3 October 2016

Supplier Charging Algebra

1 PURPOSE, INTRODUCTION AND OUTLINE

The purpose of this paper is to outline the algebra which can be incorporated into the Trading and Settlement Code for the implementation of any of the enduring and interim supplier charging approaches being considered in a consultation by the Regulatory Authorities. The options being considered are as follows:

- Interim approach:
  - Non Negative Net Demand (net settlement with a "min" function);
  - Net Demand (net settlement with no "min" function).
- Enduring approach:
  - Non Negative Net Demand (net settlement with a "min" function);
  - Net Demand (net settlement with no "min" function).
  - Gross Demand.

The charges being considered for this treatment include the following:

- In chapter F of the Trading and Settlement Code:
  - $CIMP_{vy}$, the Imperfections Charge;
  - $CREV_{vy}$, the Residual Error Volume Charge;
  - CCA_{vy}, the Currency Adjustment Payment or Charge;
  - CCC_{vc}, the Capacity Charge; and
  - $CSOCDIFFP_{vc}$, the Difference Payment Socialisation Charge.
- In chapter G of the Trading and Settlement Code:
  - $CVMO_{pb}$, the Variable Market Operator Charge.

Depending on the decisions taken by the Regulatory Authorities, the algebra outlined may be incorporated into the Trading and Settlement Code as enduring text (i.e. a clause in chapter F or G as appropriate) or as interim text (i.e. a clause in chapter H with an associated timeframe).

2 NON NEGATIVE NET DEMAND

The text in this section largely reflects the approach taken to date in the development of the Trading and Settlement Code. There are some minor additional edits where comments have been received on matters unrelated to the gross or net settlement approaches, for example the use of the Residual Metered Volume Interval Proportion factor in the Residual Error Volume Charge, and a typo in the Variable Market Operator Charge which had a "Max" function instead of a "Min" function.

2.1 IMPERFECTIONS CHARGE

A.1.1 Calculation of Imperfections Charges

A.1.1.1 The purpose of the Imperfections Charge is to recover the anticipated Dispatch Balancing Costs (less Other System Charges), Make Whole Payments, any net imbalance between Trading Payments, Trading Charges, Capacity Payments and Capacity Charges over the Year, with adjustments for previous Years as appropriate.

A.1.1.2 The Market Operator shall calculate the Imperfections Charge ($CIMP_{v\gamma}$) for each Supplier Unit, v, that is not a Trading Site Supplier Unit, in each Imbalance Settlement Period, γ, as follows:

$$CIMP_{v\gamma} = Min(QMLF_{v\gamma}, 0) \times PIMP_{y} \times FCIMP_{\gamma}$$

where:

(a) $PIMP_y$ is the Imperfections Price for Year, y;

(b) $QMLF_{v\gamma}$ is the Loss-Adjusted Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ; and

(c) $FCIMP_\gamma$ is the Imperfections Charge Factor for Imbalance Settlement Period, γ.

A.1.1.3 The Market Operator shall calculate the Imperfections Charge ($CIMP_{v\gamma}$) for each Trading Site Supplier Unit, v, in each Imbalance Settlement Period, γ, as follows:

$$CIMP_{v\gamma} = Min\left(\sum_{u \in s} QMLF_{u\gamma} + \sum_{v \in s} QMLF_{v\gamma}, 0\right) \times PIMP_{y} \times FCIMP_{\gamma}$$

where:

(a) $PIMP_y$ is the Imperfections Price for Year, y;

(b) $QMLF_{u\gamma}$ is the Loss-Adjusted Metered Quantity for Generator Unit, u, in Imbalance Settlement Period, γ;

(c) $QMLF_{v\gamma}$ is the Loss-Adjusted Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ;

(d) $\sum_{u \in s}$ is a summation over Generator Units, u, in Trading Site, s, relevant to the Trading Site Supplier Unit;

(e) $\sum_{v \in s}$ is the value for the single Trading Site Supplier Unit, v, in Trading Site, s, in accordance with paragraph B.9.1.2; and

(f) $FCIMP_{\gamma}$ is the Imperfections Charge Factor for Imbalance Settlement Period, γ.

2.2 RESIDUAL ERROR VOLUME CHARGE

A.1.1 Calculation of Residual Error Volume Charges

A.1.1.1 The Market Operator shall calculate the Residual Error Volume Charge ($CREV_{v\gamma}$) for each Supplier Unit, v, which is not a Trading Site Supplier Unit, in each Imbalance Settlement Period, γ, as follows:

$$CREV_{v\gamma} = \left(\left(1 - RMVIP_{ey}\right) \times \left(Min\left(QMLF_{v\gamma}, 0\right) \times PREV_{y} \times FNIEP_{v\gamma}\right)\right) + \left(RMVIP_{ey} \times \left(Min\left(QMLF_{v\gamma}, 0\right) \times PREV_{y} \times \left(1 - FNIEP_{v\gamma}\right)\right)\right)$$

where:

(a) $RMVIP_{ey}$ is the Residual Meter Volume Interval Proportion for Currency Zone e in year y;

(b) $PREV_{y}$ is the Residual Error Volume Price for Year, y;

(c) $QMLF_{v\gamma}$ is the Loss-Adjusted Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ; and

(d) $FNIEP_{v\gamma}$ is the Non-Interval Energy Proportion Factor for Supplier Unit v, in Imbalance Settlement Period, γ.

2.3 CURRENCY ADJUSTMENT CHARGE

A.1.1 Calculation of Currency Adjustment Charges

A.1.1.1 The Market Operator shall calculate the Currency Adjustment Charge ($CCA_{v\gamma}$) for each Supplier Unit, v, which is not a Trading Site Supplier Unit, in each Imbalance Settlement Period, γ, as follows:

$$CCA_{v\gamma} = Min(QMLF_{v\gamma}, 0) \times PCC_{y} \times FCCA_{\gamma}$$

where:

(a) PCC_{y} is the Currency Cost Price for Year, y;

(b) $QMLF_{v\gamma}$ is the Loss-Adjusted Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ; and

(c) $FCCA_{\gamma}$ is the Currency Adjustment Charge Factor in Imbalance Settlement Period, γ.

2.4 CAPACITY CHARGE

A.1.1 **Calculation of Capacity Charges**

A.1.1.1 The Market Operator shall calculate the Capacity Charge (CCC_{vc}) for each Supplier Unit, v, which is not a Storage Unit or a Trading Site Supplier Unit, in each Capacity Period, c, as follows:

$$CCC_{vc} = \sum_{\gamma \in c} Min\left(QMLF_{v\gamma}, 0\right) \times FQMCC_{\gamma} \times PCCSUP_{y}$$

where:

(a) $QMLF_{v\gamma}$ is the Loss-Adjusted Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ;

(b) $PCCSUP_{y}$ is the Supplier Capacity Charge Price in Capacity Year, y;

(c) $FQMCC_{\gamma}$ is the Capacity Charge Metered Quantity Factor in Imbalance Settlement Period, γ; and

(d) $\sum_{\gamma \in c}$ is a summation over all Imbalance Settlement Periods, γ, within Capacity Period, c.

A.1.1.2 The Market Operator shall calculate the Capacity Charge (CCC_{vc}) for each Supplier Unit, v, which is a Trading Site Supplier Unit, in each Capacity Period, c, as follows:

$$CCC_{vc} = \sum_{\gamma \in c} Min\left(\sum_{u \in s} QMLF_{u\gamma} + \sum_{v \in s} QMLF_{v\gamma}, 0\right) \times FQMCC_{\gamma} \times PCCSUP_{y}$$

where:

(a) $QMLF_{v\gamma}$ is the Loss-Adjusted Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ;

(b) $QMLF_{u\gamma}$ is the Loss-Adjusted Metered Quantity for Generator Unit, u, in Imbalance Settlement Period, γ;

(c) $PCCSUP_{y}$ is the Supplier Capacity Charge Price in Capacity Year, y;

(d) $FQMCC_{\gamma}$ is the Capacity Charge Metered Quantity Factor in Imbalance Settlement Period, γ;

(e) $\sum_{u \in s}$ is a summation over all Generator Units, u, in Trading Site, s, relevant to the Trading Site Supplier Unit;

(f) $\sum_{v \in s}$ is the value for the single Trading Site Supplier Unit, v, in Trading Site, s, in accordance with paragraph B.9.1.2; and

(g) $\sum_{\gamma \in c}$ is a summation over all Imbalance Settlement Periods, γ, within Capacity Period, c.

2.5 DIFFERENCE PAYMENT SOCIALISATION CHARGE

A.1.1 **Calculation of Difference Payment Socialisation Charges**

A.1.1.1 The Market Operator shall calculate the Difference Payment Socialisation Charge ($CSOCDIFFP_{vc}$) for each Supplier Unit, v, which is not a Storage Unit or a Trading Site Supplier Unit, in each Capacity Period, c, as follows:

$$CSOCDIFFP_{vc} = \sum_{\gamma \in c} Min\left(QMLF_{v\gamma}, 0\right) \times FQMCC_{\gamma} \times PCCSUP_{y} \times FSOCDIFFP_{y}$$

where:

(a) $QMLF_{v\gamma}$ is the Loss-Adjusted Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ;

(b) $PCCSUP_{y}$ is the Supplier Capacity Charge Price in Capacity Year, y;

(c) $FQMCC_{\gamma}$ is the Capacity Charge Metered Quantity Factor in Imbalance Settlement Period, γ;

(d) $\sum_{\gamma \in c}$ is a summation over all Imbalance Settlement Periods, γ, within Capacity Period, c; and

(e) $FSOCDIFFP_{y}$ is the Difference Payment Socialisation Multiplier in Capacity Year, y.

A.1.1.2 The Market Operator shall calculate the Difference Payment Socialisation Charge ($CSOCDIFFP_{vc}$) for each Supplier Unit, v, which is a Trading Site Supplier Unit, in each Capacity Period, c, as follows:

$$CSOCDIFFP_{vc} = \sum_{\gamma \in c} Min\left(\sum_{u \in s} QMLF_{u\gamma} + \sum_{v \in s} QMLF_{v\gamma}, 0\right) \times FQMCC_{\gamma} \times PCCSUP_{y} \times FSOCDIFFP_{y}$$

where:

(a) $QMLF_{v\gamma}$ is the Loss-Adjusted Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ;

(b) $QMLF_{u\gamma}$ is the Loss-Adjusted Metered Quantity for Generator Unit, u, in Imbalance Settlement Period, γ;

(c) $PCCSUP_{y}$ is the Supplier Capacity Charge Price in Capacity Year, y;

(d) $FQMCC_{\gamma}$ is the Capacity Charge Metered Quantity Factor in Imbalance Settlement Period, γ;

(e) $\sum_{u \in s}$ is a summation over all Generator Units, u, in Trading Site, s, relevant to the Trading Site Supplier Unit;

(f) $\sum_{v \in s}$ is the value for the single Trading Site Supplier Unit, v, in Trading Site, s, in accordance with paragraph B.9.1.2;

(g) $\sum_{\gamma \in c}$ is a summation over all Imbalance Settlement Periods, γ, within Capacity Period, c; and

(h) $FSOCDIFFP_{y}$ is the Difference Payment Socialisation Multiplier in Capacity Year, y.

2.6 VARIABLE MARKET OPERATOR CHARGE

A.1.1 Variable Market Operator Charge

A.1.1.1 The Market Operator shall calculate the Variable Market Operator Charge ($CVMO_{pb}$) for Participant p in respect of its Supplier Units in Billing Period b as follows:

$$CVMO_{pb} = PVMO_y \times Min\left\{\left[\sum_{v\ in\ p}\sum_{\gamma\ in\ b} QMLF_{v\gamma}\right], 0\right\}$$

where:

(a) $PVMO_y$ is the Variable Market Operator Price for Year y;

(b) $QMLF_{v\gamma}$ is the Loss-Adjusted Metered Quantity from Supplier Unit v for Imbalance Settlement Period γ;

(c) $\sum_{\gamma\ in\ b}$ is a summation over Imbalance Settlement Periods γ for Billing Period b; and

(d) $\sum_{v\ in\ p}$ is a summation over all Supplier Units v registered to Participant p.

3 NET DEMAND

The text in this section largely reflects the approach in the Trading and Settlement Code currently in effect for the SEM on charges which currently exist, and applies the same approach for new charges. The exception to this is the Variable Market Operator Charge, which has a Non Negative Net Demand approach in the Trading and Settlement Code currently in effect for the SEM, which is reflected in section 2.6.

3.1 IMPERFECTIONS CHARGE

A.1.1 Calculation of Imperfections Charges

A.1.1.1 The purpose of the Imperfections Charge is to recover the anticipated Dispatch Balancing Costs (less Other System Charges), Make Whole Payments, any net imbalance between Trading Payments, Trading Charges, Capacity Payments and Capacity Charges over the Year, with adjustments for previous Years as appropriate.

A.1.1.2 The Market Operator shall calculate the Imperfections Charge ($CIMP_{v\gamma}$) for each Supplier Unit, v, that is not a Trading Site Supplier Unit, in each Imbalance Settlement Period, γ, as follows:

$$CIMP_{v\gamma} = QMLF_{v\gamma} \times PIMP_y \times FCIMP_\gamma$$

where:

(a) $PIMP_y$ is the Imperfections Price for Year, y;

(b) $QMLF_{v\gamma}$ is the Loss-Adjusted Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ; and

(c) $FCIMP_{\gamma}$ is the Imperfections Charge Factor for Imbalance Settlement Period, γ.

A.1.1.3 The Market Operator shall calculate the Imperfections Charge ($CIMP_{v\gamma}$) for each Trading Site Supplier Unit, v, in each Imbalance Settlement Period, γ, as follows:

$$CIMP_{v\gamma} = Min\left(\sum_{u \in s} QMLF_{u\gamma} + \sum_{v \in s} QMLF_{v\gamma}, 0\right) \times PIMP_{y} \times FCIMP_{\gamma}$$

where:

(a) $PIMP_{y}$ is the Imperfections Price for Year, y;

(b) $QMLF_{u\gamma}$ is the Loss-Adjusted Metered Quantity for Generator Unit, u, in Imbalance Settlement Period, γ;

(c) $QMLF_{v\gamma}$ is the Loss-Adjusted Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ;

(d) $\sum_{u \in s}$ is a summation over all Generator Units, u, in Trading Site, s, relevant to the Trading Site Supplier Unit;

(e) $\sum_{v \in s}$ is the value for the single Trading Site Supplier Unit, v, in Trading Site, s, in accordance with paragraph B.9.1.2; and

(f) $FCIMP_{\gamma}$ is the Imperfections Charge Factor for Imbalance Settlement Period, γ.

3.2 RESIDUAL ERROR VOLUME CHARGE

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A.1.1.1 The Market Operator shall calculate the Residual Error Volume Charge ($CREV_{v\gamma}$) for each Supplier Unit, v, which is not a Trading Site Supplier Unit, in each Imbalance Settlement Period, γ, as follows:

$$CREV_{v\gamma} = \left(\left(1 - RMVIP_{ey}\right) \times \left(QMLF_{v\gamma} \times PREV_{y} \times FNIEP_{v\gamma}\right)\right) + \left(RMVIP_{ey} \times \left(QMLF_{v\gamma} \times PREV_{y} \times \left(1 - FNIEP_{v\gamma}\right)\right)\right)$$

where:

(a) $RMVIP_{ey}$ is the Residual Meter Volume Interval Proportion for Currency Zone e in year y;

(b) $PREV_{y}$ is the Residual Error Volume Price for Year, y;

(c) $QMLF_{v\gamma}$ is the Loss-Adjusted Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ; and

(d) $FNIEP_{v\gamma}$ is the Non-Interval Energy Proportion Factor for Supplier Unit v, in Imbalance Settlement Period, γ.

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A.1.1.1 The Market Operator shall calculate the Currency Adjustment Charge ($CCA_{v\gamma}$) for each Supplier Unit, v, which is not a Trading Site Supplier Unit, in each Imbalance Settlement Period, γ, as follows:

$$CCA_{v\gamma} = QMLF_{v\gamma} \times PCC_y \times FCCA_\gamma$$

where:

(a) PCC_y is the Currency Cost Price for Year, y;

(b) $QMLF_{v\gamma}$ is the Loss-Adjusted Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ; and

(c) $FCCA_\gamma$ is the Currency Adjustment Charge Factor in Imbalance Settlement Period, γ.

3.4 CAPACITY CHARGE

A.1.1 Calculation of Capacity Charges

A.1.1.1 The Market Operator shall calculate the Capacity Charge (CCC_{vc}) for each Supplier Unit, v, which is not a Storage Unit or a Trading Site Supplier Unit, in each Capacity Period, c, as follows:

$$CCC_{vc} = \sum_{\gamma \in c} QMLF_{v\gamma} \times FQMCC_\gamma \times PCCSUP_y$$

where:

(a) $QMLF_{v\gamma}$ is the Loss-Adjusted Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ;

(b) $PCCSUP_y$ is the Supplier Capacity Charge Price in Capacity Year, y;

(c) $FQMCC_\gamma$ is the Capacity Charge Metered Quantity Factor in Imbalance Settlement Period, γ; and

(d) $\sum_{\gamma \in c}$ is a summation over all Imbalance Settlement Periods, γ, within Capacity Period, c.

A.1.1.2 The Market Operator shall calculate the Capacity Charge (CCC_{vc}) for each Supplier Unit, v, which is a Trading Site Supplier Unit, in each Capacity Period, c, as follows:

$$CCC_{vc} = \sum_{\gamma \in c} Min\left(\sum_{u \in s} QMLF_{u\gamma} + \sum_{v \in s} QMLF_{v\gamma}, 0\right) \times FQMCC_\gamma \times PCCSUP_y$$

where:

(a) $QMLF_{v\gamma}$ is the Loss-Adjusted Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ;

(b) $QMLF_{u\gamma}$ is the Loss-Adjusted Metered Quantity for Generator Unit, u, in Imbalance Settlement Period, γ;

(c) $PCCSUP_y$ is the Supplier Capacity Charge Price in Capacity Year, y;

(d) $FQMCC_\gamma$ is the Capacity Charge Metered Quantity Factor in Imbalance Settlement Period, γ;

(e) $\sum_{u \in s}$ is a summation over all Generator Units, u, in Trading Site, s, relevant to the Trading Site Supplier Unit;

(f) $\sum_{v \in s}$ is the value for the single Trading Site Supplier Unit, v, in Trading Site, s, in accordance with paragraph B.9.1.2; and

(g) $\sum_{\gamma \in c}$ is a summation over all Imbalance Settlement Periods, γ, within Capacity Period, c.

3.5 DIFFERENCE PAYMENT SOCIALISATION CHARGE

A.1.1 Calculation of Difference Payment Socialisation Charges

A.1.1.1 The Market Operator shall calculate the Difference Payment Socialisation Charge ($CSOCDIFFP_{vc}$) for each Supplier Unit, v, which is not a Storage Unit or a Trading Site Supplier Unit, in each Capacity Period, c, as follows:

$$CSOCDIFFP_{vc} = \sum_{\gamma \in c} QMLF_{v\gamma} \times FQMCC_\gamma \times PCCSUP_y \times FSOCDIFFP_y$$

where:

(a) $QMLF_{v\gamma}$ is the Loss-Adjusted Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ;

(b) $PCCSUP_y$ is the Supplier Capacity Charge Price in Capacity Year, y;

(c) $FQMCC_\gamma$ is the Capacity Charge Metered Quantity Factor in Imbalance Settlement Period, γ;

(d) $\sum_{\gamma \in c}$ is a summation over all Imbalance Settlement Periods, γ, within Capacity Period, c; and

(e) $FSOCDIFFP_y$ is the Difference Payment Socialisation Multiplier in Capacity Year, y.

A.1.1.2 The Market Operator shall calculate the Difference Payment Socialisation Charge ($CSOCDIFFP_{vc}$) for each Supplier Unit, v, which is a Trading Site Supplier Unit, in each Capacity Period, c, as follows:

$$CSOCDIFFP_{vc} = \sum_{\gamma \in c} Min\left(\sum_{u \in s} QMLF_{u\gamma} + \sum_{v \in s} QMLF_{v\gamma}, 0\right) \times FQMCC_\gamma \times PCCSUP_y \times FSOCDIFFP_y$$

where:

(a) $QMLF_{v\gamma}$ is the Loss-Adjusted Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ;

(b) $QMLF_{u\gamma}$ is the Loss-Adjusted Metered Quantity for Generator Unit, u, in Imbalance Settlement Period, γ;

(c) $PCCSUP_y$ is the Supplier Capacity Charge Price in Capacity Year, y;

(d) $FQMCC_\gamma$ is the Capacity Charge Metered Quantity Factor in Imbalance Settlement Period, γ;

(e) $\sum_{u \in s}$ is a summation over all Generator Units, u, in Trading Site, s, relevant to the Trading Site Supplier Unit;

(f) $\sum_{v \in s}$ is the value for the single Trading Site Supplier Unit, v, in Trading Site, s, in accordance with paragraph B.9.1.2;

(g) $\sum_{\gamma \in c}$ is a summation over all Imbalance Settlement Periods, γ, within Capacity Period, c; and

(h) $FSOCDIFFP_y$ is the Difference Payment Socialisation Multiplier in Capacity Year, y.

3.6 VARIABLE MARKET OPERATOR CHARGE

A.1.1 **Variable Market Operator Charge**

A.1.1.1 The Market Operator shall calculate the Variable Market Operator Charge ($CVMO_{pb}$) for Participant p in respect of its Supplier Units in Billing Period b as follows:

$$CVMO_{pb} = PVMO_y \times \sum_{v\ in\ p} \sum_{\gamma\ in\ b} QMLF_{v\gamma}$$

where:

(a) $PVMO_y$ is the Variable Market Operator Price for Year y;

(b) $QMLF_{v\gamma}$ is the Loss-Adjusted Metered Quantity from Supplier Unit v for Imbalance Settlement Period γ;

(c) $\sum_{\gamma\ in\ b}$ is a summation over Imbalance Settlement Periods γ for Billing Period b; and

(d) $\sum_{v\ in\ p}$ is a summation over all Supplier Units v registered to Participant p.

4 GROSS DEMAND

The Gross Demand solution requires a change in the data submitted by Meter Data Providers. A generalised way to reflect this in the code is as follows:

- Meter Data Provider submits net demand for each supplier unit (as today);
- Meter Data Provider makes an additional submission (change from today);
- Market Operator uses net demand and the additional submission to calculate gross demand for each supplier unit (change from today).

In order to have a complete Code without unfinished sections, a specific example is provided on the additional submission in the form of an embedded generation MWh quantity for each Supplier Unit, so that the Market Operator can calculate gross demand as follows: (net demand – embedded generation).

However, if the Gross Demand option is selected, it is expected that the decision on when to implement it would be subject to the modifications process and would follow working with the Meter Data Providers to develop what the best enduring solution would be. Therefore the example of how gross demand can be calculated should only be seen as a placeholder and should not presuppose the outcome of those discussions. If another solution is developed which is preferred over what is in the code, it should be included in any modification to implement the Gross Demand solution.

4.1 DATA SOURCES, CONVENTIONS AND DEFINITIONS

A.1.1 **Metered Quantity Data**

A.1.1.1 Each Meter Data Provider shall submit to the Market Operator the Metered Quantities ($QM_{u\gamma}$, $QM_{v\gamma}$, and $QM_{l\gamma}$) for each Generator Unit, u, Supplier Unit, v, and Interconnector, l, as applicable, which is registered within, or linked to, its Jurisdiction in each Imbalance Settlement Period, γ.

A.1.1.2 Each Meter Data Provider shall submit to the Market Operator the Embedded Generation Metered Quantities ($QMEG_{v\gamma}$) for each Supplier Unit, v, which is registered within, or linked to, its Jurisdiction in each Imbalance Settlement Period, γ,

A.1.1.3 Each Meter Data Provider shall submit to the Market Operator the Non-Interval Energy Proportion Factor ($FNIEP_{v\gamma}$) for each Supplier Unit, v, which is registered within its Jurisdiction, in Imbalance Settlement Period, γ.

A.1.1.4 The value of the Metered Quantity ($QM_{u\gamma}$) for each Interconnector Error Unit and each Interconnector Residual Capacity Unit, u, shall be equal to the Metered Quantity ($QM_{l\gamma}$) of the relevant Interconnector, l.

A.1.1.5 The value of the Metered Quantity ($QM_{u\gamma}$) for each Generator Unit, u, which is an Assetless Unit or a Trading Unit, shall be deemed to be zero.

A.1.1.6 The value of the Metered Quantity ($QM_{u\gamma}$) for each Generator Unit, u, which is a Demand Side Unit, shall be deemed to be equal to the Dispatch Quantity ($QD_{u\gamma}$) of that Demand Side Unit.

A.1.1.7 The value of the Metered Quantity ($QM_{v\gamma}$) for each Trading Site Supplier Unit, v, which is on a Trading Site, s, associated with a Generator Unit, u, which is a Demand Side Unit, shall be deemed to be equal to the negative of the Dispatch Quantity ($QD_{u\gamma}$) of that Demand Side Unit.

A.1.1.8 The Market Operator shall calculate the Gross Demand Metered Quantity ($QMGD_{v\gamma}$) for each Supplier Unit, v, in each Imbalance Settlement Period, γ, as follows:

$$QMGD_{v\gamma} = QM_{v\gamma} - QMEG_{v\gamma}$$

where:

(a) $QM_{v\gamma}$ is the Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ; and

(b) $QMEG_{v\gamma}$ is the Embedded Generation Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ.

4.2 IMPERFECTIONS CHARGE

A.1.1 Calculation of Imperfections Charges

A.1.1.1 The purpose of the Imperfections Charge is to recover the anticipated Dispatch Balancing Costs (less Other System Charges), Make Whole Payments, any net imbalance between Trading Payments, Trading Charges, Capacity Payments and Capacity Charges over the Year, with adjustments for previous Years as appropriate.

A.1.1.2 The Market Operator shall calculate the Imperfections Charge ($CIMP_{v\gamma}$) for each Supplier Unit, v, that is not a Trading Site Supplier Unit, in each Imbalance Settlement Period, γ, as follows:

$$CIMP_{v\gamma} = QMGDLF_{v\gamma} \times PIMP_{y} \times FCIMP_{\gamma}$$

where:

(a) $PIMP_{y}$ is the Imperfections Price for Year, y;

(b) $QMGDLF_{v\gamma}$ is the Loss-Adjusted Gross Demand Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ; and

(c) $FCIMP_{\gamma}$ is the Imperfections Charge Factor for Imbalance Settlement Period, γ.

A.1.1.3 The Market Operator shall calculate the Imperfections Charge ($CIMP_{v\gamma}$) for each Trading Site Supplier Unit, v, in each Imbalance Settlement Period, γ, as follows:

$$CIMP_{v\gamma} = Min\left(\sum_{u \in s} QMLF_{u\gamma} + \sum_{v \in s} QMLF_{v\gamma}, 0\right) \times PIMP_{y} \times FCIMP_{\gamma}$$

where:

(a) $PIMP_{y}$ is the Imperfections Price for Year, y;

(b) $QMLF_{u\gamma}$ is the Loss-Adjusted Metered Quantity for Generator Unit, u, in Imbalance Settlement Period, γ;

(c) $QMLF_{v\gamma}$ is the Loss-Adjusted Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ;

(d) $\sum_{u \in s}$ is a summation over all Generator Units, u, in Trading Site, s, relevant to the Trading Site Supplier Unit;

(e) $\sum_{v \in s}$ is the value for the single Trading Site Supplier Unit, v, in Trading Site, s, in accordance with paragraph B.9.1.2; and

(f) $FCIMP_{\gamma}$ is the Imperfections Charge Factor for Imbalance Settlement Period, γ.

4.3 RESIDUAL ERROR VOLUME CHARGE

A.1.1 Calculation of Residual Error Volume Charges

A.1.1.1 The Market Operator shall calculate the Residual Error Volume Charge ($CREV_{v\gamma}$) for each Supplier Unit, v, which is not a Trading Site Supplier Unit, in each Imbalance Settlement Period, γ, as follows:

$$CREV_{v\gamma} = \left(\left(1 - RMVIP_{ey}\right) \times \left(QMGDLF_{v\gamma} \times PREV_{y} \times FNIEP_{v\gamma}\right)\right) + \left(RMVIP_{ey} \times \left(QMGDLF_{v\gamma} \times PREV_{y} \times \left(1 - FNIEP_{v\gamma}\right)\right)\right)$$

where:

(a) $RMVIP_{ey}$ is the Residual Meter Volume Interval Proportion for Currency Zone e in year y;

(b) $PREV_{y}$ is the Residual Error Volume Price for Year, y;

(c) $QMGDLF_{v\gamma}$ is the Loss-Adjusted Gross Demand Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ; and

(d) $FNIEP_{v\gamma}$ is the Non-Interval Energy Proportion Factor for Supplier Unit v, in Imbalance Settlement Period, γ.

4.4 CURRENCY ADJUSTMENT CHARGE

A.1.1 Calculation of Currency Adjustment Charges

A.1.1.1 The Market Operator shall calculate the Currency Adjustment Charge ($CCA_{v\gamma}$) for each Supplier Unit, v, which is not a Trading Site Supplier Unit, in each Imbalance Settlement Period, γ, as follows:

$$CCA_{v\gamma} = QMGDLF_{v\gamma} \times PCC_{y} \times FCCA_{\gamma}$$

where:

(a) PCC_{y} is the Currency Cost Price for Year, y;

(b) $QMGDLF_{v\gamma}$ is the Loss-Adjusted Gross Demand Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ; and

(c) $FCCA_{\gamma}$ is the Currency Adjustment Charge Factor in Imbalance Settlement Period, γ.

4.5 CAPACITY CHARGE

A.1.1 Calculation of Capacity Charges

A.1.1.1 The Market Operator shall calculate the Capacity Charge (CCC_{vc}) for each Supplier Unit, v, which is not a Storage Unit or a Trading Site Supplier Unit, in each Capacity Period, c, as follows:

$$CCC_{vc} = \sum_{\gamma \in c} QMGDLF_{v\gamma} \times FQMCC_{\gamma} \times PCCSUP_{y}$$

where:

(a) $QMGDLF_{v\gamma}$ is the Loss-Adjusted Gross Demand Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ;

(b) $PCCSUP_{y}$ is the Supplier Capacity Charge Price in Capacity Year, y;

(c) $FQMCC_{\gamma}$ is the Capacity Charge Metered Quantity Factor in Imbalance Settlement Period, γ; and

(d) $\sum_{\gamma \in c}$ is a summation over all Imbalance Settlement Periods, γ, within Capacity Period, c.

A.1.1.2 The Market Operator shall calculate the Capacity Charge (CCC_{vc}) for each Supplier Unit, v, which is a Trading Site Supplier Unit, in each Capacity Period, c, as follows:

$$CCC_{vc} = \sum_{\gamma \in c} Min\left(\sum_{u \in s} QMLF_{u\gamma} + \sum_{v \in s} QMLF_{v\gamma}, 0\right) \times FQMCC_{\gamma} \times PCCSUP_{y}$$

where:

(a) $QMLF_{v\gamma}$ is the Loss-Adjusted Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ;

(b) $QMLF_{u\gamma}$ is the Loss-Adjusted Metered Quantity for Generator Unit, u, in Imbalance Settlement Period, γ;

(c) $PCCSUP_{y}$ is the Supplier Capacity Charge Price in Capacity Year, y;

(d) $FQMCC_{\gamma}$ is the Capacity Charge Metered Quantity Factor in Imbalance Settlement Period, γ;

(e) $\sum_{u \in s}$ is a summation over all Generator Units, u, in Trading Site, s, relevant to the Trading Site Supplier Unit;

(f) $\sum_{v \in s}$ is the value for the single Trading Site Supplier Unit, v, in Trading Site, s, in accordance with paragraph B.9.1.2; and

(g) $\sum_{\gamma \in c}$ is a summation over all Imbalance Settlement Periods, γ, within Capacity Period, c.

4.6 DIFFERENCE PAYMENT SOCIALISATION CHARGE

A.1.1 Calculation of Difference Payment Socialisation Charges

A.1.1.1 The Market Operator shall calculate the Difference Payment Socialisation Charge ($CSOCDIFFP_{vc}$) for each Supplier Unit, v, which is not a Storage Unit or a Trading Site Supplier Unit, in each Capacity Period, c, as follows:

$$CSOCDIFFP_{vc} = \sum_{\gamma \in c} QMGDLF_{v\gamma} \times FQMCC_{\gamma} \times PCCSUP_{y} \times FSOCDIFFP_{y}$$

where:

(a) $QMGDLF_{v\gamma}$ is the Loss-Adjusted Gross Demand Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ;

(b) $PCCSUP_y$ is the Supplier Capacity Charge Price in Capacity Year, y;

(c) $FQMCC_\gamma$ is the Capacity Charge Metered Quantity Factor in Imbalance Settlement Period, γ;

(d) $\sum_{\gamma \in c}$ is a summation over all Imbalance Settlement Periods, γ, within Capacity Period, c; and

(e) $FSOCDIFFP_y$ is the Difference Payment Socialisation Multiplier in Capacity Year, y.

A.1.1.2 The Market Operator shall calculate the Difference Payment Socialisation Charge ($CSOCDIFFP_{vc}$) for each Supplier Unit, v, which is a Trading Site Supplier Unit, in each Capacity Period, c, as follows:

$$CSOCDIFFP_{vc} = \sum_{\gamma \in c} Min\left(\sum_{u \in s} QMLF_{u\gamma} + \sum_{v \in s} QMLF_{v\gamma}, 0\right) \times FQMCC_\gamma \times PCCSUP_y \times FSOCDIFFP_y$$

where:

(a) $QMLF_{v\gamma}$ is the Loss-Adjusted Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ;

(b) $QMLF_{u\gamma}$ is the Loss-Adjusted Metered Quantity for Generator Unit, u, in Imbalance Settlement Period, γ;

(c) $PCCSUP_y$ is the Supplier Capacity Charge Price in Capacity Year, y;

(d) $FQMCC_\gamma$ is the Capacity Charge Metered Quantity Factor in Imbalance Settlement Period, γ;

(e) $\sum_{u \in s}$ is a summation over all Generator Units, u, in Trading Site, s, relevant to the Trading Site Supplier Unit;

(f) $\sum_{v \in s}$ is the value for the single Trading Site Supplier Unit, v, in Trading Site, s, in accordance with paragraph B.9.1.2;

(g) $\sum_{\gamma \in c}$ is a summation over all Imbalance Settlement Periods, γ, within Capacity Period, c; and

(h) $FSOCDIFFP_y$ is the Difference Payment Socialisation Multiplier in Capacity Year, y.

4.7 VARIABLE MARKET OPERATOR CHARGE

A.1.1 Variable Market Operator Charge

A.1.1.1 The Market Operator shall calculate the Variable Market Operator Charge ($CVMO_{pb}$) for Participant p in respect of its Supplier Units in Billing Period b as follows:

$$CVMO_{pb} = PVMO_y \times \sum_{v\ in\ p} \sum_{\gamma\ in\ b} QMGDLF_{v\gamma}$$

where:

(a) $PVMO_y$ is the Variable Market Operator Price for Year y;

(b) $QMGDLF_{v\gamma}$ is the Loss-Adjusted Gross Demand Metered Quantity from Supplier Unit v for Imbalance Settlement Period γ;

(c) $\sum_{\gamma\ in\ b}$ is a summation over Imbalance Settlement Periods γ for Billing Period b; and

(d) $\sum_{v\ in\ p}$ is a summation over all Supplier Units v registered to Participant p.