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| **MODIFICATION PROPOSAL FORM** |
| **Proposer***(Company)* | **Date of receipt***(assigned by Secretariat)* | **Type of Proposal***(delete as appropriate)* | **Modification Proposal ID***(assigned by Secretariat)* |
| **SEMO** | **05 February 2019** | **Standard** | **Mod\_05\_19** |
| **Contact Details for Modification Proposal Originator** |
| **Name** | **Telephone number** | **Email address** |
| **Christopher Goodman** |  |  |
| **Modification Proposal Title** |
| **Amendment to Uninstructed Imbalance Charge (CUNIMB) to correct for negative price scenarios** |
| **Documents affected***(delete as appropriate)* | **Section(s) Affected** | **Version number of T&SC or AP used in Drafting** |
| **T&SC Part B** | **F.9.4.1** | **Version 20** |
| **Explanation of Proposed Change***(mandatory by originator)* |
| The Uninstructed Imbalance Charge (CUNIMB), calculated in Trading and Settlement Code paragraph F.9.4, is designed to calculate a premium to the charge applied to under generation outside prescriptively defined under generation tolerance levels and a discount to the payment for over generation outside over generation tolerance levels. This is in order to incentivise compliance with Dispatch Instructions centrally issued by the Transmission System Operators.The level of premium or discount is parameterised and set by the Regulatory Authorities using the parameters Premium for Under Generation Factor (FPUG) and Discount for Over Generation Factor (FDOG) where both are currently set at 0.2 resulting in a 20% additional charge under generation or lesser payment for over generation for Uninstructed Imbalances outside of tolerance levels based on the difference between Loss Adjusted Metered Quantity and Loss Adjusted Dispatch Quantity and taking account of the unit specific Loss Adjusted Tolerance for Over or Under Generation as appropriate.The premium or discount is applied to the product of the Imbalance Price (PIMB) and the Outside Tolerance Undelivered Quantity (QUNDELOTOL) and then an additional element of the algebra adds the premium or discount for the difference between the Imbalance Price and the Bid Offer Price (PBO) for any accepted bid where PBO is less than PIMB or any accepted offer where PBO was greater than PIMB to ensure that the premium or discount is applied at the same price at which the energy was settled where an Uninstructed Imbalance relates to an Accepted Bid or Offer Quantity. The intention here is to apply a 20% increase or decrease as appropriate for Uninstructed Imbalances outside a tolerance, at the appropriate rate, being that on which the volume was originally settled for BOAs and at the Imbalance Price otherwise.This formulation works as intended where prices and bids are positive; however, where the Imbalance Price and/or a Bid Offer Price are negative this can result in incorrect charges being calculated and in some extreme scenarios can even lead to the Uninstructed Imbalance Charge becoming a payment and therefore a perverse incentive to not comply with Dispatch Instructions. An example of this is illustrated below;Consider an Under-Generation Uninstructed Imbalance whereby a unit has an Outside Tolerance Undelivered Quantity (QUNDELOTOL) of -4 MWh, an Outside Tolerance Undelivered Accepted Offer Quantity (QAOUNDELOTOL) of 3 MWh, for a Bid Offer Price of 50 €/MWh and the Imbalance Price is -100 €/MWh. Applying the algebra in F.9.4.1 with a Discount for Over Generation Factor of 0.2 yields a charge of €10:CUNIMB = Min(-4,0)\*((0.2\*-100))+(-0.2)(Max(50-(-100),0)\*3 = (-4\*-20)+(-0.2\*150\*3) = 80 +(-90) = €-10If the Imbalance Price in this example were -200 €/MWh this would result in a payment of €70 as follows;CUNIMB = Min(-4,0)\*((0.2\*-200))+(-0.2)(Max(50-(-100),0)\*3 = (-4\*-40)+(-0.2\*150\*3) = 160 +(-90) = €70The correct outcome here is a charge for 1 MWh, which does not relate to an accepted offer, at the 20% of the Imbalance Price and a charge for 3 MWh at 20% of the Bid Offer Price for the Outside Tolerance Accepted Offer Quantity where the Bid Offer Price is greater than the Imbalance Price. For the second Imbalance Price of -200 €/MWh this should yield €-70.Calculating this intuitively by evaluating it directly on the applicable volumes (as opposed to applying PIMB to the entire outside tolerance quantity and then bringing it back to PBO for the accepted offer portion) yields: CUNIMB = (0.2\*1\*-200)-(0.2\*3\*50) =-40-30 = €-70There are various scenarios of negative Imbalance and/or Bid Offer Price which result in incorrect outcomes based on the existing formulation.Since the current algebra seeks to take an elegant approach by applying PIMB to the entire Outside Tolerance Uninstructed Imbalance Volume, and then bringing the accepted bid or offer portion to the PBO, rather than calculating the volume at the appropriate rate directly, we have aimed to retain this elegant drafting approach while proposing changes that ensure the correct outcomes regardless of the sign of the Imbalance or Bid Offer Price. This is because the alternative/direct approach would be algebraically more cumbersome both for the legal drafting and the associated system change while the approaches are equivalent in outcome. For this example, the more elegant approach would evaluate as follows:CUNIMB = (0.2\*4\*-200)-((50-200)\*0.2\*3) = -160-(-90) = €-70The proposed approach achieves the required outcomes by taking the absolute/modulus of the applicable prices and applying the product of Accepted Bid Offer Quantities and price difference only where for any accepted bid the PBO is less than PIMB or for any accepted offer the PBO was greater than PIMB prescriptively as opposed to using Maximum and Minimum of the price difference around zero. This is done by using binary operators of the form Min/Max(A-B,0)/A-B, which returns a value of one where the difference between the Bid Offer and Imbalance Prices is negative or positive for over-generation accepted bids and under-generation accepted offers respectively and applying this to the difference between the absolute values of the prices. Otherwise, the binary operator returns a zero where the Accepted Bid or Offer Quantity would have settled at the Imbalance Price, due to the relative position of PBO and PIMB, as appropriate.This is similar to what the existing max/min drafting seeks to achieve, and returns the same outcomes for positive Prices, but corrects the issues with incorrect price differentials being applied for negative prices. This approach, along with taking the modulus of the prices on application for both PIMB and PBO ensures that the outcome is always a 20% (or otherwise depending on FPUG/FDOG values) charge for each outside tolerance Uninstructed Imbalance volume at the appropriate price.This approach has been scrutinised from the point of view of the principles that apply and has also been explicitly tested by calculating the CUNIMB for 34 scenarios for different Over/Under Generation Uninstructed Imbalance and relative price positions and signage and has been confirmed as resulting in the correct settlement outcome for each of these scenarios. For the second example with a PIMB of -200 €/MWh described above this evaluates as follows (where the binary operator is underlined):CUNIMB = [Min(-4,0)\*(0.2\*200)]-[0.2\*((50-200)\*3\*(Max(50-(-200),0)/(50-(-200)))] = (-4\*40)-[0.2\*-150\*3\*(250/250)] =-160-(-90) =€-70 While the algebraic formulation here has some complexity the principle aim of this proposal is reasonably straightforward. The aim is to move from a calculation of Uninstructed Imbalance **Charge** that applies Bid Offer and Imbalance Prices as charging rates when positive and payment rates when negative to one that applies them as charging rates throughout, including where the Imbalance volume itself was a payment to decrease generation or a charge to increase generation (without being instructed to do so) due to a negative price. In this way, the mechanism is always as disincentive for deviations from dispatch and never incentivises such uninstructed deviations so that the intended incentive to comply with dispatch is not reversed where Prices are negative and also does not result in increased Dispatch Balancing Costs in error.Note that the structural change to introduce the ‘If PBO-PIMB ≠/= 0 ’, ‘then’ construct, along with the introduction of CUNIMB*u****oi****γ* is merely to avoid the mathematical oddity of a divide by zero in the binary operator, where PBO=PIMB, which cannot be evaluated. This is done by removing the binary operator from the calculation where PBO=PIMB along with the rest of the calculation to adjust back to PBO as it is not required where PBO=PIMB.Evaluating the summations over bands and BOAs over the CUNIMB*u****oi****γ* variable which has been introduced rather than within the overall algebra is also neater and is the clearest way to capture the fact that that the summation applies to each entire CUNIMB*u****oi****γ* value which has been evaluated for each BOA band.  |
| **Legal Drafting Change***(Clearly show proposed code change using* ***tracked*** *changes, if proposer fails to identify changes, please indicate best estimate of potential changes)* |
| 1. * 1. Calculation of Uninstructed Imbalance Charges
			1. Subject to paragraph F.9.4.2, the Market Operator shall calculate the Uninstructed Imbalance Charge (CUNIMBuγ) for each Generator Unit, u, in each Imbalance Settlement Period, γ, as follows:

where:* + - * 1. QUNDELOTOLuγ is the Outside Tolerance Undelivered Quantity for Generator Unit, u, in Imbalance Settlement Period, γ.
				2. QAOUNDELOTOLuoiγn is the Outside Tolerance Undelivered Accepted Offer Quantity for Generator Unit, u, for Bid Offer Acceptance, o, for Band, i, in Imbalance Settlement Period, γ.
				3. QABUNDELOTOLuoiγn is the Outside Tolerance Undelivered Accepted Bid Quantity for Generator Unit, u, for Bid Offer Acceptance, o, for Band, i, in Imbalance Settlement Period, γ.
				4. PIMBγ is the Imbalance Settlement Price in Imbalance Settlement Period, γ, calculated in accordance with Chapter E (Imbalance Pricing);
				5. PBOuoiγ is the Bid Offer Price for each Outside Tolerance Undelivered Accepted Bid Quantity and Outside Tolerance Accepted Offer Quantity for Generator Unit, u, for Bid Offer Acceptance, o, for Band, i, in Imbalance Settlement Period, γ;
				6. is a summation over all Bid Offer Acceptances, o;
				7. is a summation over all Bands, i;
				8. FPUGuγ is the Premium for Under Generation Factor for Generator Unit, u, in Imbalance Settlement Period, γ;
				9. FDOGuγ is the Discount for Over Generation Factor for Generator Unit, u, in Imbalance Settlement Period, γ;
				10. |PIMBγ| is the absolute value of the Imbalance Settlement Price in Imbalance Settlement Period, γ, calculated in accordance with Chapter E (Imbalance Pricing); and
				11. |PBOuoiγ| is the absolute value of the Bid Offer Price for each Outside Tolerance Undelivered Accepted Bid Quantity and Outside Tolerance Accepted Offer Quantity for Generator Unit, u, for Bid Offer Acceptance, o, for Band, i, in Imbalance Settlement Period, γ.
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| **Modification Proposal Justification***(Clearly state the reason for the Modification)* |
| This proposal seeks to correct the calculation of Uninstructed Imbalance Charges where negative prices apply so that this always results in a charge and therefore an incentive to comply with Dispatch Instructions at a rate governed by the appropriate energy price. This would also mean that Uninstructed Imbalance Charges appropriately reduce Dispatch Balancing Costs rather than increasing them where negative prices occur. |
| **Code Objectives Furthered***(State the Code Objectives the Proposal furthers, see Section 1.3 of Part A and/or Section A.2.1.4 of Part B of the T&SC for Code Objectives)* |
| * + - * 1. to ensure no undue discrimination between persons who are parties to the Code; and

By ensuring that the 20% increase or decrease applied for Uninstructed Imbalances outside tolerance bands applies equally to those with such imbalances at times of negative and positive Imbalance Prices and also equally to those with negative and positive Bid Offer Prices.* + - * 1. to promote the short-term and long-term interests of consumers of electricity on the island of Ireland with respect to price, quality, reliability, and security of supply of electricity.

By ensuring that the appropriate reduction in Dispatch Balancing Costs is caused by levying Uninstructed Imbalance Charges and that they are not inappropriately increased by these resulting in payments where prices are negative. |
| **Implication of not implementing the Modification Proposal***(State the possible outcomes should the Modification Proposal not be implemented)* |
| If this proposal is not implemented a perverse incentive not to comply with dispatch where Imbalance or Bid Offer Prices are negative will remain and inappropriate increases (rather than reductions as should be the case) in Dispatch Balancing Costs will continue to occur where there are Uninstructed Imbalance ‘Charges’ with negative prices applied. |
| **Working Group***(State if Working Group considered necessary to develop proposal)* | **Impacts***(Indicate the impacts on systems, resources, processes and/or procedures; also indicate impacts on any other Market Code such as Capacity Marker Code, Grid Code, Exchange Rules etc.)* |
| Not required | Change to SEMO settlement systems required to apply the amended algebra. |
| ***Please return this form to Secretariat by email to*** balancingmodifications@sem-o.com |

**Notes on completing Modification Proposal Form:**

1. **If a person submits a Modification Proposal on behalf of another person, that person who proposes the material of the change should be identified on the Modification Proposal Form as the Modification Proposal Originator.**
2. **Any person raising a Modification Proposal shall ensure that their proposal is clear and substantiated with the appropriate detail including the way in which it furthers the Code Objectives to enable it to be fully considered by the Modifications Committee.**
3. **Each Modification Proposal will include a draft text of the proposed Modification to the Code unless, if raising a Provisional Modification Proposal whereby legal drafting text is not imperative.**
4. **For the purposes of this Modification Proposal Form, the following terms shall have the following meanings:**

**Agreed Procedure(s): means the detailed procedures to be followed by Parties in performing their obligations and functions under the Code as listed in either Part A or Part B Appendix D “List of Agreed Procedures”. The Proposer will need to specify whether the Agreed Procedure to modify refers to Part A, Part B or both.**

**T&SC / Code: means the Trading and Settlement Code for the Single Electricity Market. The Proposer will also need to specify whether all Part A, Part B, Part C of the Code or a subset of these, are affected by the proposed Modification;**

**Modification Proposal: means the proposal to modify the Code as set out in the attached form**

**Derivative Work: means any text or work which incorporates or contains all or part of the Modification Proposal or any adaptation, abridgement, expansion or other modification of the Modification Proposal**

**The terms “Market Operator”, “Modifications Committee” and “Regulatory Authorities” shall have the meanings assigned to those terms in the Code.**

**In consideration for the right to submit, and have the Modification Proposal assessed in accordance with the terms of Section 2 of Part A or Chapter B of Part B of the Code (and Part A Agreed Procedure 12 or Part B Agreed Procedure 12) , which I have read and understand, I agree as follows:**

**1. I hereby grant a worldwide, perpetual, royalty-free, non-exclusive licence:**

* 1. **to the Market Operator and the Regulatory Authorities to publish and/or distribute the Modification Proposal for free and unrestricted access;**
	2. **to the Regulatory Authorities, the Modifications Committee and each member of the Modifications Committee to amend, adapt, combine, abridge, expand or otherwise modify the Modification Proposal at their sole discretion for the purpose of developing the Modification Proposal in accordance with the Code;**
	3. **to the Market Operator and the Regulatory Authorities to incorporate the Modification Proposal into the Code;**

**1.4 to all Parties to the Code and the Regulatory Authorities to use, reproduce and distribute the Modification Proposal, whether as part of the Code or otherwise, for any purpose arising out of or in connection with the Code.**

**2. The licences set out in clause 1 shall equally apply to any Derivative Works.**

**3. I hereby waive in favour of the Parties to the Code and the Regulatory Authorities any and all moral rights I may have arising out of or in connection with the Modification Proposal or any Derivative Works.**

**4. I hereby warrant that, except where expressly indicated otherwise, I am the owner of the copyright and any other intellectual property and proprietary rights in the Modification Proposal and, where not the owner, I have the requisite permissions to grant the rights set out in this form.**

**5. I hereby acknowledge that the Modification Proposal may be rejected by the Modifications Committee and/or the Regulatory Authorities and that there is no guarantee that my Modification Proposal will be incorporated into the Code.**