

Single Electricity Market

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| Final REcommendation ReportMod\_04\_17: solar in the semDD Month YEAr |

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Document History

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| --- | --- | --- | --- |
| **Version** | **Date** | **Author** | **Comment** |
| 1.0 | DD MONTH YEAR | Modifications Committee Secretariat | Issued to Modifications Committee for review and approval |

Reference Documents

|  |
| --- |
| **Document Name** |
| [Trading and Settlement Code](http://semopub/MarketDevelopment/MarketRules/TSC.doc)  |
| [Glossary](http://semopub/MarketDevelopment/MarketRules/Glossary.docx) |
| [Agreed Procedure 04](http://semopub/MarketDevelopment/MarketRules/AP04%20Marked%20Up.docx) |
| [Agreed Procedure 06](http://semopub/MarketDevelopment/MarketRules/AP06.docx) |
| [Mod\_04\_17](http://semopub/MarketDevelopment/ModificationDocuments/Mod_04_17%20Solar%20in%20the%20SEM.docx) |

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# MODIFICATIONS COMMITTEE RECOMMENDATION

## Recommended for Approval– unanimous Vote

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| **Recommended for Approval by Unanimous Vote (subject to legal drafting)** |
| Kevin Hannafin - Chair | Generator Member | Approved |
| Brian Mongan | Generator Alternate | Approved |
| Conor Powell | Supplier Member | Approved |
| William Steele | Supplier Member | Approved |
| Eamonn O’Donoghue | Interconnector Member | Approved |
| Gary Healy | Generator Member | Approved |
| Julie-Anne Hannon – Vice Chair | Supplier Member | Approved |
| Clive Bowers | Generator Alternate | Approved |
| Jim Wynne | Supplier Member | Approved |

# Background

This (urgent) Modification Proposal was raised by the SEMO on 26 May 2017.

The proposal sets out the change required to make specific provision for Solar Power Units in the market rules. Solar will be treated in a similar way to wind, given the variable fuel type and Priority Dispatch status.

The Modification Proposal was presented to the SEM Modifications Committee at Meeting 74.

The Modification Proposer presented the Modification to the SEM Committee. The presentation detailed the modification objective, to introduce a robust provision for solar powered generation within the Trading and Settlement Code by treating solar generation in the same way as wind generation in terms of Price Taker or Price Maker, Autonomous unit type prior to Operational Certification, Variable fuel/unit type once operationally certified, Scheduling and Settlement, Forecasting and Treatment in Margin/LOLP computations.

The Modification Proposal was discussed at Meeting 74 on 8th June 2017 where it was voted on.

# PURPOSE OF PROPOSED MODIFICATION

## 3A.) justification of Modification

This modification is being raised in accordance with Section 2.190 of the Trading and Settlement Code, and has been marked urgent in line with Section 2.206 of the Trading and Settlement Code.

The justification for this Modification proposal is to ensure that Solar Power Units can participate in the SEM and have accurate rules detailing their operation in the SEM in line with TSO and Regulatory requirements.

## 3B.) Impact of not Implementing a Solution

Not implementing this proposal would mean that solar power continues not to be explicitly represented in the market rules resulting in a lack of clarity and no provision for this fuel type.

## 3c.) Impact on Code Objectives

This modification would further the following Trading and Settlement Code objectives:

* 1.3 (3) to facilitate the participation of electricity undertakings engaged in the generation, supply or sale of electricity in the trading arrangements under the Single Electricity Market
* 1.3 (4) to promote competition in the single electricity wholesale market on the island of Ireland
* 1.3 (6) to ensure no undue discrimination between persons who are parties to the Code; and

# Assessment of Alternatives

N/A

# Working Group and/or Consultation

N/A

# impact on systems and resources

System changes are not required since the intention is to use the Wind fuel type within the Central Market Systems given that the scheduling, dispatch and settlement treatments are identical.

There will be a small change to procedures to capture the setting of fuel type for Solar to Wind which is captured in the updated Agreed Procedure drafting in [Appendix 1](#_Appendix_1:_Mod_04_17) below.

The Registered Capacity Report will be manually updated to identify solar units.

A note will be added to the General Publication Update Document to indicate that the wind forecast publication contains wind and solar forecast data.

# Impact on other Codes/Documents

N/A

# MODIFICATION COMMITTEE VIEWS

## Meeting 74 – 8 June 2017

MO Alternate presented a set of slides detailing the effect of and motivation for the proposed Modification. MO Member indicated that SEMO had received a letter from the Regulatory Authorities requesting that SEMO raise a Modification Proposal that would make solar powered generation legitimate under the Trading and Settlement Code. MO Member stated that the intention of the proposal was to make robust provision for solar powered generation in the Trading and Settlement Code and to treat this in the same way as wind given the similarities in terms of Priority Dispatch and Variable Fuel Type. MO Member went on to state that the modification would provide for solar as a Price Taker or Price Maker, registration as autonomous unit type prior to operational certification and variable thereafter and would also allow for similar treatment for forecasting, scheduling and settlement.

MO Member indicated that in the context of maintenance mode for the SEM systems, the intention was to flag solar units as having the fuel type wind to avoid system changes. MO Member indicated that this would result in solar forecast data being submitted and published along with wind. Supplier Member asked whether there was anyway to identify the solar units. MO Member indicated that the intention was to identify these by manually updating the SEM Registered Capacity report and also to indicate in the General Publication Update Document that the wind forecast publication contains wind and solar forecast data.

MO Member indicated that the Modification Proposal removes solar from the Margin and Loss of Load Probability variables that wind is excluded from, but that it does not include a provision for a solar capacity credit where there is a Wind Capacity Credit. TSO Member commented that this was the current status since the impact of solar on Loss of Load Probability is minimal given the current volumes and that Margin tends to be tighter in winter months when solar generation is expected to be at its lowest. TSO Member advised that this could be revisited in future if the situation changed. MO Member commented that Loss of Load Probability will not be used in the ISEM Capacity Remuneration Mechanism in the same direct way as it is in the SEM Capacity Mechanism.

Supplier Member asked what the approach to solar forecasting was. TSO Member advised that a third party solar forecast provider had been engaged and that the intention was to use this third party data similar to what is used for wind.

Supplier Member asked how solar was expected to work in ISEM. MO Member advised that the proposed Modification only addresses SEM/Part A. MO Member stated that, given the urgency with which the current rules needed to be updated, the intention was to make provision in Part A now and follow up to make provision in Part B after.

Chairperson asked whether the Committee were happy to move to a vote on the proposed Modification. The Committee agreed to proceed to a vote. The proposal was Recommended for Approval by Unanimous Vote.

# Proposed Legal Drafting

[**Appendix 1 MOD\_04\_17**](#_Appendix_1:_Mod_04_17)

#  LEGAL REVIEW

n/a

# IMPLEMENTATION TIMESCALE

As the Modifications Committee Recommended it for Approval, it is proposed that this Modification is implemented following receipt of the RA decision.

# Appendix 1: Mod\_04\_17

|  |
| --- |
| **MODIFICATION PROPOSAL FORM** |
| **Proposer***(Company)* | **Date of receipt***(assigned by Secretariat)* | **Type of Proposal***(delete as appropriate)* | **Modification Proposal ID***(assigned by Secretariat)* |
| **SEMO** | **26 May 2017** | **Urgent** | **Mod\_04\_17** |
| **Contact Details for Modification Proposal Originator** |
| **Name** | **Telephone number** | **Email address** |
| **Christopher Goodman** |  | **Christopher.goodman@sem-o.com** |
| **Modification Proposal Title** |
| **Solar in the Single Electricity Market** |
| **Documents affected***(delete as appropriate)* | **Section(s) Affected** | **Version number of T&SC or AP used in Drafting** |
| **Part A T&SC (Body, Appendices and Glossary)****Part A AP04 & AP06** | **Trading and Settlement Code Sections; 2.34, 3.86, 4.31, 5.5, 5.22 and 5.27****Appendix E table E.4****Appendix K section K.2, K.4A, K.4C, K.18, table K.23 and Table K.24****Appendix M sections; M.11, M.12, M.13, M.21, M.24, M.34, M.36 and M.37****Appendix N sections; N.30, N.55, N.55A, N.55B and N.56** **Appendix O table O.1 and section O.27****Glossary Definitions and Acronyms;****Annual Load Forecast****Monthly Load Forecast****Four Day Load Forecast****Generator Unit****Instruction Combination Code****Predictable Generator Unit****Total Conventional Capacity****Variable Generator Unit****Solar Power Unit****Wind Power Unit Forecast****Wind Power Unit Forecast Data Transaction****TCC****AP04 Appendix 2;****Generator Parameters Fuel Type****Load Parameters Fuel Type****AP06 Appendix 2;****Data Publications Two Day Rolling Wind Power Unit Forecast** | **Version 18** |
| **Explanation of Proposed Change***(mandatory by originator)* |
| The proposed change is to make specific provision for Solar Power Units in the market rules. The intention is to treat solar in a similar way to wind given the variable fuel type and Priority Dispatch status. This is in line with System Operator requirements and the Regulatory Authorities letter of intentions dated 24/03/2017 and circulated to the Modifications Committee on 28/04/2017. ISEM rules are also currently under review with the intention of addressing these once the updated three part code has been formally designated. |
| **Legal Drafting Change***(Clearly show proposed code change using* ***tracked*** *changes, if proposer fails to identify changes, please indicate best estimate of potential changes)* |
| **Trading and Settlement Code body**2.34 A Party (or Applicant, as applicable) shall, on registration of a Generator Unit, specify if the Unit is:1. a Wind Power Unit;
2. an Energy Limited Generator Unit;
3. a Pumped Storage Unit;
4. a Demand Side Unit provided the Party has the approval of the Regulatory Authorities in accordance with paragraph 2.34B;
5. an Aggregated Generator Unit provided the Party has the approval of the Regulatory Authorities in accordance with paragraph 2.34C;
6. a Netting Generator Unit;
7. an Interconnector Unit or
8. A Dual Rated Generator Unit, provided the Party has the approval of the Regulatory Authorities in accordance with paragraph 2.34A.
9. a Solar Power Unit;
	1. The Market Operator shall publish Load Forecasts and Wind and Solar Power Unit Forecasts and the assumptions behind the production of those forecasts using the data most recently submitted by the System Operators to the Market Operator at the time of publication.
	2. Each System Operator shall submit to the Market Operator the following forecast values pertaining to its Jurisdiction in accordance with Appendix K “Market Data Transactions”:
10. Annual Load Forecast;
11. Monthly Load Forecast;
12. Four Day Load Forecast; and
13. Wind and Solar Power Unit Forecast.

***Classification as Variable Generator Unit*** 5.5 A Generator Unit shall be classified as a Variable Generator Unit if: 1. the short-term availability of the Generator Unit is unpredictable as a result of its fuel source; and
2. the Generator Unit is a Wind Power Unit, a Solar Power Unit or a Run-of-River Hydro Unit; and
3. the Generator Unit is Dispatchable.

5.22 There are no Market Schedule Quantities defined for any Autonomous Generator Unit that is not a Wind Power Unit or a Solar Power Unit for any Ex-Ante One Market Schedule, Ex-Ante Two Market Schedule or Within Day One Market Schedule.5.27 For each Variable Price Taker Generator Unit u, the Market Operator shall set the indicative value of Market Schedule Quantity (MSQuh) for the Ex-Ante One Market Schedule, the Ex-Ante Two Market Schedule, and the Within Day One Market Schedule for each Trading Period h to equal the minimum of the relevant Accepted Nominated Quantity value and the relevant Accepted Forecast Availability value. In the case of Wind and Solar Power Units, the relevant value from the System Operator’s submitted Wind and Solar Power Unit Forecast shall be used in place of the Accepted Nominated Quantity.**Trading and Settlement Code Appendices****Table E.1 – Data publication list part 4: updated daily in advance of EA1 Gate Window Closure**

|  |  |  |  |
| --- | --- | --- | --- |
| **Time** | **Item / Data Record** | **Term** | **Subscript** |
| **Daily, in advance of the EA1 Gate Window Closure** |  |  |  |
| By 17:00 on the day prior to the EA1 Gate Window Closure  | Trading Day Exchange Rate between euro (€) and pounds sterling (£)  | - | - |
| By 09:30 on the day prior to the Trading Day, plus as updated | Available Transfer Capacity |  |  |
| By 09:30 on the day prior to the Trading Day, plus as updated | Four Day Load Forecast | - | - |
| By 09:30 on the day prior to the Trading Day | Any important updates to Maintenance Schedule Data Transaction | - | - |
| By 09:30 on the day prior to the Trading Day, plus as updated | Two Day Rolling Wind and Solar Power Unit Forecast aggregated by Jurisdiction | - | - |

**dATA trANSACTIONS**K.2 The Data Transactions in this Appendix include:**Data Transactions from System Operator to Market Operator** 1. System Parameters
2. Loss Adjustment Factors
3. Generator Unit Technical Characteristics
4. Demand Control
5. System Characteristics
6. Energy Limited Generator Unit Technical Characteristics
7. Loss of Load Probability for the Capacity Period
8. Ex-Post Loss of Load Probability Table
9. Dispatch Instructions
10. SO Interconnector Trades
11. Annual Load Forecast
12. Monthly Load Forecast
13. Four Day Load Forecast
14. Wind and Solar Power Unit Forecast
15. Uninstructed Imbalance Parameters
16. Testing Tariffs
17. Forecast Ex-Post Loss of Load Probability

**Contingency Data**K.4A The Market Operator shall use Contingency Data in the event that the following Data Transactions are not received within the timescales required under the Code:**Data Transactions from System Operator to Market Operator**1. Four Day Load Forecast
2. Wind and Solar Power Unit Forecast

**Data Transactions from Interconnector Administrator to Market Operator**1. Interconnector Available Transfer Capacity
2. Active Interconnector Unit Capacity Holding

**Calculation of Modified Interconnector Unit Nominations**1. Modified Interconnector Unit Nomination

K.4C Table K.1 sets out the Contingency Data values for the Data Transaction listed in respect of each MSP Software Run.**Table K.1 - Contingency Data Rules for Market Data Transactions**

| **Transaction** | **Associated MSP Software Run** | **Contingency Data** |
| --- | --- | --- |
| Four Day Load Forecast | EA1 | Most recent Four Day Load Forecast Accepted by the EA1 Gate Window Closure |
| Wind and Solar Power Unit Forecast | EA1 | Most recent Wind and Solar Forecast Accepted by the EA1 Gate Window Closure |
| Interconnector Available Transfer Capacity | EA1 | Most recent ATC data Accepted by the EA1 Gate Window Closure |
| Active Interconnector Unit Capacity Holding  | EA1 | Data shall be faxed and emailed by the IA to SEMO and shall be entered manually. If not received from the IA (via any of the channels above), zeros will be used. |
| Four Day Load Forecast | EA2 | Most recent Four Day Load Forecast Accepted by the EA2 Gate Window Closure |
| Wind and Solar Power Unit Forecast | EA2 | Most recent Wind and Solar Forecast Accepted by the EA2 Gate Window Closure |
| Interconnector Available Transfer Capacity | EA2 | Most recent Interconnector Available Transfer Capacity data Accepted by the EA2 Gate Window Closure |
| Modified Interconnector Unit Nominations | EA2 | MIUNs if available from the EA1 MSP Software Run. If not, IUNs if available from the EA1 MSP Software Run.If not, zeros will be used. |
| Four Day Load Forecast | WD1 | Most recent Four Day Load Forecast Accepted by the WD1 Gate Window Closure |
| Wind and Solar Power Unit Forecast | WD1 | Most recent Wind and Solar Forecast Accepted by the WD1 Gate Window Closure |
| Interconnector Available Transfer Capacity | WD1 | Most recent ATC data Accepted by the WD1 Gate Window Closure |
| Modified Interconnector Unit Nominations | WD1 | MIUNs if available from the EA2 MSP Software Run. If not, IUNs if available from the EA2 MSP Software Run.MIUNs if available from the EA1 MSP Software Run. If not, IUNs if available from the EA1 MSP Software Run.Otherwise, zeros will be used. |

**Wind and Solar Power Unit Forecast Data Transaction**K.18 The Data Records for the Wind and Solar Power Unit Forecast Data Transaction are described in Table K.23 and the Submission Protocol in Table K.24.**Table K.1 – Wind and Solar Power Unit Forecast Data Transaction Data Records**

|  |
| --- |
| Period Type (A for Annual, M for Monthly or D for Daily) |
| Unit ID |
| Trading Day  |
| Trading Period |
| Jurisdiction |
| Output Forecast for each Wind Power Unit and Solar Power Unit , in MW |
| Assumptions |

**Table K.2 – Wind and Solar Power Unit Forecast Data Transaction Submission Protocol**

|  |  |
| --- | --- |
| Sender | System Operator(s) |
| Recipient | Market Operator |
| Number of Data Transactions | At least once for each Jurisdiction in each of the following timescales in respect of the relevant Trading Day:* By the EA1 Gate Window Closure;
* If updated, after the publication of the EA1 Market Schedule and prior to the EA2 Gate Window Closure; and
* If updated, after the publication of the EA2 Market Schedule and prior to the WD1 Gate Window Closure.

Data Transactions should contain data for each Wind Power Unit and Solar Power Unit in a given Jurisdiction for each Trading Period in the following two complete Trading Days |
| Frequency of Data Transactions | At least once prior to the EA1 Gate Window Closure, plus as updated |
| First Submission time | As updated |
| Last Submission time | Unlimited, at least one Data Transaction shall be submitted by the EA1 Gate Window Closure, plus as updated prior to the WD1 Gate Window Closure |
| Permitted frequency of resubmission prior to last submission time | Unlimited |
| Required resubmission subsequent to last submission time | None |
| Valid Communication Channels | Type 3 (computer to computer)  |
| Process for data validation  | None |

M.11 The Unit Forced Outage Rate (UFORuy) of each Generator Unit u other than Autonomous Generator Units, Demand Side Units, Wind Power Units, Solar Power Units, Interconnector Units and Interconnector Residual Capacity Units shall be determined by the System Operators as follows:Where1. RCu is the Registered Capacity of Generator Unit u;
2. TCFuh is the Temperature Correction Factor for Generator Unit u in Trading Period h. The values of TCFuh for this equation will be determined by the System Operators by reference to the historic relationship between Generator Unit availability and temperature;
3. APuh is the Availability Profile of Generator Unit u in Trading Period h;
4. USOIuh is the Unit Scheduled Outage Indicator for Generator Unit u in Trading Period h. The values of USOluh for this equation will be determined by the System Operators by reference to the historic outage plan;
5. UTIuh is the Unit Test Indicator for Generator Unit u in Trading Period h; and
6. TPD is the Trading Period Duration.

M.12 The Unit Historic Forced Outage Factor (UHFOFuy) for each Generator Unit u other than Autonomous Generator Units, Demand Side Units, Wind Power Units, Solar Power Units, Interconnector Units and Interconnector Residual Capacity Units for each Year shall be determined 5 Working Days prior to the start of each Year by the System Operators as follows:Where1. is the mean value over the 5 years immediately preceding Year y or, where such data is not available, the System Operators shall utilise mean values for the associated Generator Unit technology, and
2. UFORuy is the Unit Forced Outage Rate for Generator Unit u in Year y, save that in relation to the year immediately preceding Year y, the value of Forced Outage Rate shall be determined by reference to the available data for such immediately preceding Year y at the time the determination is made.

M.13 For the purposes of establishing values of the Unit Historic Forced Outage Factor (UHFOFuy) to apply to each Generator Unit u other than Autonomous Generator Units, Demand Side Units, Wind Power Units, Solar Power Units, Interconnector Units and Interconnector Residual Capacity Units from the Market Start Date, the System Operators shall use best available data in relation to each such Generator Unit to establish values of UFORuy for the year containing the Market Start Date and the preceding 4 Years or, where such data is not available, shall utilise mean values for the associated Generator Unit technology.M.21 For each Trading Period within the relevant Capacity Period, the Forecast Unit Availability (FUAuh) for each Generator Unit u other than Autonomous Generator Units, Demand Side Units, Wind Power Units, Solar Power Units, Interconnector Units and Interconnector Residual Capacity Units shall be determined by the System Operators as follows:Where:1. RCu is the forecast of Registered Capacity for Generator Unit u;
2. TCFuh is the forecast of Temperature Correction Factor for Generator Unit u in Trading Period h;
3. UTIuh is the forecast of Unit Test Indicator for Generator Unit u in Trading Period h;
4. USOIuh is the forecast of Unit Scheduled Outage Indicator for Generator Unit u in Trading Period h; and
5. UHFOFuy is the Unit Historic Forced Outage Factor for Generator Unit u for Year y.

M.24 For each Trading Period h within the relevant Capacity Period, the Interim Margin (IMNh) shall be determined as follows:Where1. FUAuh is the Forecast Unit Availability of Generator Unit u in Trading Period h;
2. FIA*l*h is the Forecast Interconnector Availability of Interconnector *l* in Trading Period h;
3. FCWh is the Forecast Wind Contribution in Trading Period h;
4. MCLFh is the Monthly Combined Load Forecast value in Trading Period h;
5. is the summation over all Generator Units u other than Autonomous Generator Units, Energy Limited Generator Units, Pumped Storage Units, Wind Power Units, Solar Power Units, Interconnector Units and Interconnector Residual Capacity Units; and
6. is the summation over all Interconnectors *l.*

M.34 To determine the Loss of Load Probability Table, the System Operators shall first determine the Total Conventional Capacity (TCCy) for the Year y as follows:Where:1. Rcu is the Registered Capacity of Generator Unit u other than Autonomous Generator Units, Demand Side Units, Wind Power Units, Solar Power Units, Interconnector Units and Interconnector Residual Capacity Units;
2. AIC*l* is the Aggregate Import Capacity of Interconnector *l*; and
3. is a function which rounds x to the nearest integer.

M.36 In relation to each value of Input Margin (IM) in the Loss of Load Probability Table, the corresponding value of First Temporary Output Loss of Load Probability for the first Generator Unit (FTMPOLOLP1,IM), other than Autonomous Generator Units, Demand Side Units, Wind Power Units, Solar Power Units, Interconnector Units and Interconnector Residual Capacity Units, shall be calculated by the System Operators as follows:Where1. TCCy is the Total Conventional Capacity for Year y;
2. UHFOF1y is the Unit Historic Forced Outage Factor for the first Generator Unit in Year y;
3. RC1 is the Registered Capacity of the first Generator Unit; and
4. is a function that rounds x to the nearest integer.

M.37 In relation to each value of Input Margin in the Loss of Load Probability Table, the corresponding values of First Temporary Output Loss of Load Probability (FTMPOLOLPu,IM) determined in M.36 shall be amended by reference to the remaining Generator Units u other than Autonomous Generator Units, Demand Side Units, Wind Power Units, Solar Power Units, Interconnector Units and Interconnector Residual Capacity Units, using the following recursive function:Where:1. u = 2, 3, …, Nuy and Nuy is the total number of Generator Units u other than Wind Power Units, Solar Power Units, Interconnector Units, Interconnector Residual Capacity Units and Interconnector Error Units in Year y;
2. TCCy is the Total Conventional Capacity for Year y;
3. FTMPOLOLPz,x is the First Temporary Output Loss of Load Probability associated with the value of Input Margin (IM) corresponding to x and the collection of units corresponding to z;
4. UHFOFuy is the Unit Historic Forced Outage Factor for Generator Unit u in Year y;
5. Rcu is the Registered Capacity of Generator Unit u; and
6. round(x) is a function which rounds x to the nearest integer.

**Derivation of Schedule Demand**N.30 For each Ex-Ante One MSP Software Run, Ex-Ante Two MSP Software Run and Within Day One MSP Software Run, Schedule Demand in each Trading Period h shall be calculated by the Market Operator as follows:1. A forecast of Demand at the boundary of the Transmission System (based on the latest Accepted Four Day Load Forecast Data Transaction which contains data for all Trading Periods in the associated Optimisation Time Horizon), which will be net of forecast Generation for each Autonomous Generator Unit that is not a Wind Power Unit or a Solar Power Unit;

less the minimum of the latest Accepted Nominated Quantity (Nquh) and the latest Accepted Forecast Availability in respect of each Predictable Price Taker Generator Unit u that is not a Wind Power Unit or a Solar Power Unit and each Variable Price Taker Generator Unit u that is not a Wind Power Unit or a Solar Power Unit and each Predictable Price Maker Generator Unit u that is Under Test and that is not a Wind Power Unit or a Solar Power Unit and each Variable Price Maker Generator Unit u that is Under Test and that is not a Wind Power Unit or a Solar Power Unit, in accordance with their Accepted Nomination Profiles and Accepted Forecast Availability;less the minimum of forecast Output (based on the latest Accepted Wind and Solar Power Unit Forecast) and the latest Accepted Forecast Availability in respect of each Variable Price Taker Generator Unit u that is a Wind Power Unit or a Solar Power Unit and each Variable Price Maker Generator Unit u that is a Wind Power Unit or a Solar Power Unit and that is Under Test;less forecast Output (based on the latest Accepted Wind and Solar Power Unit Forecast) for each Autonomous Generator Unit u that is a Wind Power Unit or a Solar Power Unit.**Data values used in Ex-Ante One Market Schedule**N.55 For the purposes of each Ex-Ante One Market Schedule relating to a Trading Day, for each Trading Period h:1. for each Generator Unit u that is a Wind Power Unit or a Solar Power Unit and that is either a Variable Price Maker Generator Unit Under Test or a Variable Price Taker Generator Unit, the Ex-Ante One Market Schedule Quantity (MSQuh) shall be set by the Market Operator to equal the minimum of the most recently Accepted Forecast Availability and the most recently Accepted forecast Output (based on the Wind and Solar Power Unit Forecast); and
2. for each Generator Unit u that not a Wind Power Unit or a Solar Power Unit and that is either a Predictable Price Maker Generator Unit Under Test, Variable Price Maker Generator Unit Under Test, a Predictable Price Taker Generator Unit, or a Variable Price Taker Generator Unit, the Ex-Ante One Market Schedule Quantity (MSQuh) shall be set by the Market Operator to equal the minimum of the most recently Accepted values of the Nominated Quantity and the Forecast Availability.
3. for each Autonomous Generator Unit that is a Wind Power Unit or a Solar Power Unit, the Ex-Ante One Market Schedule will be set by the Market Operator to equal the most recently Accepted Wind and Solar Power Unit Forecast.
4. for each Autonomous Generator Unit that is not a Wind Power Unit or a Solar Power Unit, there will be no Ex-Ante One Market Schedule Quantity (MSQuh) set by the Market Operator.
5. for each Interconnector Unit for which Commercial Offer Data was not Accepted during the EA1 Gate Window, there will be no Ex-Ante One Market Schedule Quantity (MSQuh) set by the Market Operator.

**Data values used in Ex-Ante Two Market Schedule**N.55A For the purposes of each Ex-Ante Two Market Schedule relating to a Trading Day, for each Trading Period h:1. for each Generator Unit u that is a Wind Power Unit or a Solar Power Unit and that is either a Variable Price Maker Generator Unit Under Test or a Variable Price Taker Generator Unit, the Ex-Ante Two Market Schedule Quantity (MSQuh) shall be set by the Market Operator to equal the minimum of the most recently Accepted Forecast Availability and the most recently Accepted forecast Output (based on the Wind and Solar Power Unit Forecast); and
2. for each Generator Unit u that is not a Wind Power Unit or a Solar Power Unit and that is either a Predictable Price Maker Generator Unit Under Test, Variable Price Maker Generator Unit Under Test, a Predictable Price Taker Generator Unit, or a Variable Price Taker Generator Unit, the Ex-Ante Two Market Schedule Quantity (MSQuh) shall be set by the Market Operator to equal the minimum of most recently Accepted values of the Nominated Quantity and the Forecast Availability.
3. for each Autonomous Generator Unit that is a Wind Power Unit or a Solar Power Unit the Ex-Ante Two Market Schedule will be set by the Market Operator to equal the most recently Accepted Wind and Solar Power Unit Forecast.
4. for each Autonomous Generator Unit that is not a Wind Power Unit or a Solar Power Unit, there will be no Ex-Ante Two Market Schedule Quantity (MSQuh) set by the Market Operator.
5. there will be no Ex-Ante Two Market Schedule Quantity (MSQuh) set by the Market Operator where Commercial Offer Data was not Accepted during the EA2 Gate Window and no Market Schedule Quantity was set during the Ex-Ante One MSP Software Run.
6. for each Interconnector Unit for which a Market Schedule Quantity was determined during the Ex-Ante One MSP Software Run, the Ex-Ante Two Market Schedule Quantity (MSQuh) shall be set equal to the most recently calculated corresponding Modified Interconnector Unit Nomination.

**Data values used in Within Day One Market Schedule**N.55B For the purposes of each Within Day One Market Schedule relating to a Trading Day, for each Trading Period h in the WD1 Trading Window:1. for each Generator Unit u that is a Wind Power Unit or a Solar Power Unit and that is either a Variable Price Maker Generator Unit Under Test or a Variable Price Taker Generator Unit, the Within Day One Market Schedule Quantity (MSQuh) shall be set by the Market Operator to equal the minimum of the most recently Accepted values of Forecast Availability and forecast Output (based on the Wind and Solar Power Unit Forecast); and
2. for each Generator Unit u that not a Wind Power Unit or a Solar Power Unit and that is either a Predictable Price Maker Generator Unit Under Test, Variable Price Maker Generator Unit Under Test, a Predictable Price Taker Generator Unit, or a Variable Price Taker Generator Unit, the Within Day One Market Schedule Quantity (MSQuh) shall be set by the Market Operator to equal the minimum of most recently Accepted values of Nominated Quantity and the Forecast Availability.
3. for each Autonomous Generator Unit that is a Wind Power Unit or a Solar Power Unit, the Within Day One Market Schedule will be set by the Market Operator to equal the most recently Accepted Wind and Solar Power Unit Forecast.
4. for each Autonomous Generator Unit that is not a Wind Power Unit or a Solar Power Unit, there will be no Within Day One Market Schedule Quantity (MSQuh) set by the Market Operator.
5. for each Interconnector Unit for which Commercial Offer Data was not Accepted during the WD1 Gate Window, for each Interconnector Unit where no Market Schedule Quantity was set during the Ex-Ante One MSP Software Run and for each Interconnector Unit where no Market Schedule Quantity was set during the Ex-Ante Two MSP Software Run, there will be no Within Day One Market Schedule Quantity (MSQuh) set by the Market Operator.
6. for each Interconnector Unit for which a Market Schedule Quantity was determined during the Ex-Ante One MSP Software Run, the Ex-Ante Two Market Schedule Quantity (MSQuh) shall be set equal to the most recently calculated corresponding Modified Interconnector Unit Nomination.
7. for each Interconnector Unit for which a Market Schedule Quantity was determined during the Ex-Ante Two MSP Software Run, the Within Day One Market Schedule Quantity (MSQuh) shall be set equal to the most recently calculated corresponding Modified Interconnector Unit Nomination.

**Data values used in Ex-Post Indicative Market Schedule**N.56 For the purposes of each Ex Post Indicative Market Schedule relating to a Trading Day, for each Trading Period h commencing at or after 00:00:1. for each Generator Unit u that is a Wind Power Unit or a Solar Power Unit and that is either a Variable Price Maker Generator Unit Under Test or a Variable Price Taker Generator Unit, the indicative Ex-Post Market Schedule Quantity (MSQuh) shall be set by the Market Operator to equal the minimum of the most recently Accepted values of Forecast Availability and the forecast Output (based on the Wind and Solar Power Unit Forecast); and
2. for each Generator Unit u that is not a Wind Power Unit or a Solar Power Unitand that is either a Predictable Price Maker Generator Unit Under Test, Variable Price Maker Generator Unit Under Test, a Predictable Price Taker Generator Unit or a Variable Price Taker Generator Unit, the indicative Ex-Post Market Schedule Quantity (MSQuh) shall be set by the Market Operator to equal the minimum of the most recently Accepted values of Nominated Quantity and the Forecast Availability,
3. for each Autonomous Generator Unit the indicative Ex-Post Market Schedule Quantity (MSQuh) shall be set by the Market Operator to equal the Ex-Post Indicative Market Schedule Quantity set by the Market Operator for the last Trading Period prior to the Trading Period commencing at 00:00,

and for each other Trading Period the Market Schedule Quantity for each relevant Generator Unit shall be set in accordance with this Appendix N and Sections 4 and 5.O.9 The Instruction Codes and Instruction Combination Codes that are used by the System Operators are listed in Table O.1.**Table O.1 – Instruction Codes and Instruction Combination Codes**

| **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. |
| DESY | n/a | Desynchronise the Generator Unit at the specified Instruction Effective Time. |
| GOOP | PGEN | Instruct positive Output from a Pumped Storage Unit at the specified Instruction Effective Time. |
| GOOP | PUMP | Instruct negative Output from a Pumped Storage Unit at the specified Instruction Effective Time. |
| GOOP | SCT | Instruct Synchronisation in generating mode and 0MW Output for a Pumped Storage Unit at the specified Instruction Effective Time. |
| GOOP | SCP | Instruct Synchronisation in Pumping Mode and 0MW Output from a Pumped 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 or a Solar 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 or a Solar Power Unit it 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 or a Solar 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 or a Solar 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. |

O.271. The default Instructed Quantity for a Wind Power Unit or a Solar Power Unit shall be set to its Output based on its Meter Data. The Instructed Quantity for a Wind Power Unit or a Solar Power Unit having a WIND Instruction Code and a LOCL or CURL Instruction Combination Code shall be set to the minimum of the Outturn Availability of the Wind Power Unit or a Solar Power Unit and the Target Instruction Level of the Wind Power Unit or a Solar Power Unit.

**Trading and Settlement Code Glossary**

|  |  |
| --- | --- |
| **Annual Load Forecast** | means the forecast of Demand to be met by Generator Units (other than Autonomous Generator Units that are not Wind Power Units or Solar Power Units) at the point where the Units are Connected (i.e. prior to the application of Combined Loss Adjustment Factors), but net of Unit Load for Generator Units, for each Trading Period in a Year for a given Jurisdiction. |
| **Monthly Load Forecast** | means the forecast of Demand to be met by Generator Units (other than Autonomous Generator Units that are not Wind Power Units or Solar Power Units) at the point where the Units are Connected (i.e. prior to the application of Combined Loss Adjustment Factors), but net of Unit Load for Generator Units, for each Trading Period in the next Month. |
| **Four Day Load Forecast** | means the forecast of Demand to be met by Generator Units (other than Autonomous Generator Units that are not Wind Power Units or Solar Power Units) at the point where the Units are Connected (i.e. prior to the application of Combined Loss Adjustment Factors), but net of Unit Load for Generator Units, for each Trading Period in the next four Trading Days. |
| **Generator Unit** | means a Generator, and/or other item of Dispatchable plant, registered by a Participant, or which is the subject of an application for registration, under the Code. For the purposes of the Code a Generator Unit may be any one of the following types, without limitation: Aggregated Generator Unit, Autonomous Generator Unit, Demand Side Unit, Energy Limited Generator Unit, Hydro-electric Generator Unit, Interconnector Unit, Interconnector Error Unit, Interconnector Residual Capacity Unit, Netting Generator Unit, Pumped Storage Unit, Run-of-River Hydro Unit, Solar Power Unit or Wind Power Unit or Dual Rated Generator Unit. |
| **Instruction Combination Code** | means a code issued with a Dispatch Instruction for Pumped Storage Units and Wind Power Units or Solar Power Units only indicating the mode of operation of the relevant Generator Unit, for the purpose of Appendix O: “Instruction Profiling Calculations” only. |
| **Predictable Generator Unit** | means a Generator Unit with predictable Availability which is Dispatchable, and can include all types of Generator Unit, except Wind Power Units, Solar Power Units and Run-of River Hydro Units that are considered as being Variable Generator Units.  |
| **Total Conventional Capacity** | means the summed capacity, rounded to the nearest whole MW, of Interconnectors and Generator Units other than Autonomous Generator Units, Demand Side Units, Wind Power Units, Solar Power Units, Interconnector Units and Interconnector Residual Capacity Units. |
| **Variable Generator Unit** | Means a Solar Power Unit, Wind Power Unit or a Run-of-River Hydro Unit that is Dispatchable, where the short-term availability of the Generator Unit is unpredictable as a result of its fuel source. |
| **Solar Power Unit** | Means a Generator Unit generating electricity from solar energy. |
| **Wind and Solar Power Unit Forecast** | means a forecast of the Output that will be produced by Wind and Solar Power Units, excluding Autonomous Generator Units, for each Trading Period in the following two Trading Days, as carried out in relation to each such Wind or Solar Power Unit by the relevant System Operator. |
| **Wind and Solar Power Unit Forecast Data Transaction** | is a Data Transaction in relation to Wind and Solar Power Unit Forecasts detailed in Appendix K: “Market Data Transactions”. |

**Trading and Settlement Code Acronyms**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| TCC | **Total Conventional Capacity** |  | MW | The summed capacity of Generator Units other than Autonomous Generator Units, Demand Side Units, Wind Power Units, Solar Power Units, Interconnector Residual Capacity Units, each rounded to their nearest whole MW |

**Agreed Procedures**AP04 Appendix 2 Generator Parameters

|  |  |  |
| --- | --- | --- |
| Fuel Type | May be Oil (OIL), Gas (GAS), Coal (COAL), Multiple Fuel (MULTI), Wind (WIND), Hydro (HYDRO), Biomass (BIO), Combined Heat and Power (CHP), Pumped Storage (PUMP),  Demand Side Unit (DEM); Solar Power will be set equal to Wind. | VRD |

AP04 Appendix 2 Load Parameters

|  |  |  |
| --- | --- | --- |
| Fuel Type | Type of Fue; for Solar select Wind. | VRD |

AP06 Appendix 2 Data Publications

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Two Day Rolling Wind and Solar Power Unit Forecast aggregated by Jurisdiction | D | By 09:30 on the day prior to the Trading Day, plus as updated | - | Y | Y | Public Data |  |

 |
| **Modification Proposal Justification***(Clearly state the reason for the Modification)* |
| The justification for this Modification proposal is to ensure that Solar Power Units can participate in the SEM and have accurate rules detailing their operation in the SEM in line with TSO and Regulatory requirements. |
| **Code Objectives Furthered***(State the Code Objectives the Proposal furthers, see Section 1.3 of T&SC for Code Objectives)* |
| Section 1.3 1. to facilitate the participation of electricity undertakings engaged in the generation, supply or sale of electricity in the trading arrangements under the Single Electricity Market;
2. to promote competition in the single electricity wholesale market on the island of Ireland;
3. to ensure no undue discrimination between persons who are parties to the Code; and
 |
| **Implication of not implementing the Modification Proposal***(State the possible outcomes should the Modification Proposal not be implemented)* |
| Not implementing this proposal would mean that solar power continues not to be explicitly represented in the market rules resulting in a lack of clarity and no provision for this fuel type.  |
| **Working Group***(State if Working Group considered necessary to develop proposal)* | **Impacts***(Indicate the impacts on systems, resources, processes and/or procedures)* |
| No | System changes are not required since the intention is to use the Wind fuel type within the Central Market Systems given that the scheduling, dispatch and settlement treatments are identical.There will be a small change to procedures to capture the setting of fuel type for Solar to Wind which is captured in the updated Agreed Procedure drafting above.Impacts on TSO and Participants to be garnered during the Modifications Committee deliberations. |
| ***Please return this form to Secretariat by email to*** ***modifications@sem-o.com*** |