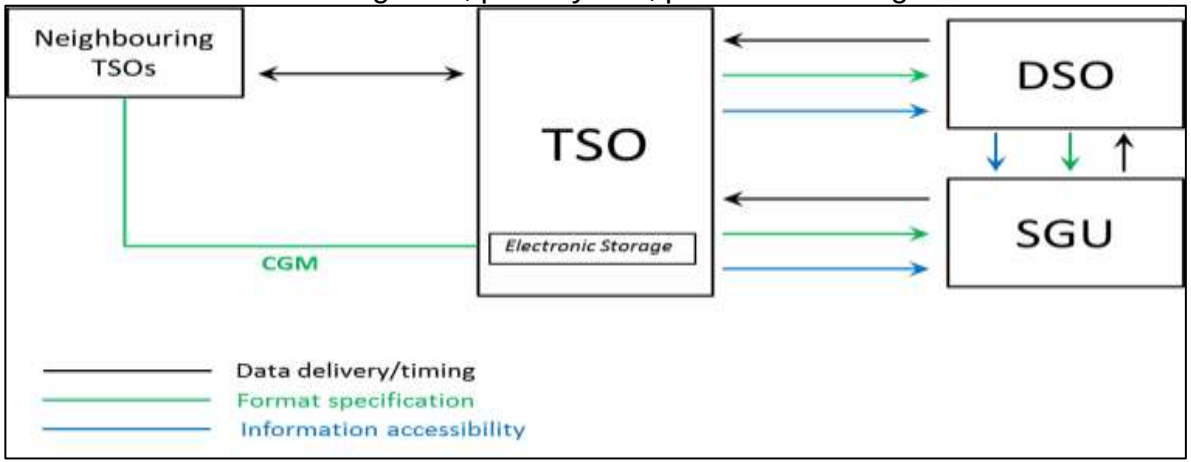
- What is KORRR?
- Significant Grid User (SGU)
- Timeline
- Stakeholder Engagement
- Current Status of Data Exchange
- Next Steps

What is KORRR?

The purpose of KORRR is to define a common framework for **data exchange** between different parties to ensure the **operational security** of electricity systems.

Structural Data

e.g. MW, primary fuel, protection settings

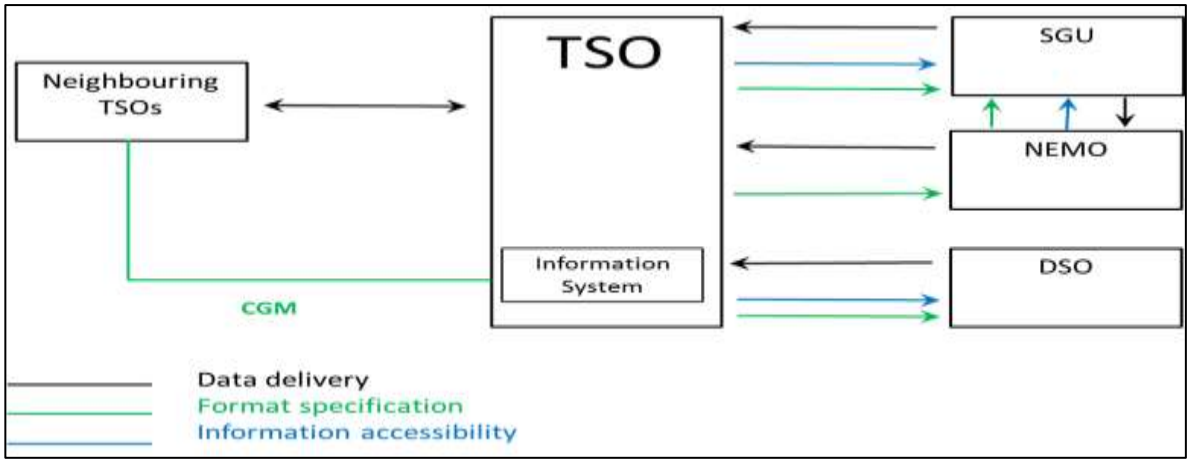


What is KORRR?

The purpose of KORRR is to define a common framework for **data exchange** between different parties to ensure the **operational security** of electricity systems.

Scheduled Data

e.g. outage planning and generation-load programs

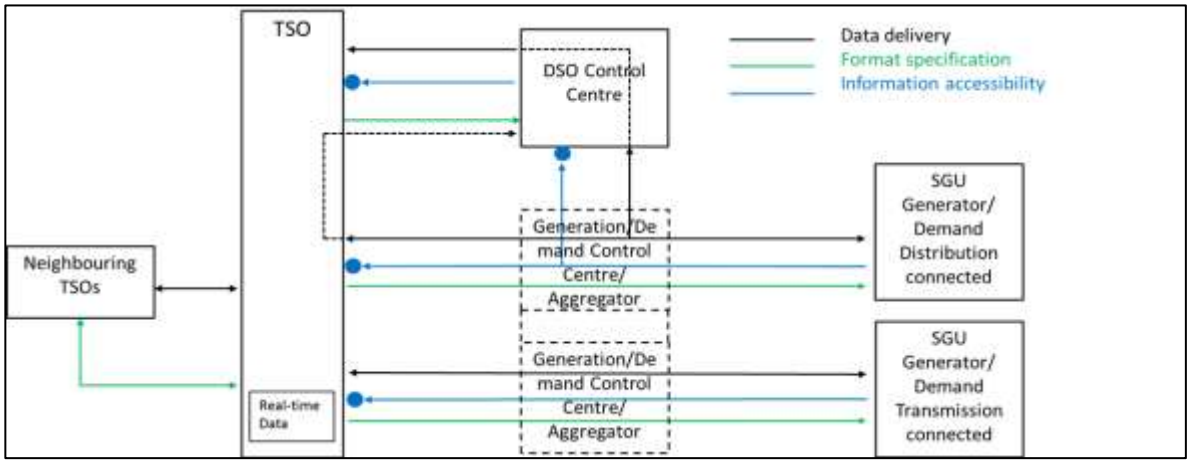


What is KORRR?

The purpose of KORRR is to define a common framework for **data exchange** between different parties to ensure the **operational security** of electricity systems.

Real Time Data

e.g. busbar voltages, frequency, tap changer positions



Significant Grid User (SGU)

- Existing and new;
  - type B, C and D PGMs as per RfG;
  - transmission-connected demand facilities;
  - transmission-connected closed distribution systems;
  - demand facilities, closed distribution systems and third parties providing demand response directly to the TSO as per Article 27 of DCC; and
  - HVDC systems as per HVDC.

- Providers of re-dispatching of PGMs or demand facilities by means of aggregation and providers of active power reserve in accordance with Title 8 of SOGL.

Timeline

- **15/10/18** – Resubmission of KORRR by TSOs to their NRAS
- **15/12/18 –** Decision due by NRAs
- **14/03/19 –** Agreement with DSOs on processes and formats for data exchange

Stakeholder Engagement

- **SONI & EirGrid**
  - Telecoms
  - Access Planning
  - Network Planning
  - Innovation
  - Near Time Operations
  - SOGL SME
  - System Support
  - Real Time
- **ESB Networks**
  - KORRR WSL
- **NIE Networks**
  - KORRR WSL
- **National Grid**
  - KORRR WSL
- **ENTSO-E**
  - KORRR Working Group

Current Status of Data Exchange

- Assessment underway of;
  - what aspects are compliant
  - what will need to be developed
  - what level they could be developed to

- Most data already exists for KORRR; however, the processes and formats need to be recorded

- Some gaps in data exchange exist e.g. type B PGMs

Next Steps

- Focus on a compliance based approach
- Continue early and clear communication with stakeholders
- Examine potential to optimise current processes
- Define suitable means of data collection and exchange for SGUs; in particular those without RTUs
- Assess applicability thresholds i.e. down to 100 kW / 1 MW / 2 MW or other

Thank You

Any Questions?

System Restoration Plan

Alan Rogers

Overview

- Network Code sets out need for System Restoration Plan
  - Quite high level requirements
  - Emphasis on helping regional neighbours (TSOs)
  - Co-ordination with neighbouring TSOs
  - Quite mainland-Europe centric in how it is written
- Sections on Design of the plan; Implementation; Activation of Plan; Market Interactions; Testing and Compliance

Ireland

- Initial assessment of NC carried out
  - Substantially in compliance with NC articles
  - Wording / definitions – some tweaks required
- System Restoration currently done via Black Start contracts with individual generators
  - Restoration Services Terms and Conditions are provided in national legal framework
  - SI 445/2000 – TSO can obtain ancillary services for securing the grid
  - Grid Code requirements OC4.7

Northern Ireland

- System Restoration Plan recently updated
- Similar to IE, substantially compliant with NC requirements
- Some re-wording of SRP could be required to align definitions

Next Steps (IE / NI)

- IE / NI: Document compliance of SRPs with NC (Dec'18)
- Amend SRPs as necessary with new definitions or concepts
- Could use Grid Code modifications to add missing requirements (if any)
- Ireland Restoration Plan v11 due mid-2019
- New Northern Ireland Restoration Plan due soon

System Defence Plan

Niall Maguire

Introduction

- Detailed requirement of E&R Code, Article 4 (5).
- SDP to include
  - Objectives, Conditions for triggering, System characteristics, Measures etc.

System Defence Plan

- 3 Step Approach
  - Design
  - Implementation
  - Activation

Drafting Considerations

- Conditions for activation
- Technical limits/Operational Guidelines
- Inter-TSO assistance/coordination in emergency state
- Compliance with Measures
  - System Protection Schemes
  - System Defence Procedures

Measures of the SDP

1. Automatic under-frequency control scheme
2. Automatic over frequency control scheme
3. Automatic scheme against voltage collapse
4. Frequency deviation management procedure
5. Voltage Deviation Management Procedure
6. Power Flow Management Procedure
7. Assistance for active power procedure
8. Manual demand disconnection procedure

Key Dates

- 18th December 2018
  - Required to notify Regulatory Authorities of SDP
- 18th December 2019
  - TSO implement measures

Questions

ER Rules for the Suspension and Restoration of Market Activities

Séamus Power

Overview

- Articles 35 – 38
- Provision for the TSO to temporarily suspend one or more specified market activities under certain conditions
- Requirement to submit proposal on rules for suspension and restoration to CRU/Utility Regulator by 18 December 2018

Work to date and next steps

- Review of market activities that can be temporarily suspended by TSO completed
- Proposal drafted
- Meeting with CRU and Utility Regulator
- Formal proposal to be submitted

ER Rules for settlement in case of Suspension of Market Activities

Seán O'Rourke

Workstream Requirement

- **COMMISSION REGULATION (EU) 2017/2196 :** Article 39

- *Develop a proposal for rules for imbalance settlement and settlement of balancing capacity and balancing energy which shall be applicable for imbalance settlement periods during which the market activities were suspended.*

- *The TSO may propose the same rules it applies for normal operations*

Workstream Approach

- Market Operations & TSO SME to review current TSC rules for imbalance settlement and settlement of balancing capacity and balancing energy
- Review includes the application of Article 39, paragraph 3 (a) to (e) to current rules
- Apply current TSC rules to a number of scenarios where the power system is on/off & market is suspended/restored
- Review findings with ER and CNC code Subject Matter Expert / CRU / Utility Regulator / MO Management

Workstream Next Steps

- **Oct 2018**: Review workstream findings with ER and CNC code Subject Matter Expert / CRU / Utility Regulator / MO Management.
- **Nov 2018**: If required, proposal of rules for imbalance settlement and settlement of balancing capacity and balancing energy
- **Dec 2018**: Submit rules for imbalance settlement and settlement of balancing capacity and balancing energy to CRU and Utility Regulator

HVDC Parameters

Miriam Ryan / Tomás Mahony

HVDC Network Code

- Introduction
- Approach
- Example of proposed parameter
- Next steps

HVDC Network Code – Introduction

- The HVDC specifies requirements for long distance direct current (DC) connections.
  - Typically used to link offshore wind parks to mainland or to connect countries over long distances
  - See code for complete definition!
- The HVDC applies to new HVDC systems only
  - Will not be retrospectively applied
  - Except articles 26, 31, 33 and 50
- HVDC system is existing if:
  - It is already connected to transmission system in Ireland by Sept 2018 or
  - The HVDC system facility owner has concluded a final and binding contract Sept 2018

HVDC Network Code - Approach

- Minimise deviation from the existing Grid Code Requirements or current practices.
- Where an existing Grid Code parameter is;
  - Within HVDC code range - existing parameter selected.
  - Outside HVDC code range - nearest value allowable to the existing Grid Code parameter selected.
- Where a new parameter must be selected which is not defined in the Grid Code, where possible the proposed parameter has been selected in line with current practices.

HVDC – Example

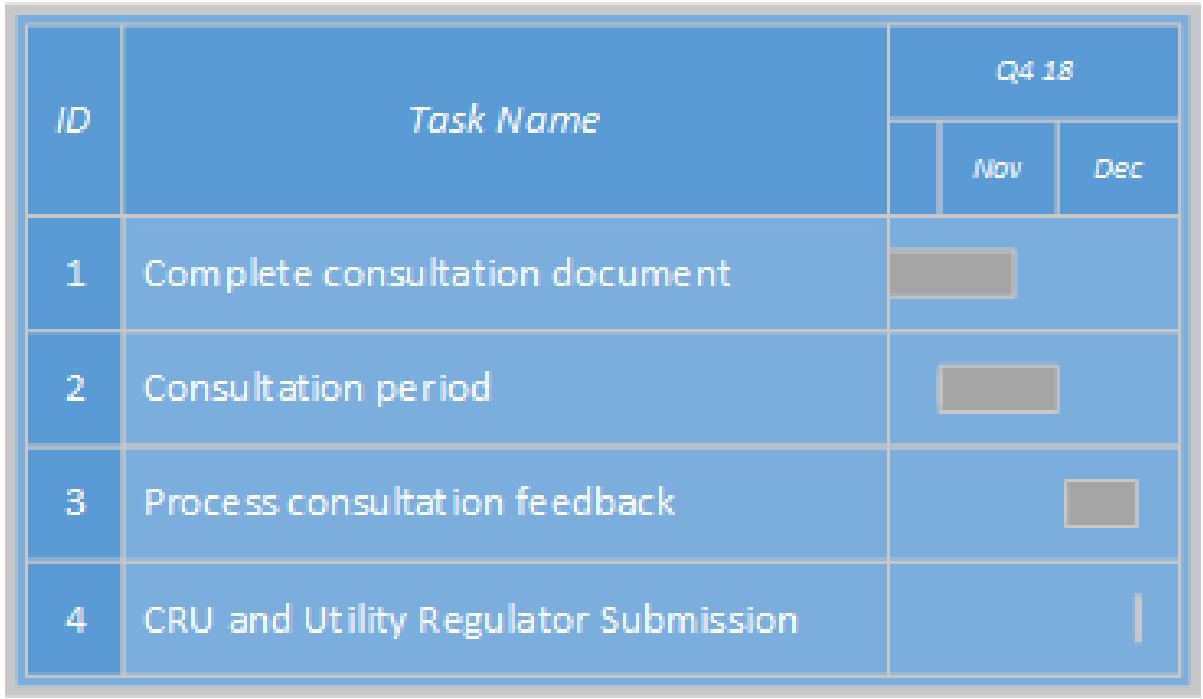
- Article 11.1:
- *An HVDC system shall be capable of staying connected to the network and remaining operable within the frequency ranges and time periods specified in Table 1, Annex I for the short circuit power range as specified in Article 32(2)*

HVDC article 11.1 – Frequency Ranges Example

Annex 1, table 1 from HVDC: Min time periods an HVDC system shall be able to operate for different frequencies deviating from a nominal value without disconnecting from the NW

Parameter range in HVDC	Consultation Proposal	Why these numbers?
47.0 Hz – 47.5 Hz for 60 seconds	60 seconds	Mandatory Exhaustive
47.5 Hz – 48.5 Hz for a time to specified by each TSO, but not longer than established times for generation and demand.	90 minutes	Mandatory Non-Exhaustive ***Aligned with RfG and DCC***
48.5 Hz – 49.0 Hz for a time to be specified by each TSO, but not longer than established times for generation and demand	90 minutes	Mandatory Non-Exhaustive ***Aligned with RfG and DCC***
49.0 Hz – 51.0 Hz for an unlimited time	Unlimited	Mandatory Exhaustive
51.0 Hz – 51.5 Hz for a time to be specified by each TSO, but not longer than established times for generation and demand	90 minutes	Mandatory Non-Exhaustive ***Aligned with RfG and DCC***
51.5 Hz – 52 Hz for a time to be specified by each TSO but longer than for DC-connected PPMs	60 minutes	Mandatory Non-Exhaustive ***Aligned with RfG and DCC***

HVDC Next Steps



Q&A

- Feedback
- More information

Work stream leads

SAOA, LFCBOA

Alan Kennedy

Regional Security Coordination

Emma Morris

Regional Outage Coordination

Gill Nolan

KORRR (Data exchange)

Eanna Farrell

System Restoration Plan

Alan Rogers

System Defence Plan

Niall Maguire

Suspension/Restoration of Market Activities

Seamus Power

Market Settlement Rules

Sean O'Rourke

AOB