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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)* |
| **EirGrid** | **11 April 2018** | | **Standard** | | **Mod\_15\_18** |
| **Contact Details for Modification Proposal Originator** | | | | | |
| **Name** | | **Telephone number** | | **Email address** | |
| **Martin Kerin** | |  | | **Martin.Kerin@EirGrid.com** | |
| **Modification Proposal Title** | | | | | |
| **Clarifications for Instruction Profiling** | | | | | |
| **Documents affected**  *(delete as appropriate)* | | **Section(s) Affected** | | **Version number of T&SC or AP used in Drafting** | |
| **Appendices Part B** | | **Appendix O** | | **20** | |
| **Explanation of Proposed Change**  *(mandatory by originator)* | | | | | |
| A number of clarifications to the operation of the Instruction Profiling function, in particular in relation to how it is used for calculating Bid Offer Acceptance Quantities, are added which include the following:   * At the moment the Appendix does not describe what happens in curtailment and constraints are both active at the same time, therefore the additional details required to understand how wind instructions are profiled are provided in the proposed modification – graphical examples of some of these scenarios are also provided in Appendix B to this modification proposal; * There is text added in a number of places to provide a better description of profiles for QBOA around SYNC instructions and subsequent instructions while the Min On Time is active. The profile for the SYNC instruction should accept the volume up to Min Gen and Min On Time (or if Min Gen is a soak time break point, until the later of Min On Time and soak time passing) before closing, while any other instructions should accept volumes in addition to that. Therefore two things need to happen: there needs to be separate Bid Offer Acceptances opened for the part up to Min Gen related to a SYNC instruction, and for the part above Min Gen related to an MWOF instruction plus all following pseudo instructions. Also the profiles for those Bid Offer Acceptances above Min Gen need to close to the SYNC instruction profile rather than closing to the FPN which would result in an unintended undo quantity. There is a graphical example of this provided in Appendix B to this modification proposal. The PSYN pseudo instruction also only needs to be created when there is no other previous instruction active on the unit while Min On Time is happening other than the SYNC instruction, because if any other instruction becomes active over that period then the pseudo instructions related to those instructions will continue (e.g. PMWO after MWOF) and PSYN is no longer needed, the text around this is clarified; * The settlement process is run for Settlement Days to go into settlement, but at the moment the TSC describes running it for Trading Days; * For wind and storage the current Code text describes calculating dispatch quantities based on metered quantities for some situations, whereas in the future it should be based only on data available in real time and therefore available for use in pricing, such as real-time availability for wind and registered pumping load for storage; * QBOA is calculated on a minute by minute basis first before calculating a half hour or five minute quantity, so when curves are intercepting each other at a point within a minute there is a need to round to the nearest minute, this has not yet been described in the TSC; * Clarification of what set of TOD is used to calculate a profile which crosses a Trading Day boundary, it is the TOD for the day where the profile started that persists into the next day, rather than changing TOD sets mid-profile. | | | | | |
| **Legal Drafting Change**  *(Clearly show proposed code change using* ***tracked*** *changes, if proposer fails to identify changes, please indicate best estimate of potential changes)* | | | | | |
| See Appendix A to this modification proposal. | | | | | |
| **Modification Proposal Justification**  *(Clearly state the reason for the Modification)* | | | | | |
| Through recent work with vendors a deeper understanding of the details of how instruction profiling and Bid Offer Acceptance Quantity (QBOA) calculations work has been gained. Based on this increased understanding a number of clarifications are needed to the rules to have them more accurately reflect how the systems are implementing the design, and to include details of how the system carries out these calculations in a number of areas in the Appendix where there is currently no explanation. In some scenarios there is a lack of definition of what should happen, in particular for Wind Units, therefore the inclusion of this additional text does not constitute a change in approach but rather a better description of the approach.  These changes will aid participants in their replication of the results and will reduce ambiguity in the intended results of the instruction profiling and Bid Offer Acceptance Quantity calculations, which would aid the query and dispute management process.  While it may appear that there is a large volume of changes, much of this is due to including the same text in multiple places, or making small changes throughout Appendix O which is a long section of the appendices. | | | | | |
| **Code Objectives Furthered**  *(State the Code Objectives the Proposal furthers, see Section 1.3 of T&SC for Code Objectives)* | | | | | |
| * to provide transparency in the operation of the Single Electricity Market; * to ensure no undue discrimination between persons who are parties to the Code.   This modification proposal if implemented would ensure that participants unambiguously understand the intended functioning of the Instruction Profiling and Bid Offer Acceptance Quantity calculation functionality, including those who have not been part of the market design or industry training processes and therefore may only have the Code as their source of understanding. | | | | | |
| **Implication of not implementing the Modification Proposal**  *(State the possible outcomes should the Modification Proposal not be implemented)* | | | | | |
| If these clarifications are not included in the code, in some cases the description in the code would be incorrect compared with how the system actually calculates results, and in other cases the means by which the calculation results in the intended outputs will not be clear enough for participants to replicate. | | | | | |
| **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.)* | | |
| N/A | | | N/A | | |
| ***Please return this form to Secretariat by email to*** [***modifications@sem-o.com***](mailto:modifications@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.**

**Appendix A:**

* + - 1. The following timing conventions applies to provisions within this Appendix O, in line with their use in the Code:
         1. The Imbalance Pricing Period is the period within an Imbalance Settlement Period relevant to the execution of the Imbalance Pricing Process, as per Chapter E “Imbalance Pricing”, and represented by the subscript φ;
         2. An Imbalance Settlement Period is the period relevant to the execution of Settlement calculations, as outlined in Chapter F “Calculation of Payments and Charges”, and represented by the subscript γ;
         3. Provisions that applies to both Imbalance Pricing Periods and Imbalance Settlement Periods, are indicated by the subscript for a generalised period, h.
      2. This Appendix O sets out detailed provisions in relation to three types of Instruction Profiles:
         1. Physical Notification Instruction Profile that shall be used by the Market Operator to determine the values of Dispatch Quantity (qDuoh(t)) for Bid Offer Acceptances resulting from Dispatch Instructions;
         2. Pseudo Instruction Profile that shall be used by the Market Operator to determine the values of Dispatch Quantity (qDuoh(t)) for Bid Offer Acceptances resulting from Pseudo Dispatch Instructions; and
         3. Uninstructed Imbalance Instruction Profile that shall be used by the Market Operator to determine values of Dispatch Quantity (QDuγ)

as required by Chapter F “Calculation of Payments and Charges” for each Dispatchable Generator Unit for each period, h.

* + - 1. Physical Notification Instruction Profiling and Pseudo Instruction Profiling for the purpose of Bid Offer Acceptance Quantity calculation, as set out in section F.6.2, shall be performed after each Imbalance Pricing Period for the purpose of being used in the Imbalance Price calculation and on D+1 and D+4 for the purpose of Imbalance Settlement Calculation.
      2. Uninstructed Imbalance Instruction Profiling for the purpose of Undelivered Quantity calculation and Uninstructed Imbalance calculation as set out in sections F.6.6 and F.9, shall be performed on D+1 and D+4 for each Imbalance Settlement Period.
      3. Instruction Profiling shall be calculated prior to any additional Imbalance Pricing Software Run performed by the Market Operator as required for Imbalance Pricing and Settlement purposes respectively.
      4. Instruction Profiling shall not be performed for Generator Units which are not Dispatchable and not Controllable, Assetless Units or Interconnector Residual Capacity Units, and the values of Dispatch Quantity for these Generator Units, where applicable, shall be calculated as set out in section F.2.4.
      5. All Dispatch Instructions shall be provided by the relevant System Operator to the Market Operator in accordance with Appendix K: “Other Market Data Transactions” and the Market Operator shall procure to publish the Dispatch Instructions within the Central Market Systems.
  1. Capture Input Data
     + 1. To calculate each type of Instruction Profile, a different combination of inputs from Appendix H: “Data Requirements for Registration”, Appendix I: “Offer Data”, Appendix K: “Other Market Data Transactions”, Dispatch Instructions issued by the System Operator and Pseudo Dispatch Instructions, created by the Market Operator as per , shall be used for each period, h, for each Dispatchable Generator Unit in accordance with paragraph .
       2. The following Commercial Offer Data, Technical Offer Data and Physical Notification Data provided in accordance with Appendix I: “Offer Data”, shall be used by the Market Operator to calculate Physical Notification Instruction Profiles and Pseudo Instruction Profiles:
          1. Complex Bid Offer Data;
          2. Simple Bid Offer Data;
          3. Minimum On Time;
          4. Minimum Off Time;
          5. Maximum On Time;
          6. Minimum Down Time (applicable to Demand Side Units);
          7. Maximum Down Time (applicable to Demand Side Units); and
          8. Final Physical Notification Quantities (qFPNuh(t)).
       3. The following Registration Data and Technical Offer Data, provided in accordance with Appendix H: “Data Requirements for Registration” and Appendix I: “Offer Data” respectively, shall be used by the Market Operator to calculate all Instruction Profile types:
          1. Registered Capacity / Maximum Generation;
          2. Hot Cooling Boundary;
          3. Warm Cooling Boundary;
          4. Block Load Flag;
          5. Block Load Cold, Block Load Warm and Block Load Hot;
          6. Loading Rate Hot 1, 2 & 3;
          7. Loading Rate Warm 1, 2 & 3;
          8. Loading Rate Cold 1, 2 & 3;
          9. Load Up Break Point Hot 1 & 2;
          10. Load Up Break Point Warm 1 & 2;
          11. Load Up Break Point Cold 1 & 2;
          12. Soak Time Hot 1 & 2;
          13. Soak Time Warm 1 & 2;
          14. Soak Time Cold 1 & 2;
          15. Soak Time Trigger Point Hot 1 & 2;
          16. Soak Time Trigger Point Warm 1 & 2;
          17. Soak Time Trigger Point Cold 1 & 2;
          18. Ramp Up Rate 1, 2, 3, 4 & 5;
          19. Ramp Up Break Point 1, 2, 3 & 4;
          20. Dwell Time Up 1, 2 & 3;
          21. Dwell Time Down 1, 2 & 3;
          22. Dwell Time Up Trigger Point 1, 2 & 3;
          23. Dwell Time DownTrigger Point 1, 2 & 3;
          24. Ramp Down Rate 1, 2, 3, 4 & 5;
          25. Ramp Down Break Point 1, 2, 3 & 4;
          26. Deloading Rate 1 & 2;
          27. Deload Break Point;
          28. Maximum Ramp Up Rate (applicable to Demand Side Units);
          29. Maximum Ramp Down Rate (applicable to Demand Side Units);
          30. Dispatchable Quantity (Maximum Generation applicable to Demand Side Units);
          31. Start of Restricted Range 1;
          32. End of Restricted Range 1;
          33. Start of Restricted Range 2;
          34. End of Restricted Range 2;
          35. Short Term Maximisation Capability;
          36. Registered Minimum Stable Generation;
          37. Registered Minimum Output;
          38. Pumping Capacity;
          39. Pumped Storage and Battery Storage Flag;
          40. Battery Storage Capacity; and
          41. Fuel Type.
       4. The following Outturn Data, provided by the relevant System Operator to the Market Operator in accordance with Appendix K: “Other Market Data Transactions”, shall be used by the Market Operator to create all Instruction Profile types:
          1. Outturn Minimum Stable Generation;
          2. Outturn Minimum Output;
          3. Outturn Availability (Primary Fuel Type Outturn Availability for Dual Rated Generator Units);
          4. Secondary Fuel Type Outturn Availability;
          5. Rating Flag; and
          6. Last Status Change Time.
       5. The following Dispatch Instructions Data Records provided by the relevant System Operator to the Market Operator in accordance with Appendix K: “Other Market Data Transactions” shall be used by the Market Operator to create all Instruction Profile types for each Generator Unit for the applicable period, h:
          1. Instruction Issue Time;
          2. Instruction Effective Time;
          3. Target Instruction Level;
          4. Instruction Code;
          5. Instruction Combination Code;
          6. Dispatch Ramp Up Rate;
          7. Dispatch Ramp Down Rate; and
          8. Instruction Effective Until Time for MWOF.
       6. The Instruction Codes and Instruction Combination Codes that are used for the calculation of all Instruction Profile types, except as provided in , are listed and described in .

**Table 1 – Instruction Codes and Instruction Combination Codes for Dispatch Instructions issued by the System Operator**

| **Instruction Code** | **Instruction Combination Code** | **Description** |
| --- | --- | --- |
| SYNC | n/a | Synchronise the Generator Unit at the specified Instruction Effective Time. |
| MWOF | n/a | Adjust the Generator Unit Output to the specified Target Instruction Level at the specified Instruction Effective Time. |
| DESY | n/a | Desynchronise the Generator Unit at the specified Instruction Effective Time. |
| GOOP | PGEN | Instruct positive Output from a Pumped Storage Unit or a Battery Storage Unit at the specified Instruction Effective Time. |
| GOOP | PUMP | Instruct negative Output from a Pumped Storage Unit or a Battery Storage Unit at the specified Instruction Effective Time. |
| GOOP | SCT | Instruct Synchronisation in generating mode and 0MW Output for a Pumped Storage Unit or a Battery Storage Unit at the specified Instruction Effective Time. |
| GOOP | SCP | Instruct Synchronisation in Pumping Mode and 0MW Output from a Pumped Storage Unit or a Battery Storage Unit at the specified Instruction Effective Time. |
| TRIP | n/a | Retrospectively issued Dispatch Instruction to indicate that a Generator Unit Desynchronised unexpectedly. |
| WIND | LOCL | Instruction for a Wind Power Unit to reduce Output due to a Local Network Constraint at the specified Instruction Effective Time. |
| WIND | LCLO | Instruction for a Wind Power Unit to cease the reduction of Output due to a Local Network Constraint at the specified Instruction Effective Time. |
| WIND | CURL | Instruction for a Wind Power Unit to reduce Output due to an All-Island Curtailment at the specified Instruction Effective Time. |
| WIND | CRLO | Instruction for a Wind Power Unit to cease the reduction of Output due to an All-Island Curtailment at the specified Instruction Effective Time. |
| MXON | n/a | Instruction to a Generator Unit to adjust its Output to the registered Short Term Maximisation Capability at the specified Instruction Effective Time. |
| MXOF | n/a | Instruction to de-activate a Maximisation Instruction at the specified Instruction Effective Time. |
| FAIL | n/a | Retrospectively-issued Dispatch Instruction to indicate that a Generator Unit failed to Synchronise as instructed. |

* + - 1. How the Instruction Codes and Instruction Combination Codes are used for the calculation of Physical Notification Instruction Profiles is described in .

**Table 2 – Instruction Codes and Instruction Combination Codes as used for Physical Notification Instruction Profile**

| **Instruction Code** | **Instruction Combination Code** | **Description** |
| --- | --- | --- |
| MWOF | n/a | **Step 1**: Adjust the Generator Unit Output to the specified Target Instruction Level until a specified Effective Until Time or until the Target Instruction Level must be maintained in order to comply with the Generator Unit’s Accepted Technical Offer Data, whichever is later;  **Step 2**: with the Instruction Effective Time set equal to the time Step 1 is achieved, adjust Target Instruction Level to Final Physical Notification Quantities, or if at the time that profile would have reached the Final Physical Notification Quantities the Physical Notification Instruction Profile associated with a previous SYNC Dispatch Instruction has not achieved Step 1 in accordance with the SYNC Instruction Code entry in Table 2, then adjust Target Instruction Level to the Physical Notification Instruction Profile associated with the SYNC Dispatch Instruction; however if a new Dispatch Instruction is issued by the System Operator with an Instruction Effective Time equal to or before the time Step 1 is achieved, profile the new Dispatch Instruction as per or as appropriate. |
| GOOP | PGEN | **Step 1**: Instruct positive Output from a Pumped Storage Unit or a Battery Storage Unit at the specified Instruction Effective Time and Adjust the Generator Unit Output to the specified Target Instruction Level until a specified Effective Until Time or until the Target Instruction Level must be maintained in order to comply with the Generator Unit’s Accepted Technical Offer Data, whichever is later;  **Step 2**: with the Instruction Effective Time set equal to the time Step 1 is achieved, adjust Target Instruction Level to Final Physical Notification Quantities, or if at the time that profile would have reached the Final Physical Notification Quantities the Physical Notification Instruction Profile associated with a previous SYNC Dispatch Instruction has not achieved Step 1 in accordance with the SYNC Instruction Code entry in Table 2, then adjust Target Instruction Level to the Physical Notification Instruction Profile associated with the SYNC Dispatch Instruction; however if a new Dispatch Instruction is issued by the System Operator with an Instruction Effective Time equal to or before the time Step 1 is achieved, profile the new Dispatch Instruction as per or as appropriate. |
| MXON | n/a | **Step 1**: Instruction to a Generator Unit to adjust its Output to the registered Short Term Maximisation Capability at the specified Instruction Effective Time until a specified Effective Until Time or until the Target Instruction Level must be maintained in order to comply with the Generator Unit’s Accepted Technical Offer Data, whichever is later;  **Step 2**: with the Instruction Effective Time set equal to the time Step 1 is achieved, adjust Target Instruction Level to Final Physical Notification Quantities, or if at the time that profile would have reached the Final Physical Notification Quantities the Physical Notification Instruction Profile associated with a previous SYNC Dispatch Instruction has not achieved Step 1 in accordance with the SYNC Instruction Code entry in Table 2, then adjust Target Instruction Level to the Physical Notification Instruction Profile associated with the SYNC Dispatch Instruction; however if a new Dispatch Instruction is issued by the System Operator with an Instruction Effective Time equal to or before the time Step 1 is achieved, profile the new Dispatch Instruction as per or as appropriate. |
| MXOF | n/a | **Step 1**: Instruction to de-activate a Maximisation Instruction at the specified Instruction Effective Time and adjust the Generator Unit Output to MWOF issued with MXOF or the last valid MWOF prior to the Maximisation instruction until specified Effective Until Time or until the Target Instruction Level must be maintained in order to comply with the Generator Unit’s Accepted Technical Offer Data, whichever is later;  **Step 2**: with the Instruction Effective Time set equal to the time Step 1 is achieved, adjust Target Instruction Level to Final Physical Notification Quantities, or if at the time that profile would have reached the Final Physical Notification Quantities the Physical Notification Instruction Profile associated with a previous SYNC Dispatch Instruction has not achieved Step 1 in accordance with the SYNC Instruction Code entry in Table 2, then adjust Target Instruction Level to the Physical Notification Instruction Profile associated with the SYNC Dispatch Instruction; however if a new Dispatch Instruction is issued by the System Operator with an Instruction Effective Time equal to or before the time Step 1 is achieved, profile the new Dispatch Instruction as per or as appropriate. |
| SYNC | n/a | If there is no MWOF Dispatch Instruction issued with the same Instruction Effective Time, and the Target Instruction Level for the SYNC Dispatch Instruction is less than or equal to the Registered Minimum Stable Generation:  **Step 1**: Synchronise the Generator Unit at the specified Instruction Effective Time and adjust the Generator Unit Output to a Target Instruction Level equal to the Registered Minimum Stable Generation until a specified Effective Until Time or until the Target Instruction Level must be maintained in order to comply with the Generator Unit’s Accepted Technical Offer Data, whichever is later;  **Step 2**: with the Instruction Effective Time set equal to the time Step 1 is achieved, adjust Target Instruction Level to Final Physical Notification Quantities; however if a new Dispatch Instruction is issued by the System Operator with an Instruction Effective Time equal to or before the time Step 1 is achieved, profile the new Dispatch Instruction as per Table 1 or Table 2 as appropriate.  Otherwise if there is no MWOF Dispatch Instruction issued with the same Instruction Effective Time, and the Target Instruction Level for the SYNC Dispatch Instruction is greater than the Registered Minimum Stable Generation, then follow Step 3:  **Step 3**: Synchronise the Generator Unit at the specified Instruction Effective Time and adjust the Generator Unit Output as described in Steps 1 and 2. For the purposes of calculating Physical Notification Instruction Profiles, create an additional Dispatch Instruction with Instruction Code “MWOF” with the same Instruction Effective Time and Instruction Issue Time as the associated SYNC Dispatch Instruction, and for the Physical Notification Instruction Profile applicable to this Dispatch Instruction adjust the Generator Unit Output as described in Steps 1 and 2 of the MWOF Instruction Code entry in Table 2. |

* + - 1. In addition to Dispatch Instructions issued by the System Operator, Pseudo Dispatch Instructions, corresponding to a subset of the Dispatch Instructions listed in , shall also be created by the Market Operator and used in accordance to the description in to calculate Pseudo Instruction Profiles.
      2. A Pseudo Dispatch Instruction shall not be created for a corresponding Dispatch Instruction where the System Operator issues a subsequent Dispatch Instruction with Instruction Effective Time at or before the time at which the Pseudo Dispatch Instruction would nominally be created in accordance with Table 3.

**Table 3 – Instruction Codes and Instruction Combination Codes for Pseudo Dispatch Instructions**

| **Pseudo Dispatch Instruction Code** | **Pseudo Dispatch Instruction Combination Code** | **Corresponding Instruction Code or Instruction Combination Code** | **Description** |
| --- | --- | --- | --- |
| PSYN | n/a | SYNC | **Continuous open acceptance after SYNC.**  At Instruction Effective Time set as the later of:   * the time when the corresponding SYNC Instruction Profile reaches Registered Minimum Stable Generation if the time to ramp up is greater than the Minimum On Time; or * the corresponding SYNC Instruction Effective Time plus Min On Time; or * if the MW value of the Registered Minimum Stable Generation corresponds to the MW value of a Soak Time Trigger Point in the applicable Accepted Technical Offer Data, then the time when the corresponding SYNC Instruction Profile reaches Registered Minimum Stable Generation plus the applicable Soak Time,   **Step 1**: create a PSYN to maintain Generator Unit Output to the specified SYNC Target Instruction Level until next Dispatch Instruction or Pseudo Dispatch Instruction;  **Step 2**: with an Instruction Effective Time set equal to the time Step 1 is achieved, adjust Target Instruction Level to Final Physical Notification Quantities.  NOTE: PSYN is not created where the Target Instruction Level of the associated SYNC Dispatch Instruction is greater than the Registered Minimum Stable Generation, or where there is a MWOF Dispatch Instruction issued at the same Instruction Effective Time as the associated SYNC Dispatch Instruction with a Target Instruction Level which is not equal to the Registered Minimum Stable Generation. |
| PMWO | n/a | MWOF | **Continuous open acceptance after MWOF**.  At Instruction Effective Time set as:   * the time when the corresponding MWOF Instruction Profile reaches the specified Target Instruction Level,   **Step 1**: create a PMWO to maintain the Generator Unit Output to the specified MWOF Target Instruction Level until next Dispatch Instruction or Pseudo Dispatch Instruction;  **Step 2**: with the Instruction Effective Time set equal to the time Step 1 is achieved, adjust Target Instruction Level to Final Physical Notification Quantities, or if at the time that profile would have reached the Final Physical Notification Quantities the Physical Notification Instruction Profile associated with a previous SYNC Dispatch Instruction has not achieved Step 1 in accordance with the SYNC Instruction Code entry in Table 2, then adjust Target Instruction Level to the Physical Notification Instruction Profile associated with the SYNC Dispatch Instruction. |
| PDES | n/a | DESY | **Continuous open acceptance after DESY.**  At Instruction Effective Time set as:   * the time when the corresponding DESY Instruction Profile reaches the Target Instruction Level plus Min Off Time,   **Step 1**: create a PDES to maintain the Generator Unit Output to the specified DESY Target Instruction Level until next Dispatch Instruction or Pseudo Dispatch Instruction;  **Step 2**: with the Instruction Effective Time set equal to the time Step 1 is achieved, adjust Target Instruction Level to Final Physical Notification Quantities, or if at the time that profile would have reached the Final Physical Notification Quantities the Physical Notification Instruction Profile associated with a previous SYNC Dispatch Instruction has not achieved Step 1 in accordance with the SYNC Instruction Code entry in Table 2, then adjust Target Instruction Level to the Physical Notification Instruction Profile associated with the SYNC Dispatch Instruction. |
| GOOP | PPGE | PGEN | **Continuous open acceptance after PGEN**.  At Instruction Effective Time set as:   * the time when the corresponding PGEN Instruction Profile reaches the specified Target Instruction Level,   **Step 1**: create a PPGE to maintain the Generator Unit Output to the specified PGEN Target Instruction Level until next Dispatch Instruction or Pseudo Dispatch Instruction;  **Step 2**: with the Instruction Effective Time set equal to the time Step 1 is achieved, Target Instruction Level to Final Physical Notification Quantities, or if at the time that profile would have reached the Final Physical Notification Quantities the Physical Notification Instruction Profile associated with a previous SYNC Dispatch Instruction has not achieved Step 1 in accordance with the SYNC Instruction Code entry in Table 2, then adjust Target Instruction Level to the Physical Notification Instruction Profile associated with the SYNC Dispatch Instruction. |
| PMXN | n/a | MXON | **Continuous open acceptance after MXON**.  At Instruction Effective Time set as:   * the time when the corresponding MXON Instruction Profile reaches the Short Term Maximisation Capability,   **Step 1**: create a PMXN to maintain the Generator Unit Output to the specified MXON Target Instruction Level until next Dispatch Instruction or Pseudo Dispatch Instruction;  **Step 2**: with the Instruction Effective Time set equal to the time Step 1 is achieved, adjust Target Instruction Level to Final Physical Notification Quantities, or if at the time that profile would have reached the Final Physical Notification Quantities the Physical Notification Instruction Profile associated with a previous SYNC Dispatch Instruction has not achieved Step 1 in accordance with the SYNC Instruction Code entry in Table 2, then adjust Target Instruction Level to the Physical Notification Instruction Profile associated with the SYNC Dispatch Instruction. |
| PMXF | n/a | MXOF | **Continuous open acceptance after MXOF**.  At Instruction Effective Time set as:   * the time when the corresponding MXON Instruction Profile reaches the last effective MWOF Target Instruction Level prior to the corresponding MXON,   **Step 1**: create a PMXF to maintain the Generator Unit Output to the specified MXOF Target Instruction Level until next Dispatch Instruction or Pseudo Dispatch Instruction;  **Step 2**: with the Instruction Effective Time set equal to the time Step 1 is achieved, adjust Target Instruction Level to Final Physical Notification Quantities, or if at the time that profile would have reached the Final Physical Notification Quantities the Physical Notification Instruction Profile associated with a previous SYNC Dispatch Instruction has not achieved Step 1 in accordance with the SYNC Instruction Code entry in Table 2, then adjust Target Instruction Level to the Physical Notification Instruction Profile associated with the SYNC Dispatch Instruction. |
| POFF | n/a | n/a | **Continuous open acceptance keeping unit off**.  At Instruction Effective Time set as:   * the time where the Final Physical Notification Quantity profile rises from zero   **Step 1**: create a POFF to maintain the Generator Unit Output to the specified Target Instruction Level (zero) until next Dispatch Instruction or Pseudo Dispatch Instruction;  **Step 2**: with the Instruction Effective Time set equal to the time Step 1 is achieved, adjust Target Instruction Level to Final Physical Notification Quantities, or if at the time that profile would have reached the Final Physical Notification Quantities the Physical Notification Instruction Profile associated with a previous SYNC Dispatch Instruction has not achieved Step 1 in accordance with the SYNC Instruction Code entry in Table 2, then adjust Target Instruction Level to the Physical Notification Instruction Profile associated with the SYNC Dispatch Instruction.  NOTE: POFF is created where the preceding Dispatch Instruction is not one of the following: MWOF, MXON, SYNC, PGEN, MXOF, DESY. |
| PCOD | n/a | n/a | **Continuous open acceptance after COD change.**  At Instruction Effective Time set as:   * the effective time of a revised set of Unit’s Commercial Offer Data set out in sub-paragraphs and   **Step 1**: create a PCOD to maintain the Generator Unit Output to the preceding Target Instruction Level associated with the Accepted Bid Offer Quantity until next Dispatch Instruction or Pseudo Dispatch Instruction;  **Step 2**: with the Instruction Effective Time set equal to the time Step 1 is achieved, adjust Target Instruction Level to Final Physical Notification Quantities, or if at the time that profile would have reached the Final Physical Notification Quantities the Physical Notification Instruction Profile associated with a previous SYNC Dispatch Instruction has not achieved Step 1 in accordance with the SYNC Instruction Code entry in Table 2, then adjust Target Instruction Level to the Physical Notification Instruction Profile associated with the SYNC Dispatch Instruction.  NOTE: PCOD is created where the preceding Dispatch Instruction is not one of the following: MWOF, MXON, SYNC, PGEN, MXOF, DESY. |
| PISP | n/a | n/a | **Continuous open acceptance after Imbalance Settlement Period boundary**,  At Instruction Effective Time set as:   * the Imbalance Settlement Period boundary time,   **Step 1**: create a PISP to maintain the Generator Unit Output to the preceding Target Instruction Level until next Dispatch Instruction or Pseudo Dispatch Instruction;  **Step 2**: with the Instruction Effective Time set equal to the time Step 1 is achieved, adjust Target Instruction Level to Final Physical Notification Quantities, or if at the time that profile would have reached the Final Physical Notification Quantities the Physical Notification Instruction Profile associated with a previous SYNC Dispatch Instruction has not achieved Step 1 in accordance with the SYNC Instruction Code entry in Table 2, then adjust Target Instruction Level to the Physical Notification Instruction Profile associated with the SYNC Dispatch Instruction.  NOTE: PISP is created where the preceding Dispatch Instruction is not one of the following: MWOF, MXON, SYNC, PGEN, MXOF, DESY. |

* 1. Dispatch Instruction and Pseudo Dispatch Instruction Validation
     + 1. Dispatch Instructions for a Settlement Day available to the Market Operator at the time of applying the process for the calculation of the Imbalance Price, or the time of applying the process for the calculation of settlement quantities, as applicable, shall be sorted by Generator Unit, Instruction Effective Time, Instruction Issue Time and the MW value of the Target Instruction Level (in order of increasing quantity). Unless otherwise specified, Instruction Issue Time for Pseudo Dispatch Instructions shall be set equal to the Instruction Effective Time. The rules for the validation and merging of Dispatch Instructions shall be applied in the following order: paragraph 18, paragraph 19 first sentence relating to MWOF Instruction Codes only, paragraph 21, paragraph 22, paragraph 19 first sentence relating to all Instruction Codes, paragraph 19 second sentence, paragraph 32(d), paragraph 23.
       2. A Dispatch Instruction shall cancel a Pseudo Dispatch Instruction with the same Instruction Effective Time, where that Pseudo Dispatch Instruction is created as a result of a previous corresponding Dispatch Instruction.
       3. If multiple Dispatch Instructions with the same Instruction Effective Time but different Instruction Issue Times are issued for a Generator Unit, then the Dispatch Instruction with the latest Instruction Issue Time shall be used. For Dispatch Instructions having the same Instruction Issue Time and Instruction Effective Time, the Dispatch Instructions shall be ordered based on the following sequence of Instruction Codes:
          1. TRIP;
          2. GOOP+PUMP;
          3. MWOF;
          4. MXON;
          5. SYNC;
          6. GOOP;
          7. WIND;
          8. MXOF; and
          9. DESY.
       4. If multiple Pseudo Dispatch Instructions are created with the same Instruction Effective Time and Instruction Issue Time, they shall be ordered based on the following sequence of Instruction Codes:
          1. PCOD;
          2. PISP;
          3. POFF; and
          4. The Pseudo Dispatch Instruction corresponding to the latest Dispatch Instruction or Instruction Combination Code ordered in accordance with paragraph .
       5. For Dispatch Instructions having a MWOF Instruction Code, equal Instruction Effective Times and equal Instruction Issue Times, the Dispatch Instruction with the largest Target Instruction Level shall be used.
       6. For any two Dispatch Instructions, having the same Instruction Effective Time, where the first Dispatch Instruction is defined as Dispatch Instruction A and the second Dispatch Instruction is defined as Dispatch Instruction B, the Instruction Code and Instruction Combination Code that shall be used for the resultant Dispatch Instruction are shown in . For the avoidance of doubt, MWOF(x) is defined as Dispatch Instruction having an Instruction Code of MWOF and a Target Instruction Level of x MW. SYNC(x) is defined as Dispatch Instruction having an Instruction Code of SYNC and a Target Instruction Level of x MW. DESY(x) is defined as Dispatch Instruction having an Instruction Code of DESY and a Target Instruction Level of x MW. PUMP(x) is defined as a Dispatch Instruction having an Instruction Code of GOOP, an Instruction Combination Code of PUMP and a Target Instruction Level of x MW. CURL(x) is defined as a Dispatch Instruction having an Instruction Code of WIND, an Instruction Combination Code of CURL and a Target Instruction Level of x MW. CRLO(x) is defined as a Dispatch Instruction having an Instruction Code of WIND, an Instruction Combination Code of CRLO and a Target Instruction Level of x MW. LOCL(x) is defined as a Dispatch Instruction having an Instruction Code of WIND, an Instruction Combination Code of LOCL and a Target Instruction Level of x MW. LCLO(x) is defined as a Dispatch Instruction having an Instruction Code of WIND, an Instruction Combination Code of LCLO and a Target Instruction Level of x MW.

**Table 4 – Validation Rules for two Dispatch Instructions issued by the System Operator having the same Effective Time**

| **Instruction Code A** | **Instruction Combination Code A** | **Instruction Code B** | **Instruction Combination Code B** | **Resultant Instruction Code** | **Resultant Instruction Combination Code** |
| --- | --- | --- | --- | --- | --- |
| MWOF(x) | n/a | SYNC | n/a | SYNC(x) | n/a |
| SYNC | n/a | MWOF(x) | n/a | SYNC(x) | n/a |
| MWOF(x) | n/a | DESY | n/a | DESY(x) | n/a |
| DESY | n/a | MWOF(x) | n/a | DESY(x) | n/a |
| MWOF(x) | n/a | GOOP | PGEN | MWOF(x) | n/a |
| GOOP | PGEN | MWOF(x) | n/a | MWOF(x) | n/a |
| GOOP | PUMP | Any type(x) | n/a | GOOP | PUMP(x) |
| Any type(x) | n/a | GOOP | PUMP | GOOP | PUMP(x) |
| WIND | CURL | MWOF(x) | n/a | WIND | CURL(x) |
| WIND | CRLO | MWOF(x) | n/a | WIND | CRLO(x) |
| WIND | LOCL | MWOF(x) | n/a | WIND | LOCL(x) |
| WIND | LCLO | MWOF(x) | n/a | WIND | LCLO(x) |

* + - 1. The sorted Dispatch Instructions for each Generator Unit shall be validated by the Market Operator using the rules in , and .

**Table 5 – Validation Rules for Dispatch Instructions issued by the System Operator**

| **Preceding Instruction Code** | **Current Instruction Code** | **Action** |
| --- | --- | --- |
| SYNC | SYNC | Ignore Dispatch Instruction linked to current Instruction Code. |
| DESY | DESY | Ignore Dispatch Instruction linked to current Instruction Code. |
| TRIP | TRIP | Ignore Dispatch Instruction linked to current Instruction Code. |
| SYNC | FAIL | If Instruction Effective Time for Dispatch Instruction having FAIL Instruction Code is up to and including 1 hour after the Instruction Effective Time for a Dispatch Instruction having SYNC Instruction Code, the Dispatch Instruction having the preceding SYNC Instruction Code shall be ignored. Dispatch Instructions having Instruction Effective Times between the Instruction Effective Times for the Dispatch Instructions having the FAIL and the preceding SYNC Instruction Codes shall be ignored. |
| SYNC | FAIL | If Instruction Effective Time for Dispatch Instruction having FAIL Instruction Code is over 1 hour after the Instruction Effective Time for the Dispatch Instruction having SYNC Instruction Code, profile the Dispatch Instruction having SYNC Instruction Code as normal and discard the Dispatch Instruction having FAIL Instruction Code. |
| FAIL | SYNC | Ignore Dispatch Instructions having FAIL Instruction Code, if this Dispatch Instruction is not matched with previous Dispatch Instruction having a SYNC Instruction Code. Profile Dispatch Instruction having SYNC Instruction Code as per normal. |

**Table 6 – Validation Rules for Dispatch Instructions issued by the System Operator for all Generator Units**

| **Instruction Code** | **MWOF(x)** | **Action** |
| --- | --- | --- |
| MWOF | x > Maximum Generation | Set x to > Maximum Generation |
| MWOF | x in Restricted Range | Profile MWOF(x) |
| SYNC[[1]](#footnote-1) | x > Maximum Generation | Set x to > Maximum Generation |
| SYNC | x in Restricted Range | Profile MWOF(x) |
| SYNC | x = Registered Minimum Stable Generation | **Step 1**: Remove the MWOF Dispatch Instruction as part of validation in accordance with Table 4. For the Physical Notification Instruction Profile related to the SYNC Dispatch Instruction, synchronise the Generator Unit at the specified Instruction Effective Time and adjust the Generator Unit Output to a Target Instruction Level equal to the Registered Minimum Stable Generation until a specified Effective Until Time or until the Target Instruction Level must be maintained in order to comply with the Generator Unit’s Accepted Technical Offer Data, whichever is later;  **Step 2**: with the Instruction Effective Time set equal to the time Step 1 is achieved, adjust Target Instruction Level to Final Physical Notification Quantities, or if the previously active Physical Notification Instruction Profile or Pseudo Instruction Profile is still active at the time it would have reached the Final Physical Notification Quantities, adjust Target Instruction Level to that previously active Physical Notification Instruction Profile or Pseudo Instruction Profile; however if a new Dispatch Instruction is issued by the System Operator with an Instruction Effective Time equal to or before the time Step 1 is achieved, profile the new Dispatch Instruction as per Table 1 or Table 2 as appropriate. |
| SYNC | x ≠ Registered Minimum Stable Generation | Synchronise the Generator Unit at the specified Instruction Effective Time and adjust the Generator Unit Output as described in Steps 1 and 2. For the purposes of calculating Physical Notification Instruction Profiles, keep the associated MWOF Dispatch Instruction rather than removing it as part of validation in accordance with Table 4, create an additional Physical Notification Instruction Profile for the MWOF Dispatch Instruction, and adjust the Generator Unit Output as described in Steps 1 and 2 of the MWOF Instruction Code entry to Table 2. |
| MWOF | 0 < x < Registered Minimum Stable Generation | Profile MWOF(x) |
| SYNC | x = NULL | Set x = Registered Minimum Stable Generation |
| DESY[[2]](#footnote-2) | x = NULL | Set x = 0 |

**Table 7 – Validation Rules for Maximisation Instructions**

| **Instructed Quantity** | **Instruction Code** | **MWOF(x)** | **Action** |
| --- | --- | --- | --- |
| Any | MXON | x = NULL | Maximisation starts. Profile to Short Term Maximisation Capability. |
| NULL | MWOF (after MXON) | x = ANY | Maximisation ends. Profile to Target Instruction Level associated with new MWOF Instruction Code. |
| NULL | MXOF (after MXON) | x = NULL | Maximisation ends. Profile back to Target Instruction Level associated with last MWOF Instruction Code at the latest Ramp Down Rate. |

* + - 1. A Dispatch Instruction having a MWOF or DESY Instruction Code which follows a Dispatch Instruction having an Instruction Code MXON shall be taken to de-activate the Maximisation Instruction.
      2. A Dispatch Instruction having a GOOP Instruction Code and having a SCP Instruction Combination Code may precede a Dispatch Instruction having a GOOP Instruction Code and a PUMP Instruction Combination Code. Validation rules for Pumped Storage Units and Battery Storage Units are detailed in .
  1. Profile Operating Modes
     + 1. The normal operating modes for a Synchronised Generator Unit are load up mode, ramp up mode, ramp down mode and deload mode. Each operating mode of a Generator Unit is described by a piecewise linear Operating Trajectory that describes the theoretical Output of a Generator Unit over time. The Technical Offer Data used to determine the piecewise linear Operating Trajectory shall be the Accepted Technical Offer Data for the Trading Day containing the Instruction Effective Time of the Dispatch Instruction.
       2. The load up trajectory of a Generator Unit is a piecewise linear curve that describes the theoretical Output of a Generator Unit over time from Start Up to Registered Minimum Stable Generation determined by:
          1. The following Technical Offer Data:

Block Load Cold, Block Load Warm and Block Load Hot;

Loading Rate Hot 1, 2 & 3;

Loading Rate Warm 1, 2 & 3;

Loading Rate Cold 1, 2 & 3;

Load Up Break Point Hot 1 & 2;

Load Up Break Point Warm 1 & 2;

Load Up Break Point Cold 1 & 2;

Soak Time Hot 1 & 2;

Soak Time Warm 1 & 2;

Soak Time Cold 1 & 2;

Soak Time Trigger Point Hot 1 & 2;

Soak Time Trigger Point Warm 1 & 2; and

Soak Time Trigger Point Cold 1 & 2.

* + - * 1. Each segment of the piecewise linear load up trajectory for the Generator Unit which is identified by start MW, end MW, rate in MW/min and the time from start MW to end MW.
      1. The ramp up trajectory of a Generator Unit is a piecewise linear curve that describes the theoretical Output of a Generator Unit over time from Registered Minimum Stable Generation to the Maximum Generation for the Generator Unit determined by:
         1. The following Technical Offer Data:

Maximum Generation;

Registered Minimum Stable Generation;

Ramp Up Rates 1, 2, 3, 4 & 5;

Ramp Up Break Point 1, 2, 3 & 4;

Dwell Time Up 1, 2 & 3; and

Dwell Time Up Trigger Point 1, 2 & 3.

* + - * 1. Each segment of the piecewise linear ramp up trajectory for the Generator Unit which is identified by start MW, end MW, rate in MW/min and the time from start MW to end MW.
      1. The ramp down trajectory of a Generator Unit is a piecewise linear curve that describes the theoretical Output of a Generator Unit over time from the Maximum Generation for the Generator Unit to Registered Minimum Stable Generation determined by:
         1. The following Technical Offer Data:

Maximum Generation;

Registered Minimum Stable Generation;

Ramp Down Rate 1, 2, 3, 4 & 5;

Ramp Down Break Point 1, 2, 3 & 4;

Dwell Time Down 1, 2 & 3; and

Dwell Time Down Trigger Point 1, 2 & 3.

* + - * 1. Each segment of the piecewise linear ramp down trajectory for the Generator Unit which is identified by start MW, end MW, rate in MW/min and the time from start MW to end MW.
      1. The deloading trajectory of a Generator Unit is a piecewise linear curve that describes the theoretical Output of a Generator Unit over time from Registered Minimum Stable Generation to 0MW determined by:
         1. The following Technical Offer Data:

Registered Minimum Stable Generation;

0MW;

Deloading Rate 1 & 2; and

Deload Break Point.

* + - * 1. Each segment of the piecewise linear deloading trajectory for the Generator Unit which is identified by start MW, end MW, rate in MW/min and the time from start MW to end MW.
  1. Create Instruction Profiles
     + 1. The Instruction Profile function calculates a piecewise linear trajectory over time, for each Dispatch Instruction, taking into account a subset of the Generator Unit’s input data listed in paragraphs to 16 with the following criteria:
          1. In order to derive Dispatch Quantities (qDuoh(t)) for each Generator Unit, u, for each Bid Offer Acceptance, o, in Period, h, the following profiles shall be created:

Physical Notification Instruction Profile using input data in paragraphs to ; and

Pseudo Instruction Profile using input data in paragraphs to 13 plus paragraphs to 16.

* + - * 1. In order to derive Dispatch Quantities (QDuγ) for each Generator Unit, u, in Imbalance Settlement Period, γ, for the purpose of Undelivered Quantity calculation and Uninstructed Imbalance calculation, an Uninstructed Imbalance Instruction Profile shall be created using input data in paragraphs to .
      1. Each section of the piecewise linear Instruction Profile for a Generator Unit shall be produced in sequence by stepping through the sequence of Dispatch Instructions and/or Pseudo Dispatch Instructions, for the Generator Unit as follows:
         1. The MW/Time Co-ordinates from the previous segment of the Instruction Profile shall be retrieved. For the initial segment of the Instruction Profile the MW/Time Co-ordinate is the end MW/Time Co-ordinate from the end segment of the Instruction Profile calculated for the previous Settlement Day.
         2. Where an initial MW/Time Co-ordinate is not available for the Generator Unit from the previous Instruction Profiling run, the Target Instruction Level for the latest Dispatch Instruction for the Generator Unit prior to 00:00 on the Settlement Day shall be used as the initial Instructed Quantity for the Generator Unit.
         3. The active Dispatch Instruction or Pseudo Dispatch Instruction shall be identified using the MW/Time Co-ordinates from the previous segment of the Instruction Profile and the Instruction Effective Time that corresponds to that Dispatch Instruction or Pseudo Dispatch Instruction.
         4. The active Dispatch Instruction or Pseudo Dispatch Instruction shall be validated by the Market Operator using the MW/Time Co-ordinates from the previous segment of the Instruction Profile, the Target Instruction Level, the Instruction Code and Instruction Combination Code using the rules specified in and .

**Table 8 – Instruction Profiling Validation Rules for Generator Units that are not Pumped Storage Units or Battery Storage Units**

| **Instructed Quantity from previous segment of Instruction Profile** | **Instruction Code for active Dispatch Instruction or Pseudo Dispatch Instructions** | **Target Instruction Level** | **Action** |
| --- | --- | --- | --- |
| 0 | SYNC | Null | Set Target Instruction Level of accompanying Dispatch Instruction having Instruction Code MWOF to Registered Minimum Stable Generation. |
| 0 | SYNC | < Registered Minimum Stable Generation | Set Target Instruction Level of accompanying Dispatch Instruction having Instruction Code MWOF to Registered Minimum Stable Generation. |
| 0 | MWOF | 0 | Ignore Dispatch Instruction. |
| 0 | MWOF | > 0 | Use Cold Start Up Operating Characteristics. |
| 0 | DESY |  | Ignore Dispatch Instruction. |
| >0 | SYNC |  | Ignore Dispatch Instruction. |
| >0 | MWOF | 0 | Profile to zero. |
| >0 | DESY | >0 | Profile to MWOF(0). |
| 0 | TRIP |  | Ignore Dispatch Instruction. |
| Any | PSYN | qFPNuh(t) | Profile to qFPNuh(t) |
| Any | PSYN | Null or <> qFPNuh(t) | Maintain the Generator Unit Output to the specified SYNC Target Instruction Level |
| Any | PMWO | qFPNuh(t) | Profile to qFPNuh(t) |
| Any | PMWO | Null or <> qFPNuh(t) | Maintain the Generator Unit Output to the specified SYNC Target Instruction Level |
| Any | PDES | qFPNuh(t) | Profile to qFPNuh(t) |
| Any | PDES | Null or <> qFPNuh(t) | Maintain the Generator Unit Output to the specified DESY Target Instruction Level |
| Any | PMXN | qFPNuh(t) | Profile to qFPNuh(t) |
| Any | PMXN | Null or <> qFPNuh(t) | Maintain the Generator Unit Output to the specified MXON Target Instruction Level |
| Any | PMXF | qFPNuh(t) | Profile to qFPNuh(t) |
| Any | PMXF | Null or <> qFPNuh(t) | Maintain the Generator Unit Output to the specified MXOF Target Instruction Level |
| Any | POFF | qFPNuh(t) | Profile to qFPNuh(t) |
| Any | POFF | Null or <> qFPNuh(t) | Maintain the Generator Unit Output to 0MW |
| Any | PCOD | qFPNuh(t) | Profile to qFPNuh(t) |
| Any | PCOD | Null or <> qFPNuh(t) | Maintain the Generator Unit Output to preceding Target Instruction Level |
| Any | PISP | qFPNuh(t) | Profile to qFPNuh(t) |
| Any | PISP | Null or <> qFPNuh(t) | Maintain the Generator Unit Output to preceding Target Instruction Level |

**Table 9 – Instruction Profiling Validation Rules for Pumped Storage Units and Battery Storage Units**

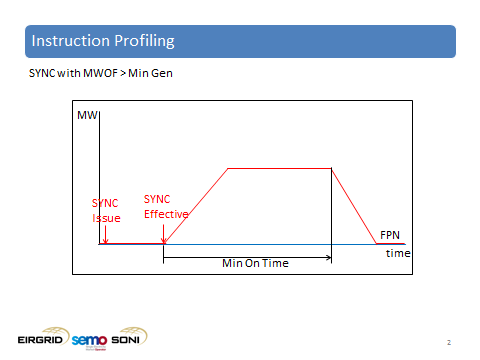
| **Instructed Quantity from previous segment of Instruction Profile** | **Instruction Code for active Dispatch Instruction** | **Instruction Combination Code** | **Action.** |
| --- | --- | --- | --- |
| 0 | SYNC | n/a | Profile to Instructed Quantity. |
| 0 | MWOF(0) | n/a | Ignore Dispatch Instruction. |
| 0 | DESY | n/a | Ignore Dispatch Instruction. |
| 0 | GOOP | SCP | Ignore Dispatch Instruction. |
| 0 | GOOP | SCT | Ignore Dispatch Instruction. |
| 0 | GOOP | PUMP | Profile to MWOF(Pumping Capacity or Battery Storage Capacity, as applicable). |
| > 0 | SYNC | n/a | Ignore Dispatch Instruction. |
| > 0 | MWOF(0) | n/a | Profile to zero. |
| > 0 | GOOP | PGEN | Ignore Dispatch Instruction. |
| > 0 | GOOP | PUMP | Profile to MWOF(Pumping Capacity or Battery Storage Capacity, as applicable). |
| < 0 | SYNC | n/a | Ignore Dispatch Instruction. |
| < 0 | MWOF(0) | n/a | Profile to zero. |
| < 0 | GOOP | PUMP | Ignore Dispatch Instruction. |
| < 0 | MWOF(> 0) | n/a | Profile to zero, then profile to Target Instruction Level associated with MWOF Instruction Code. |
| 0 | MWOF(> 0) | n/a | Profile to Target Instruction Level associated with MWOF Instruction Code. |
| < 0 | GOOP MWOF (0) | PGEN | Set Target Instruction Level associated with MWOF Instruction Code to Registered Minimum Stable Generation. Create PPGE Pseudo Dispatch Instruction in accordance with the GOOP PGEN entry of Table 3. |
| < 0 | GOOP MWOF(NULL) | PGEN | Set Target Instruction Level associated with MWOF Instruction Code to Registered Minimum Stable Generation. |
| < 0 | GOOP MWOF(NOT= (0 OR NULL)) | PGEN | Profile to zero, then profile to Target Instruction Level associated with MWOF Instruction Code. |
| 0 | TRIP | n/a | Ignore Dispatch Instruction. |
| Any | GOOP | PGEN | maintain the Generator Unit Output to the specified PGEN Target Instruction Level until next Dispatch Instruction or Pseudo Dispatch Instruction;  then adjust Target Instruction Level to Final Physical Notification Quantities. |

* + - 1. The Warm Cooling Boundary, Hot Cooling Boundary, the Instructed Quantity from the previous segment of the piecewise linear Instruction Profile and the Target Instruction Level for the current Dispatch Instruction shall be used to determine the appropriate operating mode of the Generator Unit. (The normal operating modes for a synchronised Generator Unit are load up mode, ramp up mode, ramp down mode and deload mode).
      2. The appropriate segment from the piecewise linear Operating Trajectory shall be selected.
      3. Where a Dispatch Ramp Up Rate accompanies a Dispatch Instruction, the Dispatch Ramp Up Rate shall be used in place of the Ramp Up Rates submitted as part of Technical Offer Data in the Ramp Up Operating Trajectory for the Generator Unit.
      4. Where a Dispatch Ramp Down Rate accompanies a Dispatch Instruction the Dispatch Ramp Down Rate shall be used in place of the Ramp Down Rates submitted as part of Technical Offer Data in the Ramp Down Operating Trajectory for the Generator Unit.
      5. The MW/Time Co-ordinates for the current segment of the piecewise linear Instruction Profile shall be calculated based on the MW/Time Co-ordinates from the previous segment of the Instruction Profile, the Instruction Code, the Instruction Combination Code, the Target Instruction Level, and the appropriate segment from the piecewise linear Operating Trajectory and the Imbalance Pricing Period and Imbalance Settlement Period Boundaries subject to the following rules:
         1. In the case of a Dispatch Instruction having a GOOP Instruction Code and PUMP Instruction Combination Code, the Instructed Quantity for a Pumped Storage Unit or Battery Storage Unit will remain at the specified Target Instruction Level until a DESY Instruction Code is issued at which time the Instructed Quantity will go instantaneously to 0MW.
         2. The MW/Time Co-ordinates for a Dispatch Instruction having a GOOP Instruction Code and SCT Instruction Combination Code will be determined in the same manner as if a Dispatch Instruction having a MWOF Instruction Code and a very low positive Target Instruction Level were issued.
         3. A Dispatch Instruction having a GOOP Instruction Code and a SCP Instruction Combination Code shall have no actual effect on the Instruction Profile of the Generator Unit except that a PUMP Instruction Code may follow.
         4. The Instructed Quantity at the Instruction Effective Time specified with the Dispatch Instruction having a TRIP Instruction Code will be zero. Ramp Rates, Deloading Rates and Dwell Times will be ignored in the calculation of the Instruction Profile.
         5. The default Instructed Quantity for a Wind Power Unit or a Generator Unit which has Priority Dispatch and which is not Dispatchable, shall be set to its Final Physical Notification Quantity (qFPNuh(t)). Where a CURL and/or a LOCL Instruction Combination Code is issued for the Generator Unit, a Physical Notification Instruction Profile shall be created for each Instruction Combination Code type. When a CRLO Dispatch Instruction is issued, any preceding issued CURL Dispatch Instructions shall be deemed to be no longer applicable, and when a LCLO Dispatch Instruction is issued, any preceding issued LOCL Dispatch Instructions shall be deemed to be no longer applicable. For the purposes of the Physical Notification Instruction Profile the Instructed Quantity is the minimum of the Outturn Availability of the Generator Unit and the Target Instruction Level of the latest Dispatch Instruction of that Instruction Combination Code type effective from the Instruction Effective Time of that Dispatch Instruction, and for the purposes of the Uninstructed Imbalance Instruction Profile the Instructed Quantity for the Generator Unit is the minimum of the Outturn Availability of the Generator Unit and the Target Instruction Levels of all Dispatch Instructions issued for the Generator Unit. Where Dispatch Instructions are deemed to be no longer applicable, the Instructed Quantity of the Physical Notification Instruction Profile relating to those Dispatch Instructions shall be the minimum of the Instructed Quantity of the latest Dispatch Instruction still applicable and the default Instructed Quantity. Ramp Up and Ramp Down Rates, Load Up Rates and Deloading Rates are assumed to be infinite (creating stepwise linear curves), and Dwell Times and Soak Times are assumed to have a value equal to zero, in the calculation of the Instruction Profile.
         6. The Target Instruction Level for a Generator Unit with a Dispatch Instruction having a MXON Instruction Code shall be the Short Term Maximisation Capability. The Instruction Profile shall be calculated from the last Ramp Up Rate specified for the Generator Unit.
         7. The Target Instruction Level for a Generator Unit with a Dispatch Instruction having a MXOF Instruction Code shall be the Target Instruction Level associated with the last Dispatch Instruction having a MWOF Instruction Code. The Instruction Profile shall be calculated from Ramp Down Rate 1 for the Generator Unit.
         8. Where the point in time the Instruction Profile is intersecting with the Target Instruction Level, Final Physical Notification Quantities, or the previously active Physical Notification Instruction Profile as applicable, is not at the start of a minute, then for the purposes of determining the Instruction Profile the time at which the intersection occurs shall be taken to be rounded to the start of the nearest minute, with the Instructed Quantity taken to be the value as at the actual intercept point prior to rounding.
      6. A Lag Time shall be applied when defining the MW/Time Co-ordinates for all Dispatch Instructions except Dispatch Instructions having SYNC, TRIP or FAIL Instruction Codes. No Lag Time shall apply to Pseudo Dispatch Instructions. The Lag Time shall be included in the Instruction Profile to account for the time required for a Generator Unit to make the control adjustments necessary to implement a Dispatch Instruction. The Lag Time shall be set to 0.
  1. Calculate Dispatch Quantity for Uninstructed Imbalance Calculation
     + 1. A time weighted MWh value for the Generator Unit for each Imbalance Settlement Period shall be set to be equal to the calculated time-weighted area per Imbalance Settlement Period between the piecewise linear Uninstructed Imbalance Instruction Profile for the Generator Unit and 0 MW. Areas calculated between the piecewise linear Uninstructed Imbalance Instruction Profile with negative MW values are negative.
       2. The Dispatch Quantity (QDuγ) for Pumped Storage Units in Pumping Mode and Battery Storage Units in Charging Mode shall be calculated as set out in Paragraph 39.

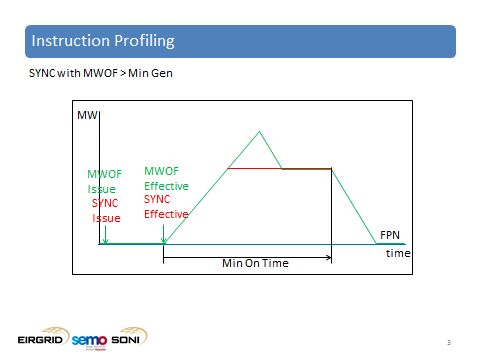
**Appendix B:**

*Example for description of QBOAs around SYNC instructions:*

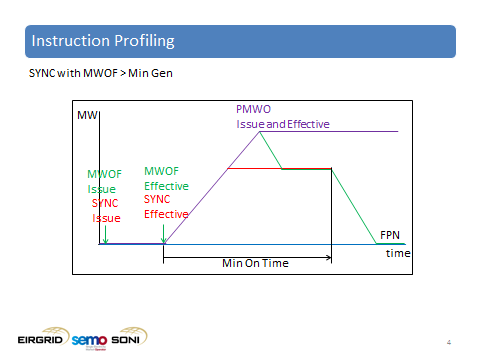
* The following diagram illustrates the volume accepted by a SYNC instruction, the minimum technically feasible quantity that can be accepted through a SYNC instruction is loading up to Minimum Stable Generation, staying there for at least the Minimum On Time, and then ramping to the FPN to close the order. The volume is calculated as the difference between the red curve (the instruction profile for the SYNC instruction) and the blue curve (the FPN profile).



* The following diagram illustrates the volume in addition to the volume accepted by the SYNC instruction which is accepted by instructing the unit to output at a level which is higher than its Minimum Stable Generation through a MWOF instruction: the minimum technically feasible quantity that can be accepted through this SYNC instruction is ramping up to the target instruction level, then ramping back to the previous instruction profile for the SYNC and following that profile to close the order. The volume is calculated as the difference between the green curve (the instruction profile for the MWOF instruction) and the red curve (the instruction profile for the SYNC instruction).

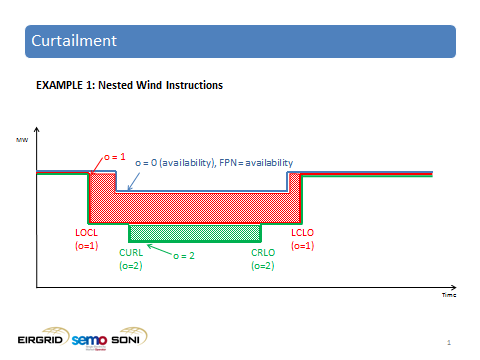


* The following diagram illustrates the volume in addition to the volumes accepted by the SYNC and MWOF instructions which is accepted by keeping the unit’s output at the level above Minimum Stable Generation after it has reached its target instruction level through a PMWO pseudo instruction: the minimum technically feasible quantity that can be accepted through this PMWO pseudo instruction is following the previous MWOF profile until the target instruction level, and then instead of closing, keeping the profile constant at that target instruction level until the next instruction is issued, at which point it will then close to the appropriate profile (FPN or previous SYNC instruction profile). The volume is calculated as the difference between the purple curve (the instruction profile for the PMWO pseudo instruction) and the green curve (the instruction profile for the MWOF instruction).

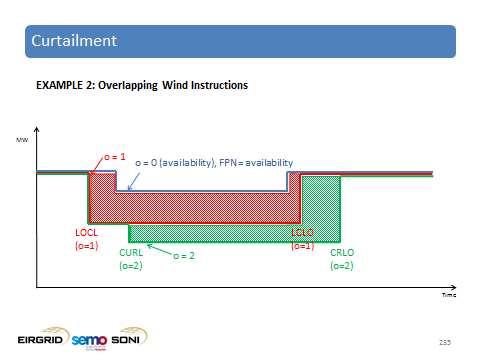


*Example for description of QBOAs around WIND instructions:*

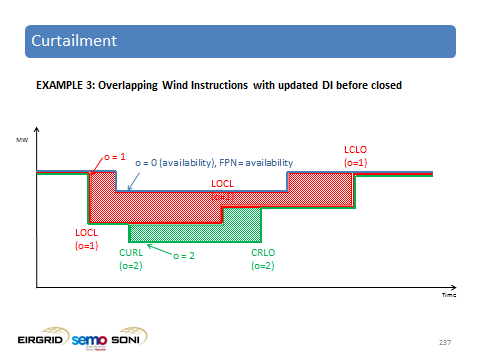
* The following example shows the profiles which are created for wind instructions where there are ones of different types open at the same time, and the closing of them is nested. The LOCL instruction opens the red profile to the target instruction level, and the LCLO closes it to the default of the FPN. The CURL instruction opens the green profile to the target instruction level, and the CRLO closes it firstly to the target instruction level of the still applicable LOCL instruction because it is lower than availability, and then goes to the default when the LOCL profile goes to the default. The red shaded area is the Bid Offer Acceptance Quantity (QBOA) related to the LOCL instructions, and the green shaded area is the QBOA related to the CURL instructions:



* The following example shows the profiles which are created for wind instructions where there are ones of different types open at the same time, and the closing of them are not in a nested sequence. The LOCL instruction opens the red profile to the target instruction level, and the LCLO closes it to the default of the FPN. The CURL instruction opens the green profile to the target instruction level, and the CRLO closes it to the default of the FPN because there are no other instructions with a target instruction level applicable. The red shaded area is the Bid Offer Acceptance Quantity (QBOA) related to the LOCL instructions, and the green shaded area is the QBOA related to the CURL instructions:



* The following example shows the profiles which are created for wind instructions where there are ones of different types open at the same time, the closing of them are nested, and there is an update in the instructed MW level of one of the profiles. The LOCL instruction opens the red profile to the target instruction level, the subsequent LOCL instruction updates the target instruction level to be followed by the instruction profile, and the LCLO closes it to the default of the FPN. The CURL instruction opens the green profile to the target instruction level, and the CRLO closes it firstly to the target instruction level of the still applicable LOCL instruction because it is lower than availability, and then goes to the default when the LOCL profile goes to the default. The red shaded area is the Bid Offer Acceptance Quantity (QBOA) related to the LOCL instructions, and the green shaded area is the QBOA related to the CURL instructions:



1. A Dispatch Instruction with a SYNC Instruction Code is accompanied by a Dispatch Instruction having a MWOF Instruction Code and an Instructed Quantity greater than or equal to Registered Minimum Stable Generation. [↑](#footnote-ref-1)
2. A Dispatch Instruction with a DESY Instruction Code is accompanied by a Dispatch Instruction having a MWOF Instruction Code and an Instructed Quantity of 0MW [↑](#footnote-ref-2)