Integrated Single Electricity Market (I-SEM)

Interim Cross Zonal TSO Arrangements for GB-ISEM go-live

Covering Letter

8th September 2017

The cross zonal TSO arrangements refer to the process and methodology for TSOs to determine the interconnector capacity available to be allocated by the day-ahead and intra-day market coupling process.

The enduring arrangements relating to cross-zonal TSO arrangements, dictated by CACM Regulation (EU) 2015/1222, will not be in place to meet the I-SEM go-live date. As such it was necessary to develop interim arrangements across the Ireland UK (IU) region that support the achievement of the I-SEM go-live objectives and at same time do not in any way hinder the achievement of the objectives of the CACM and/or FCA Regulation (EU) 2016/1719.

The attached document is a common arrangement developed by all Transmission System Operators (TSOs) within the IU Capacity Calculation Region (National Grid Electricity Transmission, EirGrid, Moyle Interconnector Ltd, System Operator Northern Ireland (SONI) and EirGrid Interconnector DAC) regarding the requirement to develop interim TSO cross zonal arrangements for ISEM go-live. This arrangement has been reviewed and endorsed by CER, UR and Ofgem.

The enduring arrangements for the IU Capacity Calculation Region will be further developed and consulted by the relevant TSOs and approved by the relevant National Regulatory Authorities in line with the timetable set out in CACM and FCA.

If for any reason the enduring solutions are not in place in time for CACM and FCA compliance the interim arrangements will persist.

SEM-GB Joint Implementation Group

Interim Cross Zonal TSO Arrangements for GB-ISEM go-live

September 2017

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WHEREAS

1. This document is a common proposal developed by all Transmission System Operators (hereafter referred to as "TSOs") within the IU[1] Capacity Calculation Region[2] regarding the requirement to develop interim TSO cross zonal arrangements for ISEM go-live. This proposal is for the IU Capacity Calculation Region and has been developed as an all TSO proposal for submission to the SEM-GB Joint Implementation Group[3].

2. Commission Regulation (EU) 2015/1222 of 24 July 2015 on establishing a guideline on capacity allocation and congestion management (CACM) sets requirements to, inter alia:

   - Develop a common capacity calculation methodology,
   - The capacity calculation methodology will include details of any allocation constraints,
   - Establish a Coordinated Capacity Calculator,
   - Establish a common Coordinated Redispatching and Countertrading Methodology.

3. Commission Regulation (EU) 2016/1719 of 26 September 2016 on establishing a guideline on forward capacity allocation (FCA) sets requirements to, inter alia:

   - Develop a common capacity calculation methodology for long-term allocations,
   - Use the Coordinated Capacity Calculator established under CACM,
   - Develop a methodology for splitting long-term cross-zonal capacity.

4. A number of detailed papers have been submitted to the Joint Implementation Group and this paper is a summary of the key proposals made to allow the All TSO group to continue with implementation at the same time as the go-live of the I-SEM market.

5. It is recognised that the enduring arrangements for the IU Capacity Calculation Region will be developed by the IU-Channel Group[4] and approved by the relevant National Regulatory Authorities in line with the timetable set out in CACM and FCA.

6. It is recognised that to meet the I-SEM go-live date the enduring arrangements will not be in place and it is necessary to develop interim arrangements across the IU region that support the

[1] The IU Capacity Calculation Region refers to the bidding zone border SEM-GB as described in ENTSO-E's all TSOs draft proposal for Capacity Calculation Regions in accordance with Article 15 of the Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a Guideline on Capacity Allocation and Congestion Management.

[2] Decision of ACER No 06/2016 of 17 November 2016 on the Electricity System Operator's proposal for the determination of capacity calculation regions.

[3] The GB/ISEM Joint Implementation Group (JIG) is a meeting between the Northern Irish, the Irish and GB Regulatory Authorities (and ministries on an adhoc basis), as well as the TSOs (EirGrid, SONI, East West Interconnector [EWIC] , Moyle and National Grid Electricity Transmission Plc [NGET]). The Irish and GB NEMOs also attend: SEMOpx, APX Commodities Limited and NordPool Spot. These meetings discuss ISEM and European Electricity Network Code/Guideline implementation

[4] TSO Channel-IU Group - (BritNed Development Limited, National Grid Electricity Transmission, National Grid Interconnectors Limited, Reseau de Transport d'Electricite, TENNET, Elia, NEMOLink, EirGrid, Moyle Interconnector Ltd, National Grid Electricity Transmission, System Operator Northern Ireland (SONI), and EirGrid Interconnector DAC) group.

achievement of I-SEM go-live objectives and do not in any way hinder the achievement of the objectives of the CACM Regulation (EU) 2015/1222 and/or FCA Regulation (EU) 2016/1719.

7. The enduring solution for the establishment of the coordinated capacity calculator envisages that relevant TSOs of the Ireland-United Kingdom (IU) Capacity Calculation Region would join the membership of a Regional Security Coordinator (RSC), in this case Coreso. As envisioned, one of the key Coreso tasks would be to perform the calculation of cross-zonal capacity for the IU coordinated capacity region. However, the Coreso solution will be unavailable at I-SEM go-live and interim cross zonal TSO arrangements for GB-ISEM go-live are required. The RSC solution is being designed by the Channel-IU group as part of the enduring CACM arrangements and will be delivered as part of that process in the latter half of 2018.

8. If for any reason the enduring solutions are not in place in time for CACM and FCA compliance the interim arrangements will persist.

GENERAL PROVISIONS

Article 1 - Subject matter and scope

9. As required under the CACM Regulation each relevant TSO[5], in coordination with all the other relevant TSOs in the capacity calculation region, shall:

    - Develop a proposal for a common capacity calculation methodology for each capacity calculation region (Article 21 - "Capacity calculation methodology") [All TSOs]
    - Jointly set up a coordinated capacity calculator and establish rules governing its operation (Article 27 – "General Provisions") [All TSOs]
    - Develop a proposal for a common methodology for coordinated redispatching and countertrading (Article 35 – "Coordinated redispatching and countertrading") [Ofgem assigns this to SO and not ICOs while CER/UR assign this to EirGrid & SONI]

10. As required under the FCA Regulation each relevant TSO[6], in coordination with all the other relevant TSOs in the capacity calculation region, shall:

    - Develop a regional proposal for a common capacity calculation methodology (Article 10 - "Capacity calculation methodology") [All TSOs]
    - Develop a methodology for splitting long-term cross-zonal capacity [Ofgem assigns this to both the SOs and ICOs]

11. Where possible the interim arrangements have sought to preserve the existing TSO arrangements and to introduce minimum system changes.

[5] Decisions on assignment of TSO responsibilities under CACM: SEM – https://www.semcommittee.com/publication/decision-assignment-tso-obligations-under-article-13-cacm-guidelines; Ofgem – https://www.ofgem.gov.uk/publications-and-updates/decision-our-consultations-assignment-transmission-system-operator-obligations-under-capacity-allocation-and-congestion-management-regulation-within-gb

[6] Decisions on assignment of TSO responsibilities under FCA: Ofgem – https://www.ofgem.gov.uk/publications-and-updates/decision-our-consultation-assignment-transmission-system-operator-obligations-under-requirements-generators-demand-connection-high-voltage-direct-current-and-forward-capacity-allocation-regulations-within-gb

12. Appendices will be added to this document setting out the outcomes of the detailed design for delivery of the Interim Cross Zonal TSO Arrangements for GB-ISEM go-live.

Article 2 - Definitions

13. For the purpose of this proposal, the definitions in Article 2 of the CACM Regulation shall apply.

14. In addition, the following definitions shall apply:

    - 'EWIC' means the East West Interconnector connecting Ireland at Woodland to Wales at Deeside.
    - 'Moyle' means the Moyle interconnector connecting Northern Ireland at Ballycronan More to Scotland at Auchencrosh.

Article 3 - Interim capacity calculation arrangements on the SEM-GB Border

15. NTC calculations associated with power system security will be jointly determined by all TSOs i.e. EirGrid, SONI, Moyle, EWIC and NGET under an approach set out in Article 4 (Coordinated Capacity Calculator). When determining the capacity of the interconnection between the two systems, the capacity is calculated independently by EirGrid/SONI and NGET using existing security analysis methods.

16. The objective is to give the market the highest possible capacity for energy trading taking into account the available interconnector capacity, secure and efficient operation of the power systems on both sides of the Interconnector and the possibility of faults on either network.

17. Long term NTC calculation will be jointly determined by all TSOs i.e. EirGrid, SONI, Moyle, EWIC and NGET. The process to derive NTC values for both EWIC and Moyle is based on the existing TSO outage management processes

18. Long-term NTC (before consideration of outages) will be at least equal to the transmission system access rights specified in the existing contractual frameworks[7].

19. Reduction in NTC will be subject to "causer pays" principle. Once the causer is determined ex-post, the Interconnector Owner/Administrator will then invoice the causer for reimbursement.

20. For the reduction in NTC:

    - Prior to the Day Ahead Firmness Deadline the concerned TSOs on the bidding zone border where long-term transmission rights have been curtailed shall compensate the ICOs with the (loss adjusted) Day Ahead market spread.

    - After the Day Ahead Firmness Deadline but prior to the IDM1 auction the concerned TSOs on the bidding zone border where NTC reduction has occurred shall compensate the ICOs with the (loss adjusted) IDM1 market spread.

[7] From November 2017 NGET may carry out long term capacity calculation(s) for Moyle to attempt to provide capacity above TEC

- After the IDM1 Firmness Deadline but prior to the IDM2 auction the concerned TSOs on the bidding zone border where NTC reduction has occurred shall compensate the ICOs with the (loss adjusted) IDM2 market spread.

- After the IDM2 Firmness Deadline but prior to the IDM3 auction the concerned TSOs on the bidding zone border NTC reduction has occurred shall compensate the ICOs with the (loss adjusted) IDM3 market spread.

21. In all cases above the FTR option holders will be financially unaffected by any NTC reduction unless annual/monthly compensation caps are breached.

22. For reduction in NTC after the Firmness Deadline has passed for all Intraday Auctions relating to the delivery period, the concerned TSOs on the bidding zone border where NTC reduction has occurred shall compensate the ICOs with the associated imbalance costs incurred by the reduction.

23. The GB-SEM TSOs interim interconnector curtailment compensation arrangement process based on the principle of "causer pays" will be adopted and further developed.

Article 4 - Coordinated Capacity Calculation

24. NTC reduction on interconnectors (from long term position) is only envisaged if system operator foresees being unable to facilitate flows up to this value on a day and has exhausted the use of system operator tools other than capacity reduction.

25. The following process to derive NTC values for both EWIC and Moyle will be adapted and further developed:

    - Determination of contractual system access rights
        - Moyle's contractual system access rights will vary with a daily capacity calculation being performed by National Grid with the aim of declaring a higher NTC value in the NI-GB direction[8] than that calculated in the long-term timeframe.
    - Planned Outage Co-ordination Phase
        - EWIC, Moyle, NGET, SONI, and EirGrid will undertake an annual Planned Outage Coordination exercise in line with the current Interconnector Operating Protocols.
    - Individual TSO Validation Phase
        - When determining the capacity on interconnection between two systems the interim proposal is that the capacity in each direction is calculated individually by the TSOs on each side of the interconnector. If the calculated values for a direction differ (and in line with paragraph 24), the lower value is used.
    - All TSO co-ordination:
        - The final stage of the derivation of NTC values is for an all TSO joint proposal on the annual NTC values in each direction (52 values at weekly resolution with additional

[8] This calculation is not an I-SEM interim deliverable but is a relevant process

resolution as necessary during any planned outage periods) to the Interconnector Operating Panel Meeting(s) for discussion.

- These will be set sufficiently in advance to facilitate the sale of Calendar annual and SEM annual (October to September) long term transmission rights products.
- Transparency Obligations EirGrid and SONI will publish the required transparency and REMIT information, including Forecast NTC, on the ENTSO-E transparency platform and local platform.

Article 5 - Coordinated Redispatching and Countertrading (CTPT)

26. The interim solution on countertrading and redispatching is to utilise existing Cross Border Actions[9] and to develop a third party countertrading solution (Coordinated Third Party Trading). The interim solution is to retain the existing CBB service in essentially its current format (as described in the EWIC and Moyle Operating Protocols).

27. The TSOs will develop and implement a third party countertrading solution: Coordinated Third Party Trading (CTPT). This is the process by which a TSO contracts a third party to trade in a neighbouring intraday market so as to alter the cross-zonal flow for system operation reasons. The advantages of this type of trading over SO-SO trading is that actions can be taken with more flexibility and associated prices are also likely to be lower than the equivalent CBB trade price and with much higher volumes available. CTPT could be used in the following circumstances:

    - System security (including)
        - Congestion Management
    - Priority Dispatch

Article 6 - The requirement for a single distinct loss factors for application to interconnectors

28. The current Single Electricity Market (SEM) method for attribution of a Transmission Loss Adjustment Factor (TLAF) provides separate TLAF figures for day and night for each month for the annual period from October to September by which the energy provided by units on the Moyle and EWIC interconnectors is adjusted for transmission system losses for settlement purposes.

29. All TSO's have proposed that an annual single loss factor is to be determined for each interconnector. This same loss factor per interconnector will be used for all of the SEM-GB coupled day-ahead and intraday markets, imbalance settlement in the SEM market, and adjustment of market spread for FTR remuneration.

30. With this approach there should be consistency between the loss factors used in the coupled ex-ante markets, and SEM imbalance settlement, so that there is no imbalance from the choice of loss factor.

[9] Interconnector instructions are a method by which EirGrid, SONI and NGET can exchange services across the Moyle and EWIC interconnectors. Interconnector instructions can be requested by EirGrid, SONI or NGET and are generically known as Cross Border Actions.

Article 7 – Proposals regarding interconnector ramping limits

31. The I-SEM project needs to resolve issues regarding Interconnector ramping in the Day Ahead Market (DAM) and Intra Day Market (IDM) auctions which use the EUPHEMIA algorithm, and a misalignment with the nomination of calculated schedules based on those results into the SEM and GB markets resulting in imbalance volumes for settlement in those markets.

32. As presented at the December 2016 Joint Implementation Group, the following proposed solutions and next steps will be taken:

    - Submit change requests for EUPHEMIA.
    - Undertake modelling to ascertain the cost impact of the imbalance volume associated with a range of EUPHEMIA ramp limits and also market efficiency.
    - Confirm initial ramp limits (for the DAM and each IDM auction) in EUPHEMIA.
    - Define rules for EUPHEMIA ramp limit setting, splitting and updating based on market experience; for example, limits could be set for the first year of market operation with a review undertaken during the market trial.
    - Confirm the regulatory requirements to give effect to the proposal including the requirements to enable TSOs to trade in the GB and SEM markets to manage the imbalance cost caused by ramping and other impacts such as interconnector trips.
    - Establish the necessary changes to regulatory or commercial instruments. Preliminary investigations suggest this may be mainly to the Licenses and Operating Agreements to enable imbalance trading, with little if any change likely to be required to the Interconnector Operating Protocols or Balancing & Ancillary Services Agreements
    - Establish market requirements to manage issues such as the imbalance from the GB Physical Nomination (PN) position requiring the setup of Balancing Market Units for settlement etc.
    - Investigate the feasibility of dynamic operational ramp rate setting.
    - Investigate with ECC whether the profiling of DAM volumes from one hour time period to the half hour time period is possible from a GB market perspective. Also assess the impact on the I-SEM rules/systems and the independence of the proposed SEM and GB solutions.

Article 8 – SEM NRA proposals on Balance Responsibility

33. The issue of balance responsibility caused by system ramping constraints on the interconnectors, in I-SEM, due to the representation of the interconnectors in Euphemia and the ramping limitations of the SEM system was brought to the attention of the CER/UR.

34. Based on the information gathered UR and CER have decided that the TSOs should manage imbalances arising on the interconnectors from ramping constraints on behalf of the system.

35. Imbalances resulting from trips are more in the control of the ICOs. The ICOs will be responsible for managing these.

36. Further, CER and UR confirm that congestion rent shortfalls due to ramping constraints will be a responsibility of the ICOs and will not be remunerated.

FUTURE REQUIREMENTS

Article 9 - Enduring arrangements

37. The interim arrangements set out in this paper are part of a phased implementation of the CACM and FCA requirements. The enduring arrangements for the IU Capacity Calculation Region will be developed by the IU-Channel Group and approved by the relevant National Regulatory Authorities in line with the timetable set out in applicable regulations.

FINAL PROVISIONS

Article 10 - Implementation

38. The arrangements outlined shall be implemented to align with go-live of the I-SEM market.

APPENDICES - Interim Cross Zonal TSO Arrangements for GB-ISEM go-live

1. A common proposal was developed by all Transmission System Operators (hereafter referred to as "TSOs") within the IU Capacity Calculation Region regarding the requirement to develop interim TSO cross zonal arrangements for ISEM go-live. The SEM-GB Joint Implementation Group approved the direction of the approaches contained within "JIG023 – Interim Cross Zonal TSO Arrangements for GB-ISEM go-live"

2. The following Appendices set out the detailed design for delivery of the Interim Cross Zonal TSO Arrangements to meet the key milestones associated with GB-ISEM go-live...

3. If for any reason the enduring solutions are not in place in time for CACM and FCA compliance then this interim arrangement will persist.

Appendix 1 – Interim capacity calculation arrangements

Background

Interim Capacity Calculation Arrangements on the SEM-GB Border

1. NTC calculations associated with power system security will be jointly determined by all TSOs i.e. EirGrid, SONI, Moyle, EWIC and NGET under an approach set out in Appendix 2 (Coordinated Capacity Calculator).

2. Long-term NTC (before consideration of outages) will be at least equal to the transmission system access rights specified in the existing contractual frameworks.

Scope

3. The scope of this Appendix is to define the roles and responsibilities necessary to implement the "causer pays" principle and to set out the interconnector compensation arrangements.

Objective

4. The objective of these interim capacity calculation arrangements is to give the market the highest possible capacity for energy trading taking into account the available interconnector capacity, secure and efficient operation of the power systems on both sides of the Interconnector and the possibility of faults on either network.

Detailed description

Implementation of a "causer pays" Principle

5. Reduction in NTC will be subject to "causer pays" principle. Once the causer is determined ex-post, the Interconnector Owner/Administrator will then invoice the causer for reimbursement.

6. The GB-SEM TSOs interim interconnector curtailment compensation arrangement process based on the principle of "causer pays" will be developed as part of the changes to the Interconnector Operating Protocol to be agreed and signed in January 2018.

7. It was agreed at the GB-ISEM implementation group (20/9/16) that the GB-SEM TSOs will develop and implement an interim interconnector curtailment compensation arrangement and process based on the principle of "causer pays". The NRAs agreed that this principle was in line with ACER's 'direction of travel'.

General principles of 'Causer Pays'

8. No decisions on "who the causer is" taken in real time operations i.e. in the Control Centres.

9. The existing EWIC, Moyle, NGET, SONI and EirGrid Interconnector Operating Protocols and processes will as far as possible be used to allocate responsibility for interconnector curtailment.

- This could be further complicated in EirGrid/SONI if the 'causer' is identified as NIE or ESB. Currently neither party attends the Interconnector Operating Panel (IOP) meeting nor do back to back arrangements exist to recover costs. For the purposes of this proposal, EirGrid or SONI will have initial responsibility when ESB or NIE are identified as the 'causer'.

10. Once responsibility has been determined ex-post, the Interconnector Owner (via IA where delegated) will invoice the causer for reimbursement of costs incurred.

Allocation of responsibility for interconnector curtailment

Stage 1 - Initial notification of interconnector capacity reduction via the Significant Incident Report (SIR) process.

11. The already existing SIR process allows NGET, SONI, EirGrid, EIDAC or Moyle to request a Significant Incident Report (SIR) from any other party if an operation or event has, or may have had, a significant effect on its system. The SIR process will be reviewed and updated to reflect the need to identify to all parties that interconnector capacity has been curtailed.

    - All Significant Incident Reports remain confidential to the parties involved and may be discussed at the next IOP meeting.
    - The GB Grid Code references in relation to Significant Incident Reports are OC7 and OC10.
    - The SONI Grid code reference in relation to Significant System Incidents is OC5.4.6.
    - The requirements for Significant Incident Reports (GB) and Significant Incidents (IRELAND) are covered by this Significant Incident Report section.

Stage 2 –EWIC or Moyle (or IA) produce a Significant Incident Follow-Up Report

- Description of what happened – from the SIR reports.
- Moyle and EWIC conduct an initial allocation of responsibility based on the latest information from EWIC, Moyle, SONI, EirGrid and NGET.

Stage 3 – With 5 working days all parties have opportunity to dispute allocation of responsibility.

- Send written notice to EWIC or Moyle (or IA) that they dispute the initial allocation of responsibility.
- Request urgent meeting to review incident and where possible come to mutual agreement.
    - Each party will use its diligent good faith efforts to settle amicably any dispute
    - If no agreement can be found then regulatory oversight shall be sought.

Interconnector curtailment compensation arrangements

12. For the reduction in NTC:

    - Prior to the Day Ahead Firmness Deadline the concerned TSOs on the bidding zone border where long-term transmission rights have been curtailed shall compensate the ICOs with the (loss adjusted) Day Ahead market spread.

- After the Day Ahead Firmness Deadline but prior to the IDM1 auction the concerned TSOs on the bidding zone border where NTC reduction has occurred shall compensate the ICOs with the (loss adjusted) IDM1 market spread.

- After the IDM1 Firmness Deadline but prior to the IDM2 auction the concerned TSOs on the bidding zone border where NTC reduction has occurred shall compensate the ICOs with the (loss adjusted) IDM2 market spread.

- After the IDM2 Firmness Deadline but prior to the IDM3 auction the concerned TSOs on the bidding zone border NTC reduction has occurred shall compensate the ICOs with the (loss adjusted) IDM3 market spread.

13. In all cases above the FTR option holders will be financially unaffected by any NTC reduction unless annual/monthly compensation caps are breached.

14. For reduction in NTC after the Firmness Deadline has passed for all Intraday Auctions relating to the delivery period, the concerned TSOs on the bidding zone border where NTC reduction has occurred shall compensate the ICOs with the associated imbalance costs incurred by the reduction.

15. As per FCA Article 53 the concerned TSOs on the bidding zone border where long-term transmission rights have been curtailed shall compensate the holders of curtailed long-term transmission rights with the (loss adjusted) market spread. Effectively, the FTR option holders will be financially unaffected by any NTC reduction unless annual/monthly compensation caps are breached.

16. JAO will handle calculation and settlement and the Interconnector Owner will then invoice the causer for reimbursement.

17. *"CACM Article 72 - Firmness in the event of force majeure or emergency situations"* –

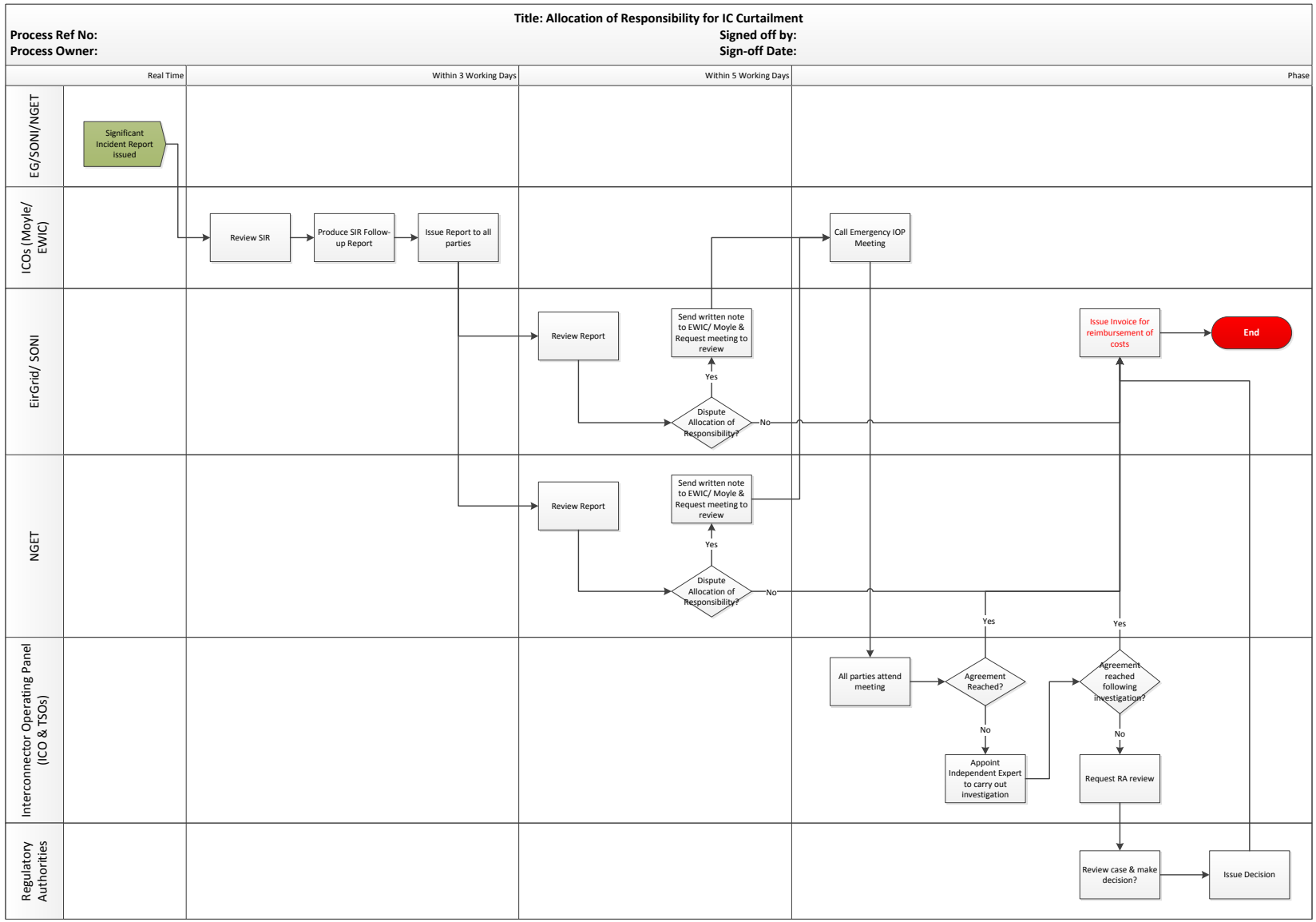
- In the event of force majeure or an emergency situation referred to in Article 16(2) of Regulation (EC) No 714/2009, where the TSO shall act in an expeditious manner and redispatching or countertrading is not possible, each TSO shall have the right to curtail allocated cross-zonal capacity. In all cases, curtailment shall be undertaken in a coordinated manner following liaison with all directly concerned TSOs." Countertrading in the context of the interim proposals refers to CTPT and SO-SO trading.
- If allocated capacity is curtailed because of force majeure or an emergency situation invoked by a TSO, the TSO shall reimburse or provide compensation for the period of force majeure or the emergency situation, in accordance with the following requirements: (a) if there is implicit allocation, central counter parties or shipping agents shall not be subject to financial damage or financial benefit arising from any imbalance created by such curtailment. (b) in the event of force majeure, if capacity is allocated via explicit allocation, market participants shall be entitled to reimbursement of the price paid for the capacity during the explicit

allocation process; (c) in an emergency situation, if capacity is allocated via explicit allocation, market participants shall be entitled to compensation equal to the price difference of relevant markets between the bidding zones concerned in the relevant time-frame; or (d) in an emergency situation, if capacity is allocated via explicit allocation but the bidding zone price is not calculated in at least one of the two relevant bidding zones in the relevant time-frame, market participants shall be entitled to reimbursement of the price paid for capacity during the explicit allocation process.

18. It is expected that restriction of capacity after DAFD allocation will be rare but where it does occur, the Interconnector Error Administrator may be exposed to imbalances in both the I-SEM and BETTA markets. Where it is not possible to execute countertrading measures (e.g. in a trip situation), restriction of allocated capacity can still occur in this timeframe. If no further action is taken (redispatching or countertrading (CTPT or SO-SO trading for this interim proposal)), the Interconnector Error Account will be exposed to the associated volume in the I-SEM and BETTA imbalance markets. In this case, the Interconnector Error Account compensation shall be the imbalance cost.

19. Once the causer is determined ex-post, the Interconnector Owner (via the IA) will then invoice the causer for reimbursement.

High Level Process Map



Appendix 2 – Coordinated capacity calculator

Background

Coordinated Capacity Calculation

1. The enduring solution for the establishment of the coordinated capacity calculator envisages that TSOs of the Ireland-United Kingdom (IU) Capacity Calculation Region would join the membership of a Regional Security Coordinator (RSC), in this case Coreso. As envisioned, one of the key Coreso tasks would be to perform the calculation of cross-zonal capacity for the IU capacity calculation region. However, the Coreso solution will be unavailable at I-SEM go-live and thus interim cross zonal TSO arrangements are required.

Scope

2. The scope of this Appendix is to define the roles and responsibilities necessary to calculate Net Transfer Capacity across all timescales and Available Transfer Capacity for timescales for the Day-Ahead and Intra-Day Market auctions.

Objectives

3. The objective of this Appendix is to implement the agreed interim coordinated capacity calculation as set out in JIG023 – Interim Cross Zonal TSO Arrangements for GB-ISEM go-live

Detailed description

4. Net Transfer Capacity (NTC) calculations using the coordinated NTC approach associated with power system security will be jointly determined by the TSOs. When determining the capacity of the interconnection that can be facilitated in each direction between two systems, the capacity is calculated by using computer programs and models of each area. If the values differ for a direction (and after exhausting all available SO tools) the lower value is used. The objective is to give the market the highest possible capacity for energy trading taking into account the available interconnector capacity, secure and efficient operation of the power systems on both sides of the Interconnector and the possibility of faults on either network.

5. NTC is the maximum exchange programme between two areas compatible with operational security standards applicable in both areas and taking into account the technical uncertainties on future network conditions. The NTC is set separately for both directions of transfer across EWIC and Moyle.

6. To communicate operational capacity between parties the NTC figures are used. These are the maximum values that EWIC and Moyle can be scheduled to, in each direction, at any given time. Two NTC values are declared: the maximum import and export capacities at the operational reference point.

7. NTC calculations associated with power system security will be jointly determined by all TSOs i.e. EirGrid, SONI, Moyle, EWIC and NGET. The process to derive NTC values for both EWIC and Moyle is a five stage process:

    1. Determination of contractual system access rights
    2. Planned Outage Co-ordination Phase
    3. Individual TSO Validation Phase
    4. All TSO co-ordination phase
    5. Setting NTC values

1. Determination of contractual system access rights

8. Moyle's contractual system access rights will vary with a daily capacity calculation being performed by National Grid with the aim of declaring a higher NTC value in the NI-GB direction[10] than that calculated in the long-term timeframe.

2. Planned Outage Co-ordination Phase

9. EWIC, Moyle, NGET, SONI, and EirGrid will undertake an annual Planned Outage Coordination exercise in line with the current Interconnector Operating Protocols.

10. Coordination of outages between EirGrid/SONI, National Grid and Interconnector Owners will continue as per current with the aim of minimising any restrictions on the interconnector, outage requirements and other factors likely to affect the capability of operation of the interconnector. Long term outage planning covers the period from seven years ahead up until the Day Firmness Deadline. Submission of outage information to National Grid will continue as per current process via their Transmission Outage Generator Availability (TOGA) system.

11. EWIC, Moyle, NGET, SONI and EirGrid undertake an annual Planned Outage Coordination exercise in line with the current EirGrid- EirGrid Interconnector - National Grid Interconnector Operating Protocol and SONI-Moyle Interconnector – National Grid Interconnector Operating Protocol.

12. There are two parts to this coordination:

    - NGET coordination (in line with OC.2 of the GB Grid Code):
        - EWIC and NGET will liaise regarding planned EWIC outages and planned outages on the NGET transmission system that impact on EWIC.
        - SONI, Moyle and NGET will liaise regarding planned Moyle outages and planned outages on the NGET transmission system that impact on Moyle.
    - SONI and EirGrid coordination (in line with EirGrid and SONI's generation and planning processes):
        - EWIC and EirGrid will liaise regarding planned EWIC outages and planned outages on the transmission system in Ireland that impact on EWIC.

[10] This calculation is not an I-SEM interim deliverable but is a relevant process

- Moyle and SONI will liaise regarding planned Moyle outages and planned outages on the transmission system in Northern Ireland that impact on Moyle.

13. To minimise any restrictions to EWIC and Moyle, outage requirements and other factors likely to affect the capability or operation of EWIC or Moyle will, as far as is reasonably practicable, be co-ordinated between EWIC, EirGrid, Moyle, SONI and NGET.

14. EIDAC, EirGrid, Moyle, SONI and NGET will examine the outage requirements which impact directly on Moyle and EWIC capability up to seven years ahead and will formalise a programme up to one year ahead.

3. Individual TSO Validation Phase

15. When determining the capacity on interconnection between two systems the interim proposal is that the capacity is calculated individually by the TSOs on each side of the interconnector. If the calculated values differ (and after exhausting all available SO tools), the lower value is used.

16. The objective is to give the market the highest possible capacity of energy trade taking into account interconnector capacity, secure and efficient operation of the power systems on both sides and the possibility of faults on either network.

17. As part of the I-SEM implementation phase the existing EirGrid document "Process for determining the transfer on the East-West Interconnector" will be reviewed and published. A similar "Process for determining the transfer on the Moyle Interconnector" will be developed and published.

18. To enable the efficient and secure operation of the system, generation and interconnectors are studied to prevent equipment overloading, voltages outside limits or system instability. The individual TSO validation stage involves network security analysis and takes into account operating reserve requirements and system constraints.

19. Following the first two stages each TSO (EirGrid, SONI, EWIC, Moyle and NGET) should be able to identify, on an annual basis 52 NTC values at weekly resolution with additional resolution as necessary during any planned outage periods.

4. All TSO co-ordination phase

20. The final stage of the derivation of NTC values is for an all TSO joint proposal on the annual NTC values in each direction (52 values at weekly resolution with additional resolution as necessary during any planned outage periods) to the Interconnector Operating Panel Meeting(s) for discussion.

21. These will be set sufficiently in advance to facilitate the sale of Calendar annual and SEM annual (October to September) long term transmission rights products.

22. NTC reduction on interconnectors (from long term position) is only envisaged if system operator foresees being unable to facilitate flows up to this value on a day and has exhausted the use of system operator tools other than capacity reduction.

5. Publishing NTC values

23. EirGrid and SONI will publish the required REMIT and transparency information on the ENTSO-E transparency platform and local platform.

24. Annual NTC values in each direction (52 values at weekly resolution with additional resolution as necessary during any planned outage periods) will be published sufficiently in advance to facilitate the sale of Calendar annual and SEM annual (October to September) long term transmission rights products.

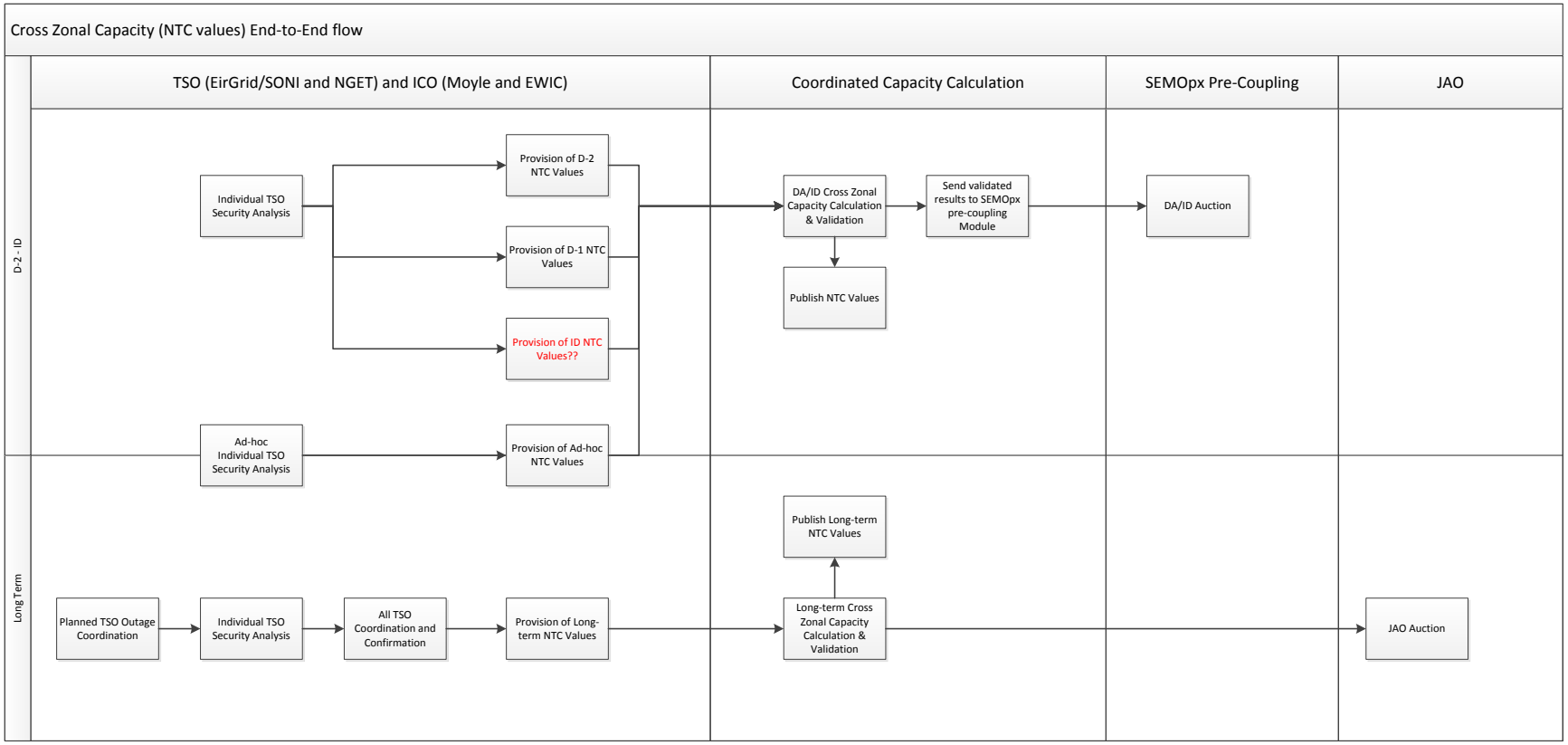
    - EirGrid will input EWIC outage information to the TOGA system on behalf of EWIC.
    - SONI will input Moyle outage information to the TOGA system on behalf of Moyle.

25. The following values will be published to the ENTSO-E Transparency platform:

    - All NTC changes in all timeframes i.e. in advance of FTR auctions, D-2 and Intraday
    - Forecast NTC published in advance of auctions (Annual, Monthly, Quarterly, Seasonal)
    - Minute NTC Update (information not sent to JAO)
    - Intraday Transfer Limits
    - Ramping Restrictions

High Level Process Map

Draft process map



Appendix 3 - Coordinated Redispatching and Countertrading

Background

1. In accordance with CACM Regulation Article 35, each TSO, in coordination with all other TSOs in the capacity calculation region, should develop a proposal for a common methodology for coordinated re-dispatching and countertrading. To ensure compliance with this regulation, EirGrid/SONI and National Grid have agreed to develop a mechanism, referred to as Coordinated Third Party Trading (CTP Trading), to facilitate these proposals.
2. Coordinated Third Party Trading denotes a process by which a TSO contracts a third party in a neighbouring market to facilitate the alteration of the cross-zonal flow for system operation reasons (non-energy trades).
3. With both TSOs having to agree any potential change in cross-zonal flow across either the Moyle or East West interconnectors, the process is coordinated and meets the requirements of European Network Codes. It should be noted that trades should only be undertaken on a firm cross-zonal market schedule.
4. The mechanism for CTP Trading is separate to, and independent of, System Operator to System Operator Trading (SO Trading) as each instrument operates under different timelines and parameters. SO Trading in its current form will be retained for I-SEM.

Scope

5. The scope of this Appendix is to define the processes surrounding CTP Trading as well as the roles and responsibilities in its implementation.

Objectives

6. The objective of CTP Trading is to provide a flexible mechanism which facilitates coordinated energy trading (for system operational reasons) between TSOs within the capacity calculation region. Trades can be undertaken further ahead of real-time and for longer periods of time compared to those of Cross Border Balancing (which remains a component of wider SO Trading).

Coordinated Third Party Trading Rules

7. SONI/EirGrid and National Grid are required, through their licences, to operate their transmission systems in a safe, secure and co-ordinated manner, with these forming the key principles underlying the need to trade across the Moyle and East West interconnectors.
8. There are two expected situations that may generate CTP Trading requests. These are System Security (including congestion management and interconnector trips) and Priority Dispatch.
    - System Security: Although TSOs aim to prepare for all contingencies, there may be occasions when unforeseen circumstances occur. In any situation where system security is risked, CTP Trading may be used to assist in its restoration.

- Such a situation may arise, for example, when a market schedule violates a system constraint. In this circumstance, CTP Trading could be used as a mechanism to help address the constraint violation and restore security.

- Priority Dispatch: By ensuring that renewable generation has precedence during the scheduling process, Priority Dispatch has the ability to be further enhanced through the use of interconnector trading.
    - For example, CTP Trading can be used to change the cross-zonal flow to help accommodate additional renewable generation on the system and reduce its curtailment.

9. CTP Trading (for System Security, Priority Dispatch or other statutory reasons) should be undertaken after cross border intra-day auctions have completed and the cross border market has cleared. This provides the market with the opportunity to resolve any potential issues before the TSO has to undertake cross-border actions. As a result, CTP Trades should therefore be initiated on a firm market schedule only. If possible, any information available that could indicate a need for CTPT balancing transactions should be published in time before the last IDM gate closure.

Detailed Description

10. Although the advent of I-SEM introduces continuous, local trading for the all-island market, interconnectors will not, initially, be party to this. Instead, they will have daily auctions – day-ahead and intra-day. These will implicitly allocate volumes and form the basis of the schedules on both the Moyle and East West interconnectors.

CTP Process

- At any point during normal business hours either TSO can propose a CTP trade for consideration by the receiving TSO. The initiating TSO will provide the proposed trade volumes to the receiving TSO via email and/or telephone, thus allowing the receiving TSO to assess the potential impact of the trade on their transmission system.

- The receiving TSO will have the right to reject the proposed trade where it is deemed to have a negative impact on secure, efficient, and economical system operation. If the receiving TSO accepts the trade, the CTP trade volumes will be indicative and only confirmed following receipt of results from the intraday auctions. The mechanism for providing out hours confirmation is being developed by both TSOs.

- After receipt of results from the intraday IDA auction (IDA), the EWIC and Moyle interconnector schedules (ICRPs) are calculated based on the results received and are provided to both EirGrid/SONI and National Grid.

- When the receiving TSO accepts the trade, the CTP trade volumes will be approved. It is the responsibility of the initiating TSO to communicate the proposed trade volumes to a nominated

third party who will undertake their own actions in the appropriate neighbouring intra-day market (I-SEM for National Grid and BETTA for EirGrid/SONI).

- An EirGrid/SONI Operator will enter the agreed CTP trade volumes into Interconnector Management Platform (ICMP) on behalf of the initiating TSO. Upon a final confirmation of the volumes from the initiating TSO, a new, proposed ICRP will be produced.
- The new, firm ICRP will be communicated to EirGrid/SONI and National Grid.
- Local volumes will be assigned to the initiating TSO and it is their responsibility to report the associated Physical Notifications (PNs) and Deemed Metered Volumes (DMVs), or to ensure the third party does so on their behalf.

Addendum

11. The CTP trading process outlined above will be further refined and operationalised during a proposed trial period which is to be initiated later in 2017. The mechanism for providing an out hours confirmation is being developed by both TSOs.

Appendix 4 - The requirement for single distinct loss factors for application to interconnectors

Background

1. The current Single Electricity Market (SEM) method for attribution of a Transmission Loss Adjustment Factor (TLAF) provides separate TLAF figures for day and night for each month for the annual period from October to September by which the energy provided by units on the Moyle and EWIC interconnectors is adjusted for transmission system losses for settlement purposes.

2. In response to the joint paper JIG018, CER/UR approved the use of:

   - An annual single loss factor for each interconnector in both GB and SEM markets.
   - The calculation methodology based on the existing SEM TLAF process

Scope

3. The scope of this Appendix is to define the roles and responsibilities necessary to implement annual single loss factor for each interconnector in both GB and SEM markets.

Objectives

4. Determine an annual single loss factor for each interconnector. This same loss factor per interconnector will be used for all of the SEM-GB coupled day-ahead and intraday markets, imbalance settlement in the SEM market, and adjustment of market spread for FTR remuneration.

Detailed description

5. The EirGrid/SONI TLAF process will be modified to provide loss factors calculated for each interconnector as per JIG018 Proposal 2 with losses from Option A. Note that the annual single loss value is to be determined for each interconnector based on “Option A: Linear loss value derived from the quadratic losses using a (0, 0) intercept point. No load losses will inhibit flow”

6. With this approach there should be consistency between the loss factors used in the coupled ex-ante markets, and SEM imbalance settlement, so that there is no imbalance from the choice of loss factor.

7. This would entail using the same single loss value per interconnector for both EUPHEMIA and SEM imbalance markets. The loss values would include no-load losses.

Appendix 5 – Proposals regarding interconnector ramping limits

Background

Interim Interconnector Ramp Limit on the SEM-GB Border

8. The I-SEM project needs to resolve issues regarding interconnector ramping in the Day Ahead Market (DAM) and Intra Day Market (IDM)[11] auctions which use the EUPHEMIA algorithm. Discrepancies in the interconnector schedule from market coupling and calculated interconnector flow instructions are created by the difference between the form of ramp limit used in EUPHEMIA for a market auction and the form of operational ramp limit applied by the SEM TSOs in calculating interconnector flow instructions. These discrepancies result in imbalance volumes in both the SEM and GB markets

- The operational ramp limit required for system security as represented in the Interconnector Reference Program is not a physical limitation of the interconnectors; rather it is an estimate of the sustained ramp capability of the combined generation fleet in the SEM. The current "all-island" limit of 10MW/min (5MW/min for each interconnector[12]) is considered a normally achievable limit given the characteristics of the power system and the time, frequency, and magnitude of existing market driven interconnector ramping events.

- The process is underway to have the EUPHEMIA algorithm changed to resolve the issues[13] regarding interconnector ramping so that interconnector flows represented in the Day Ahead Market (DAM) and Intra Day Market (IDM) auctions reflect as close as practicable the physical operational constraints; represented as interconnector ramp limits.

- EIrGrid/SONI as the TSO is planning to trial an increase to the operational ramp limit in 2017/18.

Scope

- The scope of this Appendix is to outline the process undertaken to set the initial ramp limit in EUPHEMIA and to define the process, and roles and responsibilities for changing the ramp limit, if required, until changes are made to the EUPHEMIA algorithm.

Objectives

- To have in place a description setting out the approach taken to set a EUPHEMIA (market) ramp limit for market start; and

[11] Whereas the Day Ahead Market has hourly trading periods, the Intra Day Market has half hourly trading intervals.
[12] In the event only one interconnector is in service the 10MW/min will apply to that single interconnector and the inputs to EUPHEMIA updated accordingly.
[13] A change request was submitted into the MRC/PCR process on 12 May 2017

- To describe the process of how the EUPHEMIA (market) ramp limit may be revised in the future together with splitting the ramp limit across the DAM and IDM markets.

Detailed description

Principles for establishing the EUPHEMIA Ramp Limit for Market Start

- It was agreed at the GB-ISEM Implementation Group (15 December 2016) that a ramp limit will be applied and that the ramp limit may be subject to "splitting" across the DAM and IDM auctions. This was agreed with knowledge that the ramp limit could be changed over time as market experience was gained.

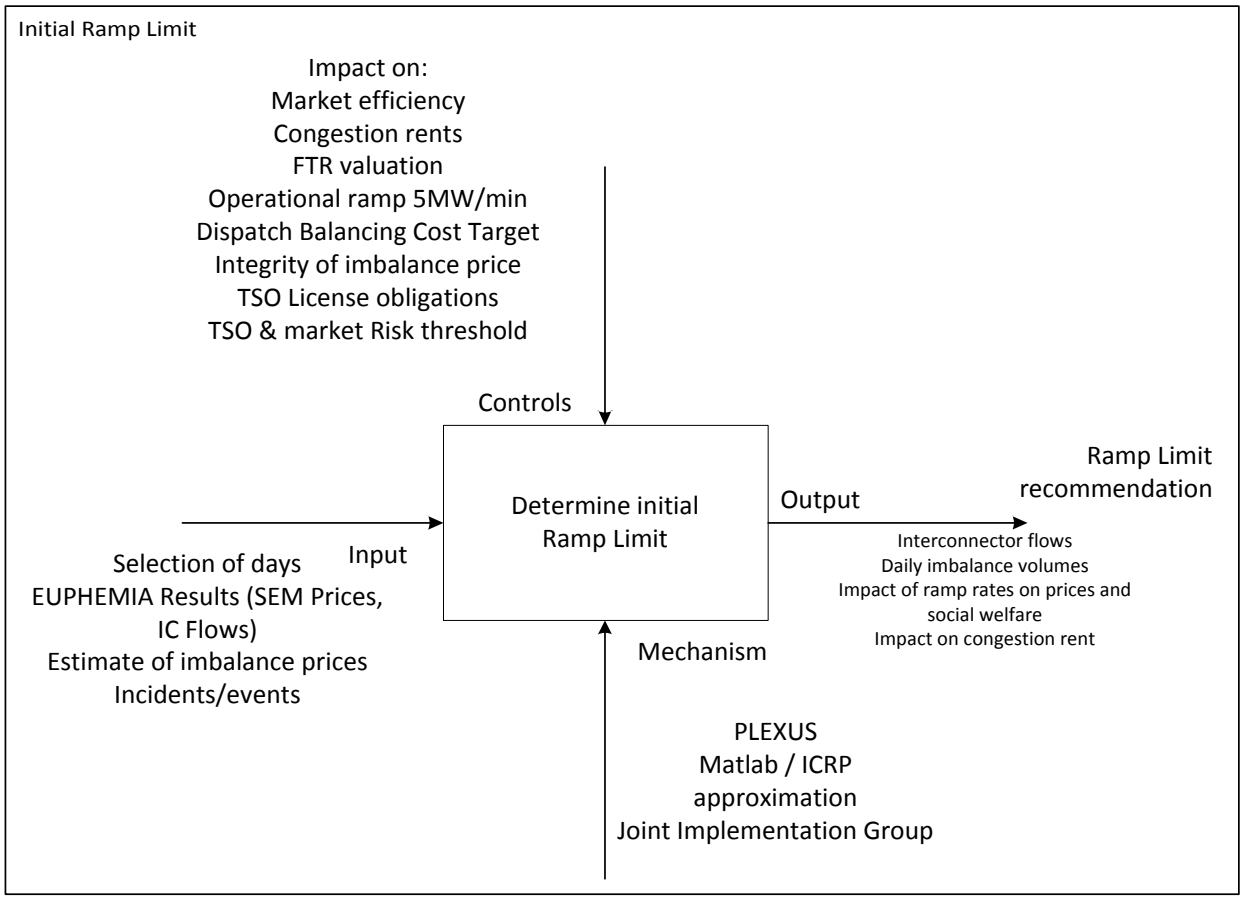
- It was also agreed that the initial ramp limit for market start will be based on the following considerations:
    - The impact on the market in terms of efficiency (production costs, economic surplus, social welfare);
    - The impact on congestion rents for the Interconnector Owners;
    - The estimate of potential imbalance prices and costs;
    - Potentially a view as to the affected value or quantity of the Financial Transmission Rights;
    - Other important factors requiring consideration are the impact on system operation, the need for the TSO to take balancing actions and the practicality of this, and market stability and the impact on the DAM and IDM if the balancing market is distorted through high or volatile imbalance volumes, and
    - Knowledge that an interim ramp limit is requiring pending enduring changes to EUPHEMIA

Decision on Interim EUPHEMIA Ramp Limit for Market Start

- With consideration to the above principles, the function diagram[14] below (Figure 1) sets out the process used by the I-SEM Project to model a range of outcomes using ramp limits of 150 MWh/h, 300 MWh/h, 450 MWh/h, 600 MWh/h and "infinity" so that a decision could be made by the CER/UR on an initial ramp limit for market start.

[14] The function diagram shows how inputs are transformed into outputs via the use of mechanisms and bound by controls.

Figure 1 – Determine Initial EUPHEMIA Ramp Limit Function



- Modelling outcomes enabled discussion between the I-SEM Project, CER/UR and Interconnector Owners on the benefits and impacts associated with the range of ramp limits.

- Key factors considered in the decision by the CER/UR were the impact on interconnector congestion rent, the cost of imbalance volumes, and efficient interconnector flow transfers. On balance, with consideration to the analysis provided by the I-SEM Project, feedback from the Interconnector Owners, and its own independent advice, the conclusion of the CER/UR was to set a ramp limit of 300 MW/h/h per interconnector for market start.

EUPHEMIA Ramp splitting across markets

- The ramp splitting proposal required that consideration be given to which market (i.e. DAM, IDM) the ramp limit should be made available in, including the possibility that the full ramp limit should be provided to DAM with the IDM ramp limits only considering the residual amount after the DAM.

- Ramp Splitting varies the ramp limit submitted to EUPHEMIA for each of DAM and each IDM run. To the extent that ramp capability is not utilised in earlier markets, the ramp limit in the next market equals that residual ramp capability, plus the additional ramp capability reserved for use in the next market auction. Attachment 1 illustrates an example of how the total reserved ramp would be calculated for each auction for each interconnector.

- The ICO's have expressed preference for the full ramp limit to be available for the DAM to ensure there are no additional allocation constraints caused by ramp limits which would reduce efficiency of the DAM and potentially the FTR market. This view is consistent with feedback from CER/UR, who also indicated the need to consider having higher liquidity in the DAM.

- With consideration of the above requirements, the CER/UR confirms the market will commence with 100% of the ramp limit available for the DAM.

- The consequence of having 100% of the ramp limit available for the DAM means that initially for market start no ramp limit will be reserved for the IDM. However, any residual ramp capability from the DAM auction will be available for the IDM auctions.

- The Interconnector Management Platform is designed to enable the Interconnector Administrator to define a reserved ramp limit per interconnector and auction if required in the future. This will define the ramp limit reserved for each auction type i.e. DAM and IDM.

- If the EUPHEMIA Ramp Limit is changed after the market commences, further consideration will be given by the ICO's and EirGrid/SONI in consultation with CER/UR as to the split of the Ramp Limit across auctions.

Process for Changing EUPHEMIA Ramp Limit

- The ramp limit is not intended to be changed on a frequent or regular basis and the intention is to have changes made to the EUPHEMIA algorithm as soon as possible.

- However, the proposal for ramp splitting was agreed knowing that with knowledge gained over time with market experience that the ramp limit could be changed.

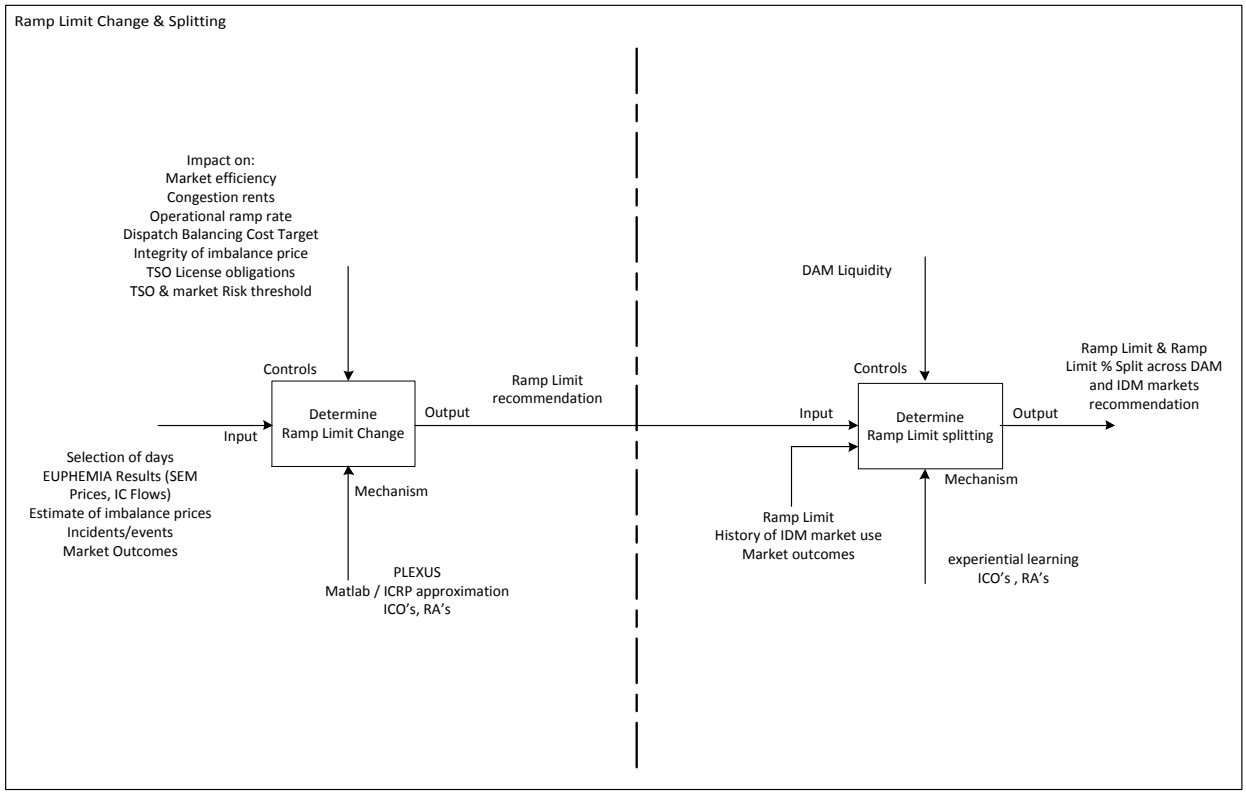
- There are two foreseeable reasons for changing the ramp limit. Firstly, market outcomes may indicate a need, if for example imbalance volumes are greater or less than forecast or secondly a positive outcome of the proposed operational trial to raise the operational ramp limit may enable the ramp limit to be raised accordingly.

- If one of the above instances triggers a TSO to recommend a review of the ramp limit, the process illustrated in Figure 2 will apply to form a decision on the ramp limit by CER/UR.

- If a decision is made to change the Ramp limit, the process will also consider whether any associated splitting of the ramp limit is warranted based on market history with respect to IDM activity. Refer Figure 2.

- A decision to change the ramp limit will also need to consider the appropriate lead time to implement the change as it will affect participant valuations of FTR's.

Figure 2 – Determine Ramp Limit Change and Splitting Function



Attachment 1- Reserved Ramp Rate Example

Auction delivery times are defined as follows:

Auction	**Delivery Period Start**	**Delivery Period End**
DAM	23:00 D-1	23:00 D
IDA1	23:00 D-1	23:00 D
IDA2	11:00 D	23:00 D
IDA3 (local only)	17:00 D	23:00 D

The following is defined for an interconnector (NB all Reserved Ramp Rate numbers in these tables are for illustrative purposes only:

Auction Type	**Reserved Ramp Rate(MW/Hour)**
IDA1	50
IDA2	50

Then for the DAM

RRR = Reserved Ramp Rate, TRRR = Total Reserved Ramp Rate

Period	**RRR_{IDA1}**	**RRR_{IDA2}**	**TRRR**
23:00	50		50
00:00	50		50
01:00	50		50
02:00	50		50
03:00	50		50
04:00	50		50
05:00	50		50
06:00	50		50
07:00	50		50

Period	RRR_{IDA1}	RRR_{IDA2}	TRRR
08:00	50		50
09:00	50		50
10:00	50		50
11:00	50	50	100
12:00	50	50	100
13:00	50	50	100
14:00	50	50	100
15:00	50	50	100
16:00	50	50	100
17:00	50	50	100
18:00	50	50	100
19:00	50	50	100
20:00	50	50	100
21:00	50	50	100
22:00	50	50	100