Single Electricity Market

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| Final REcommendation Report*Mod\_31\_11: calculation of estimated energy price (EEp) and estimated capacity price (ecp)*14 November 2011 |

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Document History

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| --- | --- | --- | --- |
| **Version** | **Date** | **Author** | **Comment** |
| 0.3 | 07 November 2011 | Modifications Committee Secretariat | Issued to Modifications Committee for review and approval |
| 1.0 | 14 November 2011 | Modifications Committee Secretariat | Issued to Regulatory Authorities for final decision |

Reference Documents

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| **Document Name** |
| [Trading and Settlement Code](http://semopub/MarketDevelopment/MarketRules/TSC.doc)  |
| [Mod\_31\_11 *Calculation of Estimated Energy Price (EEP) and Estimated Capacity Price (ECP)*](http://semopub/MarketDevelopment/ModificationDocuments/Mod_31_11%20Calculation%20of%20Estimated%20Energy%20Price%20%28EEP%29%20and%20Estimated%20Capacity%20Price%20%28ECP%29.docx) |
| [Meeting 38 Presentation Slides](http://semopub/MarketDevelopment/ModificationDocuments/Meeting%2038%20SEMO%20Slides.ppt) |

Relevant Sections

| **In accordance with Section 2.215 of the Trading & Settlement Code, the sections marked applicable will be included in the FRR** |
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| 1. **Modifications Committee Recommendation**
 | **Applicable** |
| 1. **Development Process**
 | **Applicable** |
| 1. **3. Purpose of Proposed Modification**

a.) Justification for Modificationb.) Impact of not implementing a solutionc.) Impact on Code Objectives | **Applicable** |
| 1. **Assessment of Alternatives**
 | **N/A** |
| 1. **Working Group and/or Consultation**
 | **N/A** |
| 1. **Impact on other Codes/Documents**
 | **N/A** |
| 1. **Impact on Systems and Resources**
 | **N/A** |
| 1. **Modifications Committee Views**
 | **Applicable** |
| 1. **Proposed Legal Drafting**
 | **Applicable** |
| 1. **Legal Review**
 | **Applicable** |
| 1. **Implementation Timescale**
 | **Applicable** |

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# 1 MODIFICATIONS COMMITTEE RECOMMENDATION

## Recommended for approval – Unanimous Vote

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| --- |
| **Recommended for Approval by the Modifications Committee as follows:** |
| Generator Alternate | Brian Mongan | AES |
| Generator Alternate | Mary Doorly | IWEA |
| Generator Member | Kevin Hannafin | Viridian Power & Energy |
| Generator Member | Andrew Burke | ESBI |
| Supplier Member | Jill Murray | Bord Gáis Energy Supply |
| Supplier Alternate | Philip Carson | Power NI |
| Supplier Alternate | Emeka Chukwureh | Airtricity |

# 2 DEVELOPMENT PROCESS

The Modification Proposal was raised by SEMO and proposed changes to the Section 6 of the T & SC. It was received by the Secretariat on 27 September 2011 and was initially presented at Meeting 38 on 11 October 2011, where it was voted on. The proposal was raised to address an inconsistency in the calculation of EEP and ECP, which was identified during the FG2 drafting of the Mod\_18\_10 *Intra-Day Trading* (IDT) Modification.

# 3 PURPOSE OF PROPOSED MODIFICATION

## 3A.) Justification for Modification

The Code currently specifies the use of Trading Period SMP/CPDP values in the calculation of the standard deviation value as an input to the calculation of EEP/ECP. It has been identified that SEMO has since Go-Live (November 2007) been calculating the standard deviation values based on the daily average SMP (for EEP) and daily average CPDP (for ECP). These EEP and ECP values are used only for New or Adjusted Participants. The new/adjusted calculation only affects a small proportion of Participants at any one time, typically 5% of the market. In addition Participants are only classed as new/adjusted for approximately 100 days, until sufficient historical information is available for the Standard calculation to be valid.

Under the Code, New Participants are those with insufficient historical data for the calculation of undefined exposure, therefore, Participants provided forecast data that is used for the first approximately 100 days.

Adjusted Participants are those where their consumption/generation is planned to changed significantly from their historical data. Forecast data is used as for the New Participant case.

Standard Participants are, where sufficient historical data is available to allow the calculation of Required Credit Cover, using this historical data as basis for future exposure. SEMO’s analysis, as below, indicates that the calculation as utilised by SEMO since Go Live produces in a better estimate of the actual SMP/CPDP than the calculation as specified in the Code currently. In the graph shown below:

1. Line 1 relates to the calculation as currently defined in the Code (for New and Adjusted Participants).
2. Line 2 relates to the calculation that SEMO has implemented since Go Live (for New and Adjusted Participants).
3. Line 3 relates to the calculation for Standard Participants, to which the calculation for New and Adjusted Participants should closely align if it is an accurate prediction of future SMP/CPDP values.
4. Line 4 represents the actual exposure to the market of the Participant at the time. This is calculated retrospectively by using final historic settlement values. Estimated undefined exposure values are replaced with the actual exposures that arose during the Undefined Exposure Period.

**Figure 1 – Undefined Exposure calculations for new Participants based on Trading Period and Settlement Day calculations, the Undefined Exposure for Standard Participants and the Actual Exposure**

The principle in the market is to be conservative in the approach to calculating Required Credit Cover for Participant, yet not unduly burden Participants with credit cover requirements. From figure 1, Line 4 indicates the actual exposure the market had for the Participant (based on retrospectively applying the settled amounts instead of using the estimation of undefined exposure). Line 2 uses the Average Daily calculation in the Required Credit Cover for new/adjusted Participants This provides a conservative estimate of the Participants exposure, being approximately 35% higher than the actual exposure. Line 1 uses the Trading Period calculation in the Required Credit Cover, and provides what appears to be an excessive overestimation of the Required Credit Cover in the order of 70%.

This indicates that the Average Daily calculation meets the principle to use a conservative calculation of Required Credit Cover for new/adjusted Participants, while not being excessively conservative as occurs for the Trading Period calculation. Furthermore, the accuracy of the calculation for Standard Participants is reported on a quarterly basis. No concerns have received from Participants with the level of credit cover as calculated for Standard Participants. As the Daily Average calculation is in line with the standard calculation, this further indicates that the calculations as implemented are appropriate. As such SEMO proposes to amend the Code to reflect this more accurate methodology that has been in place since the beginning of the SEM.

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

1. SEMO’s calculation of EEP and ECP will need to be revised to match the provisions of the Code.
2. Future calculations will most likely overestimate the EEP/ECP and therefore result in an increased amount of Credit Cover being required to be posted for New and Adjusted Participants.

## 3c.) Impact on Code Objectives

This Modification Proposal aligns the provisions of the Code with the business process implemented by SEMO since Market Go Live. It therefore clarifies the calculations utilised by SEMO and furthers Code Objectives #1, #2 and #5, which are as follows:

1. to facilitate the efficient discharge by the Market Operator of the obligations imposed upon it by its Market Operator Licences;
2. to facilitate the efficient, economic and coordinated operation, administration and development of the Single Electricity Market in a financially secure manner;

5. to provide transparency in the operation of the Single Electricity Market;

# 4 Assessment of Alternatives

N/A

# 5 Working Group And/Or Consultation

N/A

# 6 Impact on other Codes/Documents

N/A

# 7 Impact on Systems and Resources

N/A

# 8 MODIFICATION COMMITTEE VIEWS

SEMO Member presented slides outlining the proposal advising that an inconsistency in the calculation of EEP and ECP was identified during FG2 drafting of the IDT Modification. The current calculation in the Central Market System (CMS) is inconsistent with that of the Code. The Code currently specifies the use of Trading Period SMP/CPDP values in the calculation of the standard deviation value as an input to the calculation of EEP/ECP. However the CMS calculates the standard deviation values based on the daily average SMP (for EEP) and daily average CPDP (for ECP). SEMO believes the calculation in the CMS to be correct as it calculates Undefined Exposure for New and Adjusted Participants at a similar level to that of Standard Participants. SEMO further added that the proposal will not incur any additional Market exposure.

The Chair was supportive of the proposal in principle but questioned the mathematical formula querying as to whether the standard deviation should be on prices rather than an average. SEMO provided clarification regarding the calculations set out in the proposal.

# 9 Proposed legal drafting

As set out below in Appendix 1.

# 10 LEGAL REVIEW

Complete

# 11 IMPLEMENTATION TIMESCALE

The proposed implementation date is one working day after the day on which the Regulatory Authority decision is made. It is proposed that this Modification is made on a Settlement Day basis.

# Appendix 1: Modification proposal

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| **MODIFICATION PROPOSAL FORM** |
| **Proposer***(Company)* | **Date of receipt***(assigned by Secretariat)* | **Type of Proposal***(delete as appropriate)* | **Modification Proposal ID***(assigned by Secretariat)* |
| **SEMO** | **27 September 2011** | **Standard** | **Mod\_31\_11** |
| **Contact Details for Modification Proposal Originator** |
| **Name** | **Telephone number** | **Email address** |
| **Nigel Thomson** | **+353 123 70322** | **nigel.thomson@sem-o.com** |
| **Modification Proposal Title** |
| **Calculation of Estimated Energy Price (EEP) and Estimated Capacity Price (ECP)** |
| **Documents affected***(delete as appropriate)* | **Section(s) Affected** | **Version number of T&SC or AP used in Drafting** |
| **T&SC** | **6.191 to 6.200** | **9.0** |
| **Explanation of Proposed Change***(mandatory by originator)* |
| During the development of the Intra-Day Trading design and associated Modification Proposal, a discrepancy between the Code and the actual calculation of Estimated Energy Price (EEP) and Estimated Capacity Price (ECP) has been identified. This Modification proposes to amend the existing calculations for EEP and ECP, to align with the calculations that have been utilised by SEMO since Market Go Live. There are no systems changes required, if this Modification Proposal is implemented and as is set out in the justification, the current method more accurately estimates the a new Participant’s exposure. |
| **Legal Drafting Change***(Clearly show proposed code change using* ***tracked*** *changes, if proposer fails to identify changes, please indicate best estimate of potential changes)* |
| Calculation of the Estimated Energy Price6.191 The Daily Average System Marginal Price (DASMPd) for Settlement Day d shall be calculated as follows: Where:1. SMPh is the System Marginal Price for Trading Period h;
2. is a summation over Trading Periods h in Settlement Day d.
3. is the number of all System Marginal Prices in Settlement Day d.

6.192 The number of all Daily Average System Marginal Prices (NDASMPg) in the Historical Assessment Period for Billing Periods γ to be applied for the Undefined Exposure Period g shall be calculated as follows:Where:1. is the number of all Daily Average System Marginal Prices in the Historical Assessment Period for Billing Periods γ.

6.193 The mean value of Daily Average System Marginal Prices (UMSMPg) in the Historical Assessment Period for Billing Periods γ to be applied for the Undefined Exposure Period g shall be calculated as follows:Where:1. DASMPd is the Daily Average System Marginal Price for Settlement Day d;
2. is a summation over all Settlement Days d in Historical Assessment Period for Billing Periods γ;
3. NDASMPg is the number of all Daily Average System Marginal Prices in the Historical Assessment Period for Billing Periods γ to be applied for the Undefined Exposure Period g.

6.194 The standard deviation of the Daily Average System Marginal Price (SDSMPg) in the Historical Assessment Period for Billing Periods γ to be applied for the Undefined Exposure Period g shall be calculated as follows:Where:1. NDASMPg is the number of all Daily Average System Marginal Prices in the Historical Assessment Period for Billing Periods γ to be applied for the Undefined Exposure Period g;
2. DASMPd is the Daily Average System Marginal Price for Settlement Day d;
3. is a summation over all Settlement Days d in Historical Assessment Period for Billing Periods γ.

6.195 The Estimated Energy Price (EEPg) for Undefined Exposure Period g shall be calculated as follows:Where:1. UMSMPg is the mean value of System Marginal Prices in the Historical Assessment Period for Billing Periods γ applied for the Undefined Exposure Period g;
2. AnPP is the Analysis Percentile Parameter function in effect to determine the amount that must be added to the mean value in order that the required percentage of values shall fall below that value. The details of this function are defined in Agreed Procedure 9 “Management of Credit Cover and Credit Default”;
3. SDSMPg is the standard deviation of the values of System Marginal Prices in the Historical Assessment Period for Billing Periods γ to be applied for the Undefined Exposure Period g.

Calculation of the Estimated Capacity Price6.196 The Daily Average Capacity Payments Demand Price (DAPDPd) for Settlement Day d shall be calculated as follows: Where:1. CPDPh is the Capacity Payments Demand Price for Trading Period h;
2. is a summation over Trading Periods h in Settlement Day d;
3. is the number of all the Capacity Payments Demand Prices in Settlement Day d.

6.197 The number of all Daily Average Capacity Payments Demand Prices (NDACPDPg) for the Historical Assessment Period for Capacity Periods ρ to be applied for the Undefined Exposure Period g shall be calculated as follows:Where1. DACPDPh is the Capacity Payments Demand Price for Trading Period h;
2. is the count of all the Capacity Payments Demand Prices in the Historical Assessment Period for Capacity Periods ρ.

6.198 The mean value of the Daily Average Capacity Payments Demand Price (HACPDPg) for the Historical Assessment Period for Capacity Periods ρ to be applied for the Undefined Exposure Period g shall be calculated as follows:Where:1. DACPDPd is the Daily Average Capacity Payments Demand Price for Settlement Day d;
2. is a summation over each Settlement Day d in the Historical Assessment Period for Capacity Periods ρ;
3. NDACPDPg is the number of all Daily Average Capacity Payments Demand Prices in the Historical Assessment Period for Capacity Periods ρ to be applied for the Undefined Exposure Period g;

6.199 The standard deviation of the Daily Average Capacity Payments Demand Prices (SDCPDPg) in the Historical Assessment Period for Capacity Periods ρ to be applied for the Undefined Exposure Period g shall be calculated as follows:Where:1. NDACPDPg is the number of all Daily Average Capacity Payments Demand Prices in the Historical Assessment Period for Capacity Periods ρ to be applied for the Undefined Exposure Period g;
2. DACPDPd is the Daily Average Capacity Payments Demand Price for Settlement Day d;
3. is a summation over all Settlement Days d in Historical Assessment Period for Capacity Periods ρ.

6.200 The Estimated Capacity Price (ECPg) for the Undefined Exposure Period g shall be calculated as follows:Where1. UMCPDPg is the average Capacity Payments Demand Price in the Historical Assessment Period for Capacity Periods ρ to be applied for the Undefined Exposure Period g;
2. AnPP is the Analysis Percentile Parameter function in effect to determine the amount that must be added to the mean value in order that the required percentage of values shall fall below that value. The details of this function are defined in Agreed Procedure 9 “Management of Credit Cover and Credit Default”;
3. SDCPDPg is the standard deviation of the values of Capacity Payments Demand Prices in the Historical Assessment Period for Capacity Periods ρ to be applied for the Undefined Exposure Period g.

**Glossary:**

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| **Daily Average System Marginal Price** | means the arithmetic time-weighted average of System Marginal Prices for a given Settlement Day. |
| **Daily Average Capacity Payments Demand Prices** | means the arithmetic time-weighted average of Capacity Payments Demand Prices for a given Settlement Day. |

**LIST OF VARIABLES, APPLICABLE SUBSCRIPTS AND UNITS**

| Name | Term | Subscripts | Units | Description |
| --- | --- | --- | --- | --- |
| Number of Daily Average Capacity Payments Demand Prices in the Historical Assessment Period | NDACPDP | g | Number | The number of Daily Average Capacity Payments Demand Prices in the Historical Assessment Period for Capacity Periods ρ to be applied for the Undefined Exposure Period g |
| **Number of Daily System Marginal Prices in the Historical Assessment Period** | NDASMP | g | Number | Number of Daily Average System Marginal Prices in the Historical Assessment Period for Billing Periods γ to be applied for the Undefined Exposure Period g |
| **Daily Average of the Capacity Payments Demand Prices** | DACPDP | d | €/MWh | Arithmetic time-weighted average of Capacity Payments Demand Prices for a given Settlement Day |
| Daily Average of System Marginal Prices | DASMP | d | €/MWh | Arithmetic time-weighted average of System Marginal Prices for a given Settlement Day |

 |
| **Modification Proposal Justification***(Clearly state the reason for the Modification)* |
| The Code currently specifies the use of Trading Period SMP/CPDP values in the calculation of the standard deviation value as an input to the calculation of EEP/ECP. It has been identified that SEMO has since Go-Live (November 2007) been calculating the standard deviation values based on the daily average SMP (for EEP) and daily average CPDP (for ECP).These EEP and ECP values are used only for New or Adjusted Participants. The new/adjusted calculation only affects a small proportion of Participants at any one time, typically 5% of the market. In addition Participants are only classed as new/adjusted for approximately 100 days, until sufficient historical information is available for the Standard calculation to be valid.Under the Code, New Participants are those with insufficient historical data for the calculation of undefined exposure, therefore, Participants provided forecast data that is used for the first approximately 100 days.Adjusted Participants are those where their consumption/generation is planned to changed significantly from their historical data. Forecast data is used as for the New Participant case.Standard Participants are where sufficient historical data is available to allow the calculation of Required Credit Cover using this historical data as basis for future exposure. SEMO’s analysis, as below, indicates that the calculation as utilised by SEMO since Go Live produces in a better estimate of the actual SMP/CPDP than the calculation as specified in the Code currently. In the graph shown below:1. Line 1 relates to the calculation as currently defined in the Code (for New and Adjusted Participants).
2. Line 2 relates to the calculation that SEMO has implemented since Go Live (for New and Adjusted Participants).
3. Line 3 relates to the calculation for Standard Participants, to which the calculation for New and Adjusted Participants should closely align if it is an accurate prediction of future SMP/CPDP values.
4. Line 4 represents the actual exposure to the market of the Participant at the time. This is calculated retrospectively by using final historic settlement values. Estimated undefined exposure values are replaced with the actual exposures that arose during the Undefined Exposure Period.

**Figure 1 – Undefined Exposure calculations for new Participants based on Trading Period and Settlement Day calculations, the Undefined Exposure for Standard Participants and the Actual Exposure** The principle in the market is to be conservative in the approach to calculating Required Credit Cover for Participant, yet not unduly burden Participants with credit cover requirements. From figure 1, Line 4 indicates the actual exposure the market had for the Participant (based on retrospectively applying the settled amounts instead of using the estimation of undefined exposure). Line 2 uses the Average Daily calculation in the Required Credit Cover for new/adjusted Participants This provides a conservative estimate of the Participants exposure, being approximately 35% higher than the actual exposure. Line 1 uses the Trading Period calculation in the Required Credit Cover, and provides what appears to be an excessive overestimation of the Required Credit Cover in the order of 70%. This indicates that the Average Daily calculation meets the principle to use a conservative calculation of Required Credit Cover for new/adjusted Participants, while not being excessively conservative as occurs for the Trading Period calculation.Further more, the accuracy of the calculation for Standard Participants is reported on a quarterly basis. No concerns have received from Participants with the level of credit cover as calculated for Standard Participants. As the Daily Average calculation is in line with the standard calculation, this further indicates that the calculations as implemented are appropriate.As such SEMO proposes to amend the Code to reflect this more accurate methodology that has been in place since the beginning of the SEM. |
| **Code Objectives Furthered***(State the Code Objectives the Proposal furthers, see Section 1.3 of T&SC for Code Objectives)* |
| This Modification Proposal aligns the provisions of the Code with the business process implemented by SEMO since Market Go Live. It therefore clarifies the calculations utilised by SEMO and furthers Code Objectives #1, #2 and #5, which are as follows:1. *to facilitate the efficient discharge by the Market Operator of the obligations imposed upon it by its Market Operator Licences;*
2. *to facilitate the efficient, economic and coordinated operation, administration and development of the Single Electricity Market in a financially secure manner;*
3. *to provide transparency in the operation of the Single Electricity Market;*
 |
| **Implication of not implementing the Modification Proposal***(State the possible outcomes should the Modification Proposal not be implemented)* |
| 1. SEMO’s calculation of EEP and ECP will need to be revised to match the provisions of the Code.
2. Future calculations will most likely overestimate the EEP/ECP and therefore result in an increased amount of Credit Cover being required to be posted for New and Adjusted Participants.
 |
| **Working Group***(State if Working Group considered necessary to develop proposal)* | **Impacts***(Indicate the impacts on systems, resources, processes and/or procedures)* |
| No | No impact if implemented. |
| ***Please return this form to Secretariat by email to*** *modifications@sem-o.com* |