



GC0154

Incorporation of interconnector ramping requirements into the Grid Code as per SOGL Article 119

Meeting 3
17th March 2022

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Review and Approve Terms of Reference

Sally Musaka – National Grid ESO Code Administrator

The background features several thick, flowing yellow lines that curve and sweep across the slide, creating a dynamic and modern aesthetic. These lines originate from the left side and extend towards the right, with some forming loops and others following a more linear path.

Workgroup Responsibilities

Sally Musaka – National Grid ESO Code Administrator

Expectations of a Workgroup Member

Contribute to the discussion

Be respectful of each other's opinions

Language and Conduct to be consistent with the values of equality and diversity

Do not share commercially sensitive information

Be prepared - Review Papers and Reports ahead of meetings

Complete actions in a timely manner

Keep to agreed scope

Your Roles

Help refine/develop the solution(s)

Bring forward alternatives as early as possible

Vote on whether or not to proceed with requests for Alternatives

Vote on whether the solution(s) better facilitate the Code Objectives

Timeline for GC0154 as of 06 December 2021

Milestone	Date	Milestone	Date
Proposal Presented to Panel	16 December 2021	Code Administrator Consultation	01 September 2022- 30 September 2022
Workgroup 1 – (discussion of the proposal) and solution (what has changed), agree timeline and review terms of reference	18 January 2022	Draft Final Modification Report (DFMR) issued to Panel	19 October 2022
Workgroup 2 (finalise solution to be consulted on, agree alternatives and agree Workgroup Consultation questions)	17 February 2022	Panel undertake DFMR recommendation vote	27 October 2022
Workgroup 3	17 March 2022	Final Modification Report issued to Panel to check votes recorded correctly (5 working days)	31 October 2022
Workgroup 4	07 April 2022	Final Modification Report issued to Ofgem	07 November 2022
Workgroup 5	10 May 2022	Ofgem decision	TBC
Work group 6	09 June 2022		
Workgroup Consultation (15 Working Days)	20 June 2022– 08 July 2022	Implementation Date	10 working days after Ofgem decision
Work group 7- Assess Work group consultation responses	21 July 2022		
Workgroup 8- Finalise solution(s) and legal text, agree that Terms of Reference have been met, Review Workgroup Report and hold Workgroup Vote	04 August 2022		
Workgroup 9	11 August 2022		
Workgroup Report issued to Panel (5 working days)	25 August 2022		
Panel sign off that Workgroup Report has met its Terms of Reference			

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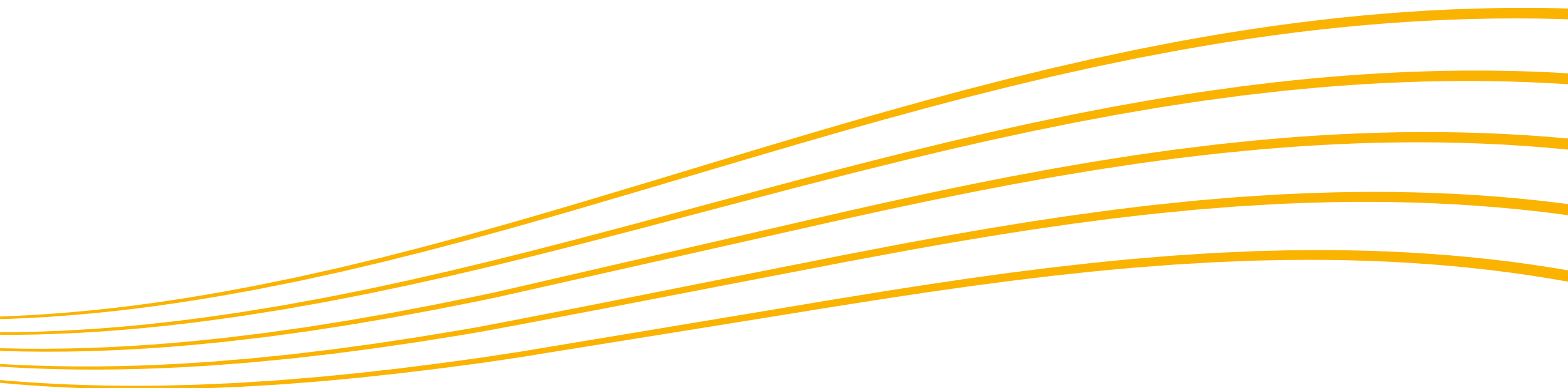
Action Updates

Sally Musaka – National Grid ESO Code Administrator

Action Number	Action	Owner	Due by	Status
1	Workgroup Members to agree the ToRs	All	17 March 2022	Open
2	To Provide updates on market-based solutions used for managing ramping	Antonio Del Castillo Zas	17 March 2022	Close
3	To Produce data on distribution of swings at the next workgroup	Antonio Del Castillo Zas	17 March 2022	Open
4	To provide more details on the capacity of ramping and what the issue is about	ESO	17 March 2022	Open

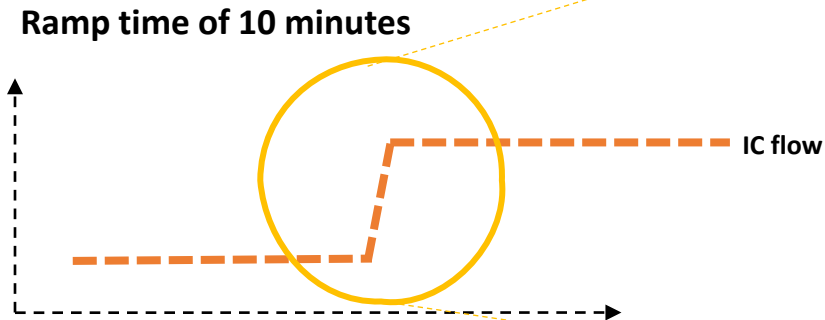
EU TSO Update

Tom Ireland



Operational Analysis: Problem analysis

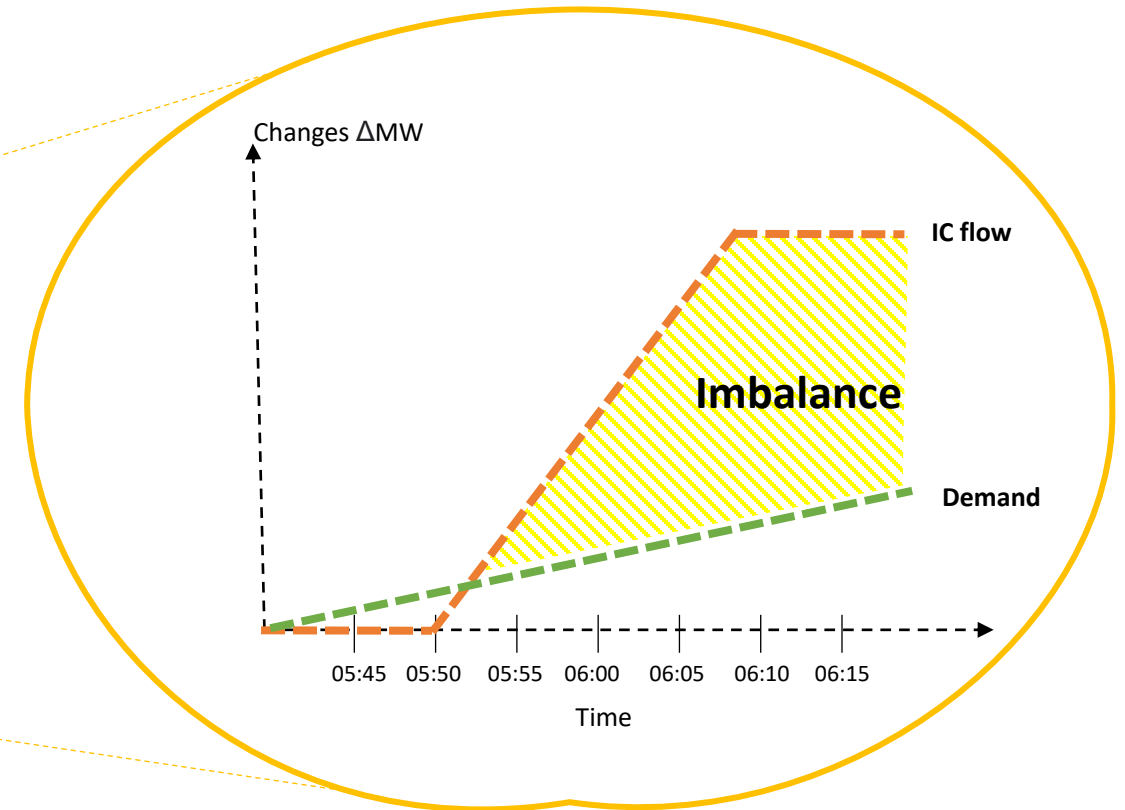
Ramp rate = Volume / Ramping time



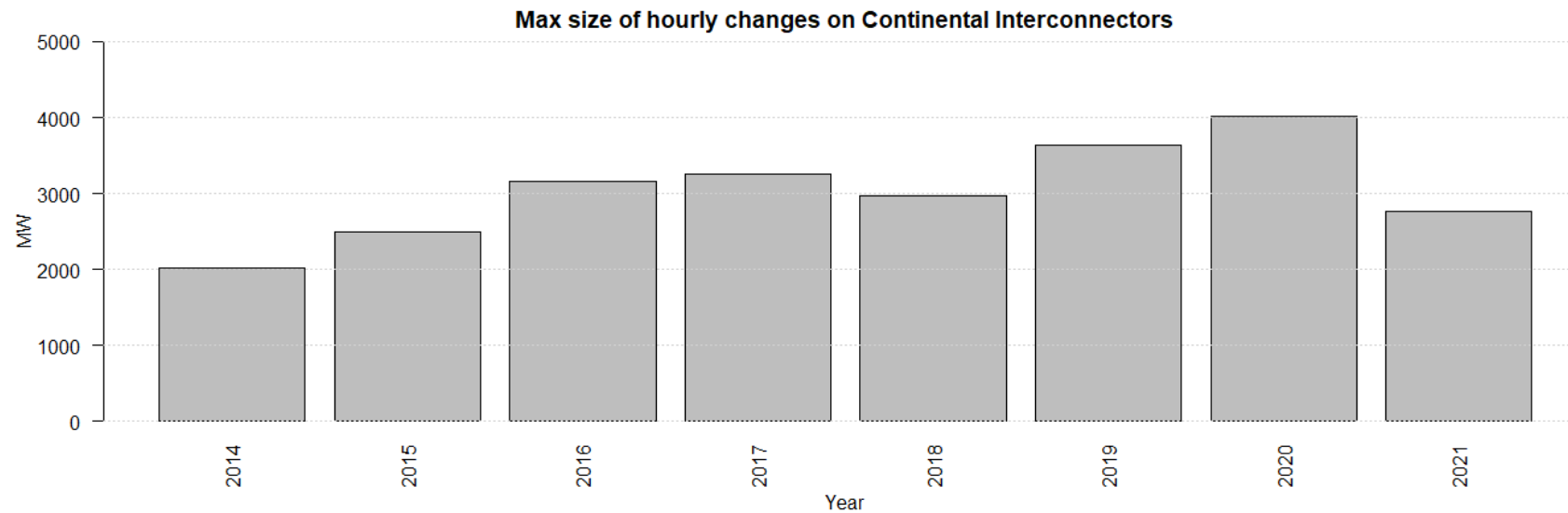
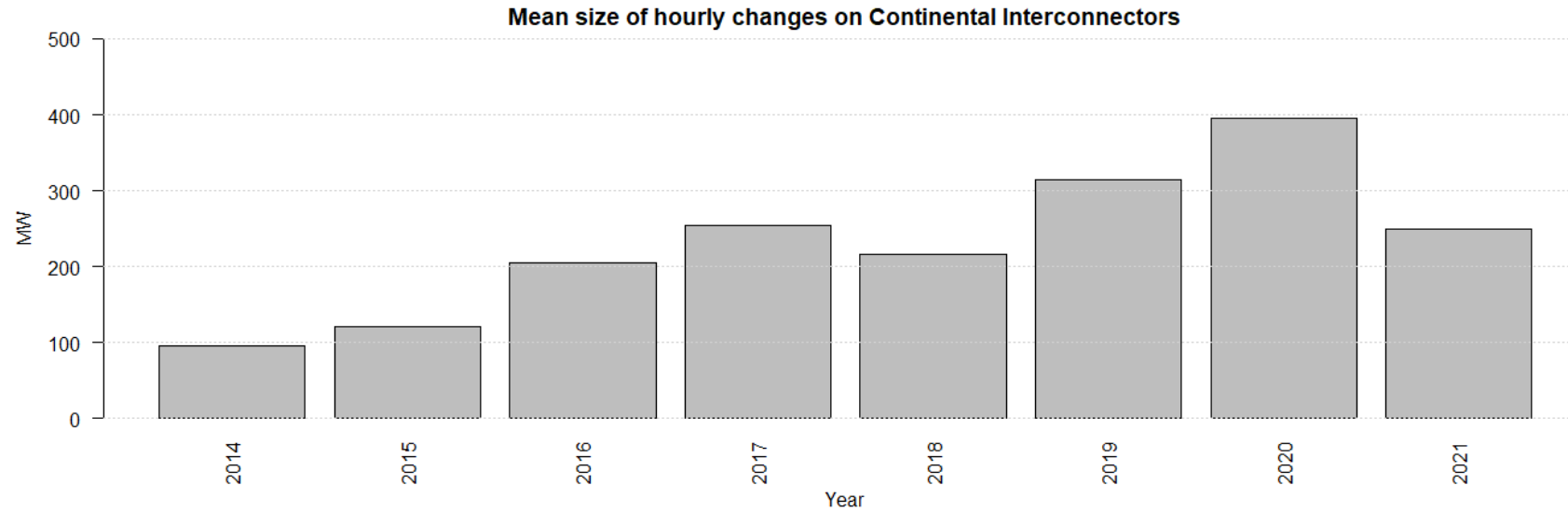
Ramp time is defined -5 min before full hour and +5 min after = 10 minutes (constant)

The problem is the speed of large changes (100MW/min) – how fast we are developing the imbalance (and how big the imbalance is) between demand changes and IC flows.

We are trying to illustrate how many large and fast changes the Control Room was facing in the past, how many right now and potential risks for the future.

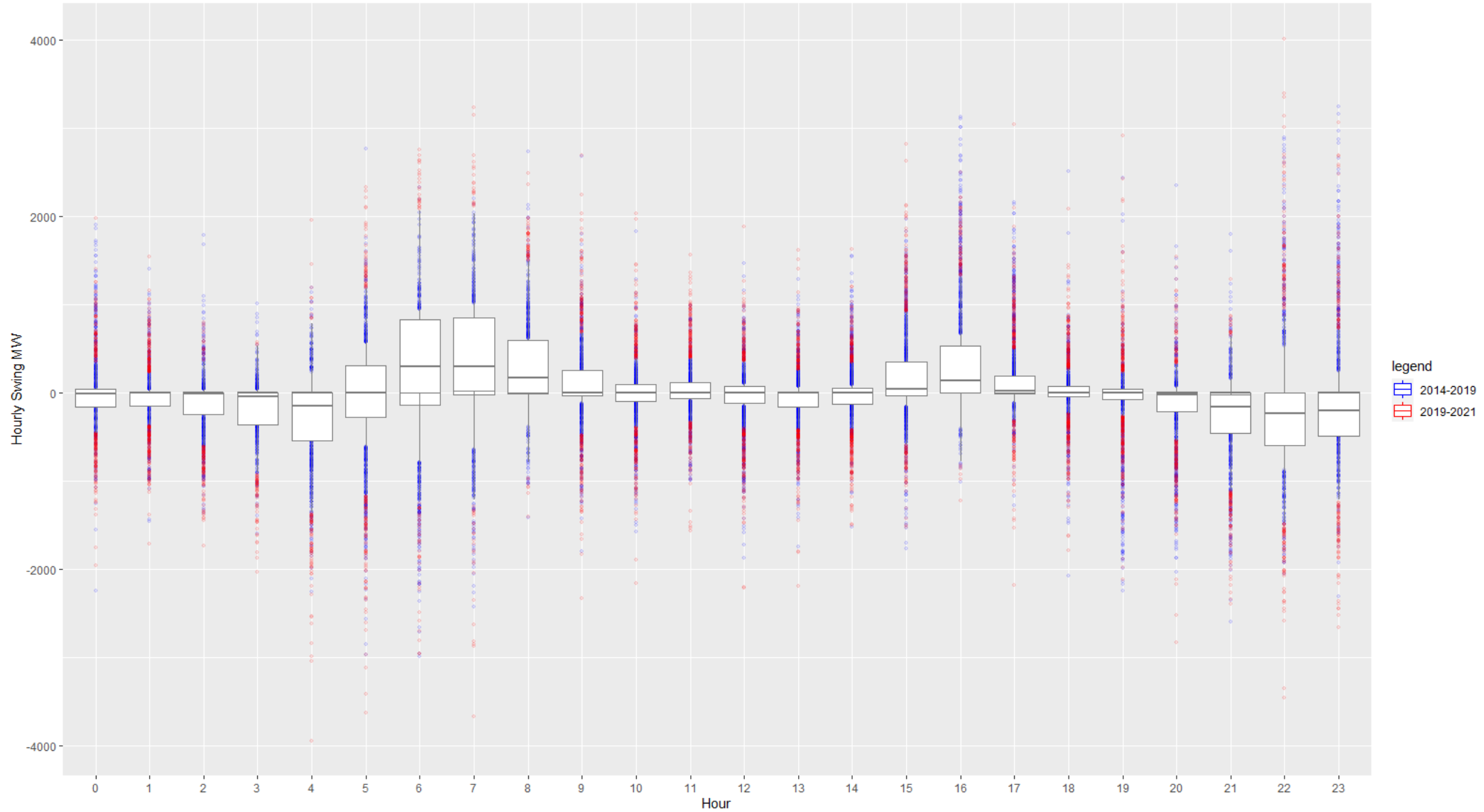


Operational Analysis: Problem analysis



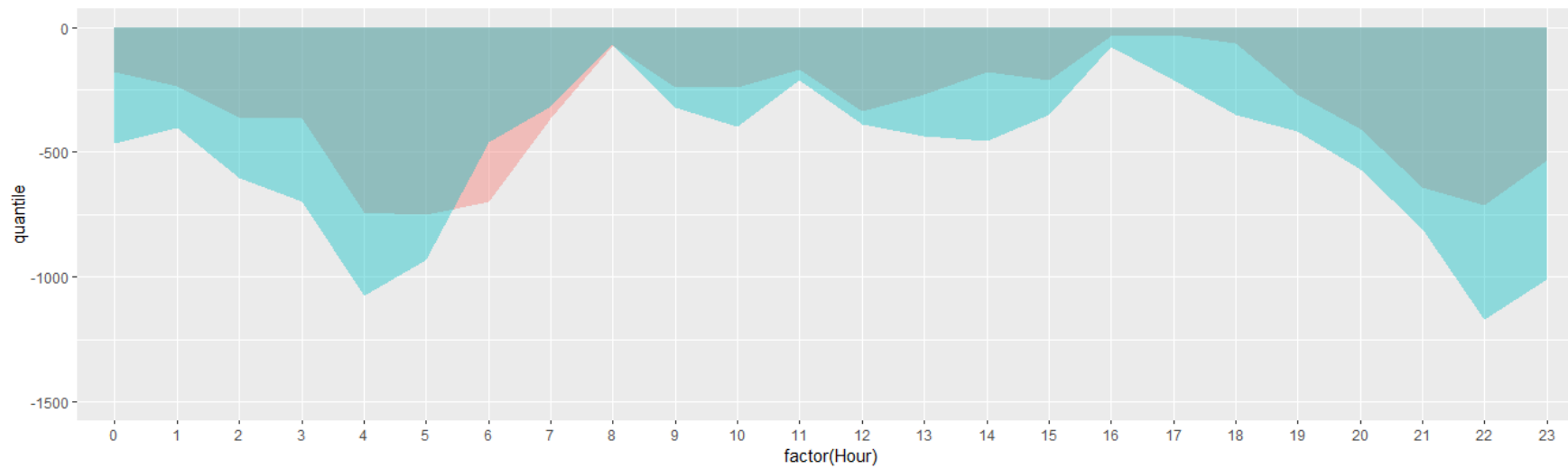
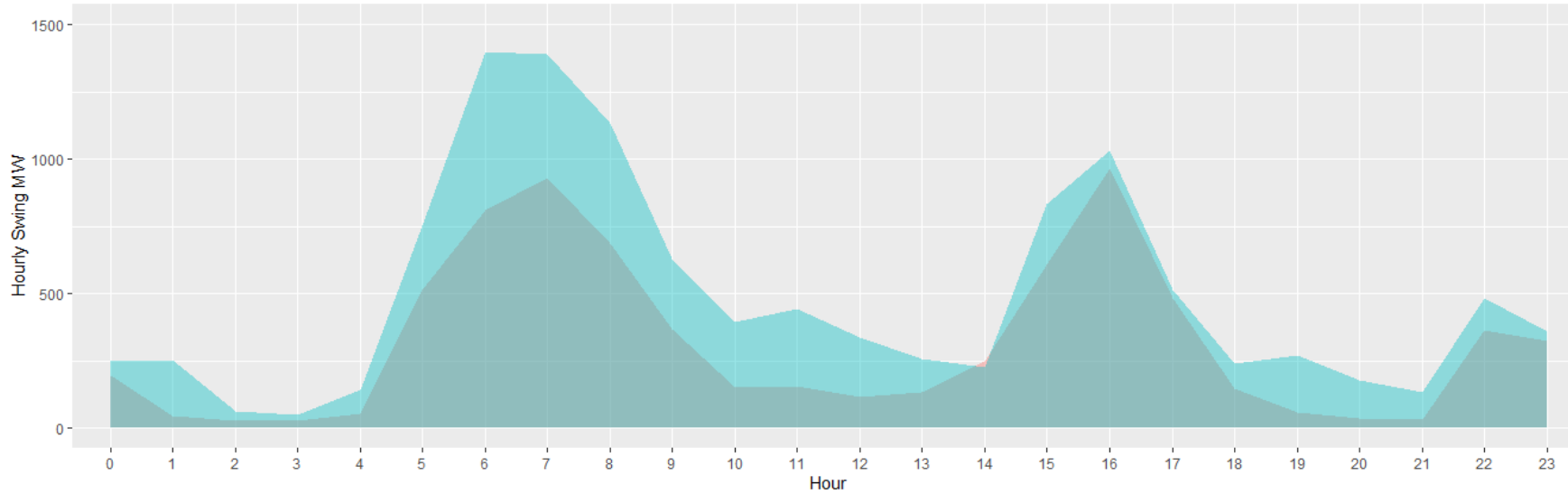
Operational Analysis: Problem analysis

Distribution of Swings per Hour (2014-2021)



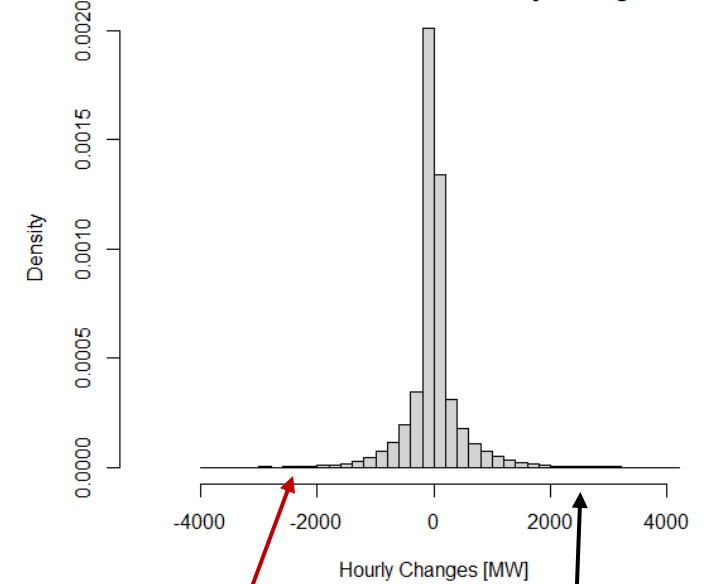
Operational Analysis: Problem analysis

90th Percentile of Swings Distribution per Hour (2014-2021)



Year 2014-2019 2019-2021

Normal distribution of Hourly Changes



10th percentile

90th percentile

Operational Analysis

Current pre-gate and post-gate tools available

Tool	Use	Pros	Cons
Repositing all plants	Post-gate	<ul style="list-style-type: none"> The most cost effective from other tools Reliable to support IC ramping 	<ul style="list-style-type: none"> Time consuming process in Control Room Sometimes it can be expensive
Trading	Pre-gate	<ul style="list-style-type: none"> Reduce ramping by reducing volume Many ICs available to trade on 	<ul style="list-style-type: none"> Not against final program (ICRP) – could be countertraded or not required Not time to trade once ICRP is fixed Potentially high costs
Response	Post-gate	<ul style="list-style-type: none"> Reliable to support IC ramping 	<ul style="list-style-type: none"> Need to contract additional volumes of response (additional costs) Potentially response services from the back of the price stack
Short Term Reserve	Post-gate	<ul style="list-style-type: none"> Reliable to support IC ramping 	<ul style="list-style-type: none"> Need to contract additional volumes of response (additional costs)
SO-SO Trade	Post-gate	<ul style="list-style-type: none"> Reduce ramping 	<ul style="list-style-type: none"> Not efficient (takes long time to issue instructions) Non-firm service
Slow ramp (limited ICs only)	Post-gate	<ul style="list-style-type: none"> Reduce ramping 	<ul style="list-style-type: none"> Potential fee for the service Imbalance in GB and neighbour country to be covered by NG ESO Non-firm service

Possible solutions

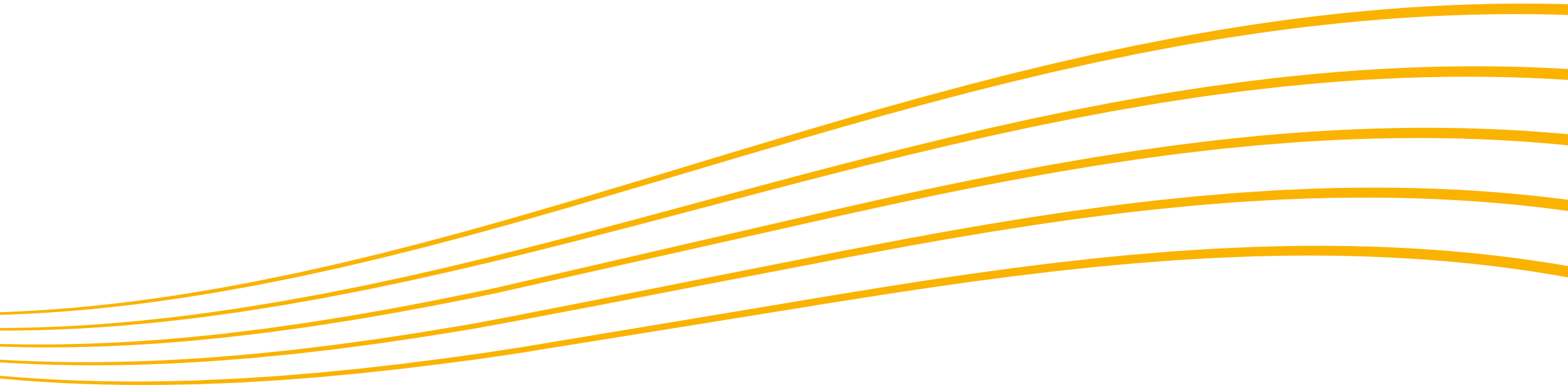
Review/discussion



Possible solutions

Suggested at first workgroup	Additional solutions from workgroup members
Apply current BMU ramping rates to the interconnectors as per BC1.A.1.1	Working with ESO, to understand how the new technology (i.e. battery) and new market design can help ESO manage ramping for ICs and other generation assets
Include current bespoke ramping arrangements, as they are, in the Grid Code BC1.A1.1	Effective utilise and design additional services with ICs and other technologies
Dynamic ramping rate - based on an assessment, NGENSO will decide if any ramp rate limit needs to be amended	A dynamic overall ramping rate, is only derived based on a verified market condition if above market solution doesn't work.
Apply a reduced static interconnector ramp rate limit	Change of GB wholesale market design and IC capacity market which might be the enduring solution
Ensure NGENSO holds sufficient response and reserve to facilitate unrestricted interconnector ramping	Establish cross border Frequency response on all borders through the ICs
Develop additional services with the interconnector and EU Transmission System Operators (TSOs) to mitigate ramping e.g. slow or delay	Change to a 5 minute settlement period to address the root cause.
Changes to the GB wholesale market design to be more compatible with cross border capacity market	Create a market for ramp rates.
Change cross border capacity markets	NGESO set a maximum ramp rate for each period of the day and then interconnectors bid for the use of this ramp rate.
	We feel there is a strong case for codifying the current IC ramping limit of 100 MW/min.

Annex



Assumptions

The aim is to map the requirements of Article 119 to the Grid Code as requested by Ofgem.

This will require the ESO and stakeholders to work collaboratively to find a solution that aligns with the text which has been written and approved.

The solution needs to consider the requirements of the transmission system now and be resilient enough for the future.

Cross –border ramping is a shared decision with the remote end EU System Operator. Therefore, their involvement and coordination with this process is key to ensure a mutually acceptable solution.

Ramping for BMUs will be considered outside this modification.

SOGL Articles to review

Ramping restriction for active power output - Article 119 (c)

LFC block operational agreements

1. By 12 months after entry into force of this Regulation, all TSOs of each LFC block shall jointly develop common proposals for:
 - (a) where the LFC block consists of more than one LFC area, FRCE target parameters for each LFC area defined in accordance with Article 128(4);
 - (b) LFC block monitor in accordance with Article 134(1);
 - (c) **ramping restrictions for active power output in accordance with Article 137 (3)* and (4)**

*outstanding action

Ramping restriction for active power output

Article 137 (3) & (4) of SOGL

Code
mapping

3. All connecting TSOs of an HVDC interconnector shall have the right to determine in the LFC block operational agreement common restrictions for the active power output of that HVDC interconnector to limit its influence on the fulfilment of the FRCE target parameter of the connected LFC blocks by agreeing on ramping periods and/or maximum ramping rates for this HVDC interconnector. Those common restrictions shall not apply for imbalance netting, frequency coupling as well as cross-border activation of FRR and RR over HVDC interconnectors. All TSOs of the GB synchronous area shall coordinate these measures within the synchronous area.

4. All TSOs of an LFC block shall have the right to determine in the LFC block operational agreement the following measures to support the fulfilment of the FRCE target parameter of the LFC block and to alleviate deterministic frequency deviations, taking into account the technological restrictions of power generating modules and demand units:

- (a) obligations on ramping periods and/or maximum ramping rates for power generating modules and/or demand units;
- (b) obligations on individual ramping starting times for power generating modules and/or demand units within the LFC block; and
- (c) coordination of the ramping between power generating modules, demand units and active power consumption within the LFC block.

BC1.A.1.1

Highlighted to show gap to close

Text taken from the SOGL

LFC Block Operational Methodology for Article 119 (1) (c)

A119 Methodology text to map to codes	Supporting paper reference
1. Rules for ramping restrictions on the active power output of each HVDC interconnector between a LFC Block of another synchronous area and the GB LFC block, in accordance with SOGL Article 137(3):	N/A
a. The ESO, and the connecting TSOs supervising a LFC block of an HVDC interconnector shall have the right to determine common ramping restrictions in the form of ramping periods and/or maximum ramping rates and shall enter into agreement with the TSOs responsible for operating the interconnector, to determine the processes and mechanisms by which these restrictions will be put in place. These ramping restrictions shall not apply to imbalance netting, frequency coupling, cross-border activation of FRR or cross-border activation of RR. These ramping restrictions shall not apply to any service aimed at maintaining or returning one of the connected electricity systems to a normal system state.	The ESO has sought to maintain simplicity of application in that compliant regimes already exist on all GB connecting HVDC interconnectors, where the ramping restrictions and manner in which they are applied is agreed and defined in the operational agreements

LFC Block Operational Methodology for Article 119 (1) (c)

A119 Methodology text to map to codes	Supporting paper reference
<p>b. The ramping restrictions for each interconnector shall be applied in a non-discriminatory manner. The ESO shall ensure alignment of ramping restrictions between all HVDC interconnectors linking the same two synchronous areas, taking into account the technical capabilities of each HVDC interconnector;</p>	<p>The ESO wants to demonstrate that all interconnector parties are being treated fairly, but highlights that rules between different synchronous areas may differ as ramping-restrictions imposed from another synchronous area may, if more onerous than those sought by the ESO, result in different rules for those particular interconnectors.</p>
<p>c. A summary of the ramping-restrictions to be applied to HVDC interconnectors connecting to the GB LFC Block, shall be published by the ESO on its website at least one week before the rules are enforced, in accordance with the obligations in SOGL Article 8;</p>	<p>Transparency and fairness is demonstrated by publishing a summary of the ramping-restrictions being applied to GB interconnectors on the internet.</p>

LFC Block Operational Methodology for Article 119 (1) (c)

A119 Methodology text to map to codes	Supporting paper reference
<p>d. The ESO, in order to prevent the GB LFC block from entering into an emergency state, may restrict equitably the ramp rates of GB interconnectors between GB and the same connecting synchronous areas, in coordination with the affected national TSOs and affected interconnector operators according to the terms referred to paragraph (a) of this Article;</p>	<p>There is a need to be able to reduce the ramping-rates being applied to interconnectors when there is a current need or anticipated situation which, without action, would result in Great Britain entering an emergency state. Under these circumstances, the ESO will follow procedures to be determined in the operational agreements between parties to apply reduced ramp-rates to all market-based transfer programs on all the affected interconnectors.</p>
<p>e. Within 30 calendar days of an incident which restricted one or more of the HVDC interconnectors, under the process referred to in paragraph (d), the ESO shall prepare a report containing an explanation of the rationale, implementation and impact of this action and submit it to the relevant regulatory authority in accordance with Article 37 of Directive 2009/72/EC and neighbouring TSOs, and also make the report available to all significantly affected system users.</p>	<p>For transparency purposes, the ESO will publish information on the circumstances leading up to the need to reduce ramping-rates and the actions followed until operations were returned to normal ramping-rules.</p>

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Summary and Next Steps

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