TRADING & SETTLEMENT CODE – HELICOPTER GUIDE

Version 2.0

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1. INTRODUCTION

1.1 Purpose

This Helicopter Guide is intended to provide a high-level summary of the Single Electricity Market (SEM) arrangements, which are set out in a multi-lateral agreement that all electricity licensees are required to become a Party to: the Trading and Settlement Code (TSC), which includes the Glossary, the Appendices and the Agreed Procedures (collectively referred to as the TSC in this Helicopter Guide. This guide is written based upon version 13.0 of the TSC.

1.2 Disclaimer

This guide is only intended to give an overview of the SEM arrangements, as defined within the TSC, but does not form part of the TSC. It is not, and is not meant to be, a comprehensive description of the TSC and/or a substitute for the detailed provisions of the TSC and no person is entitled to rely on this Helicopter Guide for any purpose. It is intended as a guide to assist the reader in understanding the TSC and should be read in conjunction with the TSC. Any person that is, or is considering becoming, a Party to the TSC must refer to the TSC itself in order to understand the SEM arrangements.

While care has been taken to ensure that this Helicopter Guide provides an accurate reflection of the rules, readers should be aware that should there be any discrepancies between this guide and the TSC, then the provisions set out in the TSC apply.

1.3 The TSC

The TSC sets out the trading and settlement rules and procedures for participation in the SEM. The TSC consists of the sections outlined below:

- **Section 1 "Introduction and Interpretation"**: sets out the Objectives of the TSC and the rules of interpretation to be applied throughout the TSC.

- **Section 2 "Legal and Governance"**: sets out the legal basis for the TSC and requirements for those who seek to participate in the SEM and also includes TSC accession and registration processes, obligations on Parties to the TSC and TSC modification governance.

- **Section 3 "Data and Information Systems"**: sets out rules relating to the systems and procedures for data transactions and storage.

- **Section 4 "Pricing"**: sets out pricing rules for Participants, which apply for all Generator Units unless specific rules to the contrary are outlined in Section 5.

- **Section 5 "Categorisation of Units and Rules for Special Units"**: sets out specific pricing rules which apply to some specific Generator Units in addition to or instead of those specified in Section 4.

- **Section 6 "Financial and Settlement"**: sets out rules for the settlement of payments/charges under the TSC and for financial arrangements including credit cover.

- **Section 7 "Interim Arrangements"[1]**: sets out provisions which suspend, amend or replace the provisions of other parts of the TSC, and which apply for a limited period of time only.

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[1] The provisions within this Section are not reflected in this guide.

- **Section 8 "Transitional Arrangements"**[2]: sets out provisions which suspend, amend or replace the provisions of other parts of the TSC to apply in the run up to SEM go-live and during the early operation of the SEM, particularly the first Trading Day.

- **Section 9 "Intra-Day Trading Transitional Arrangements"**[3]: sets out provisions which were required to enable the initiation of Intra-Day Trading into the SEM, introduced by Mod_18_10 from July 2012.

  These provisions in Sections 8 and 9 are now no longer operational, but have not been removed from the TSC on legal advice.

- **Appendices**: set out details of data transactions and specific calculations or processes required under the TSC, such as the pricing algorithm.

- **Glossary**: sets out definitions for the terms and variables (which have initial Capital Letters) used in the TSC.

- **Agreed Procedures**: set out detailed procedures to be followed in performing obligations and functions under the TSC.

1.4 Timing conventions

The TSC uses the following main timing conventions:

- **Trading Period**: means a thirty minute period beginning on each hour or half-hour.

- **Trading Day**: means the period commencing at 06:00 each day and ending at 06:00 the next day.

- **Gate Window Closure**: means a period of time within which Data Transactions may be submitted and accepted for use in the associated MSP Software Run.

- **Settlement Day**: means a period starting from 00:00 and ending at 24:00 each day.

- **Billing Period**: means one Week commencing at 00:00 on Sunday.

- **Capacity Period**: means one Month commencing at 00:00 on the first day of the Month.

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[2]   The provisions within this Section are not reflected in this guide.
[3]   The provisions within this Section are not reflected in this guide.

2. PARTIES AND PARTICIPANTS

2.1 Introduction

This section outlines the roles and obligations of the original signatories to the TSC and the registration process for Participants.

The TSC was developed as part of the process of establishing the SEM and constitutes the trading arrangements for the Single Electricity Market pursuant to section 23 of the Northern Ireland (Miscellaneous Provisions) Act 2006 in Northern Ireland and section 9BA(1) of the Electricity Regulation Act 1999 in Ireland. The legal basis of the TSC is a Framework Agreement which binds the original signatories and all those who subsequently become Parties to the Agreement through the Execution of an Accession Deed. All electricity licensees are required by their licence to be a Party to the TSC[4].

2.2 Roles and obligations of original signatories

Parties who undertake the following roles are the original signatories to the Framework Agreement and so are bound by the TSC:

- Market Operator;
- System Operators;
- Distribution System Operators;
- Transmission Asset Owners; and
- Meter Data Providers.

2.2.1 Market Operator

SEMO is responsible for the administration and operation of the TSC. EirGrid plc. (EirGrid) and SONI Ltd. (SONI) jointly carry out the Single Market Operator (SEMO) function for the SEM under licence. Note that SEMO is known as the Market Operator throughout the TSC.

2.2.2 System Operators

SONI is the System Operator (SO) for Northern Ireland while EirGrid is the SO in Ireland.[5] SONI and EirGrid take joint responsibility for the role of System Operator in the SEM and so are collectively responsible for coordination, direction and flow of electricity on the transmission network. SONI and EirGrid each retain responsibility for dispatching generation connected to their own transmission system and for fulfilling System Operator obligations under the TSC within their own jurisdiction.

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[4] Where the RAs have consented to the registration of any Licensee's Generation Units by an Intermediary, the Licensee shall not be obliged to be a party to the Single Electricity Market Trading and Settlement Code in respect of such Generation Units but shall ensure that the Intermediary shall be party to and shall comply with the Single Electricity Market Trading and Settlement Code insofar as applicable to the Intermediary in respect of such Generation Units. (See Condition 17 of Generation Licence)

[5] SONI Ltd is the licensed TSO for Northern Ireland under Article 10(1) (b) of the Electricity (Northern Ireland) Order 1992. EirGrid plc is the independent TSO in Ireland licensed under Section 14 (1) (e) of the Electricity Regulation Act 1999. In March 2009 EirGrid completed the acquisition of SONI Limited, the System Operator for Northern Ireland.

2.2.3   Distribution System Operators

Distribution System Operators (DSOs) refer to the operators of the distribution networks. The operator of the distribution network in Northern Ireland is Northern Ireland Electricity, a subsidiary company of ESB Group while in Ireland the DSO is ESB Networks Ltd. (ESB Networks).

2.2.4   Transmission Asset Owners

The Transmission Asset Owner is the entity owning the transmission network. ESB Networks owns the transmission assets in Ireland. In Northern Ireland, the transmission network is owned by Northern Ireland Electricity.

2.2.5   Meter Data Providers

The relevant DSOs are the Meter Data Providers, which are obliged to submit meter data to SEMO. In Ireland, the Distribution System Operator, ESB Networks also has responsibility for the metering code and equipment. In Northern Ireland, Northern Ireland Electricity is in charge of metering data provision to SEMO. Separately, both System Operators (SONI and EirGrid) have metering responsibilities in respect of generation and of transmission system metering and are Meter Data Providers.

2.3   Accession and Registration

2.3.1   Accession

Persons other than the original signatories who wish to be Parties to the TSC must follow the accession process. This entails the completion of an application form, payment of an Accession Fee, demonstration of compliance with the eligibility criteria and, when provided, execution of the Accession Deed. When SEMO receives an executed Accession Deed, the applicant becomes a Party to the Framework Agreement and thus bound by the provisions of the TSC.

2.3.2   Registration

In order to participate in the market, a Party (or an applicant to become a Party) must become a Participant by registering Unit(s). This entails the completion of a Participation Notice, exchange of information (including validation by SEMO of the information submitted), and the payment of a Participation Fee. As part of the registration process, SEMO requires evidence that valid connection agreements, use of system agreements and generation or supply licences are in place. The detailed requirements are set out on the application form.

2.3.3   De Minimis Threshold

The TSC requires mandatory participation for Generators with a Maximum Export Capacity of 10MW or greater. In the TSC, this is referred to as the De Minimis Threshold. Any generator(s) with a capacity greater than or equal to the De Minimis Threshold and which is covered by a single connection agreement is obliged to participate in the Pool. Generators with capacities less than the De Minimis Threshold are not so obliged and may choose not to participate as Generator Units under the TSC, and may instead participate within a Supplier Unit as negative demand. There is no requirement for mandatory participation by Demand Side Units.

2.3.4   Intermediary arrangements

The Intermediary arrangements permit the owner of a generator to appoint an Intermediary to fulfil all of its obligations under the TSC. In order that the Generator Unit may be registered by the Intermediary, both regulatory approval[6] and formal authorisation from the unit owner must be given. In these circumstances, the unit owner has no direct obligations under the Code relating to that generator.

2.3.5   Data Processing Entity arrangements

The TSC makes formal provision for Parties to appoint a Data Processing Entity who may submit data, raise queries and view settlement statements on its behalf. In these circumstances, the Party remains liable for fulfilling all TSC obligations. The Data Processing Entity is simply the Party's agent.

2.4   Unit types

There are two generic Unit types used for settlement within the Code; Generator Units and Supplier Units. Generator Units predominantly cover those entities which are capable of delivering energy to the SEM, including all units relating to interconnectors (whether in either import or export mode), and including Demand Side Units which offer demand reduction. Supplier Units predominantly cover those settlement entities that typically consume energy (excluding interconnectors), but may include (as negative demand) generators that are below the 10MW De Minimis Threshold.

2.4.1   Generator Units

The TSC recognises several distinct types of Generator Units for the purposes of participation. These are grouped into several generic settlement classes, plus some special cases. Table 1 below presents the five generic settlement classes for Generator Units and the distinctions between them. Each Generator Unit must be registered as belonging to one of these generic settlement classes, except where the TSC makes specific provisions to the contrary. The relevant generic settlement class for a Generator Unit is based on the answers to the following questions:

1.   Is the Generator Unit Dispatchable by the relevant System Operator?

  –   if the Generator Unit is not Dispatchable it is classed as Autonomous, then proceed directly to Decision 3

  –   if the Generator Unit is Dispatchable, then proceed to decision 2

2.   Is the availability of the Generator Unit's fuel source variable (limited to wind or run-or-river hydro) in the short-term?

  –   if the Generator Unit's fuel source is variable in the short term; that is, the fuel in question is wind or run-of-river hydro, it is classed as a Variable Generator Unit

  –   if the Generator Unit's fuel source is not variable in the short term, (i.e. the fuel in question is not wind or run-of-river hydro), it is classed as a Predictable Generator Unit

  –   in both cases, then proceed to Decision 3

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[6]   The Regulatory Authorities published four decisions on the criteria that need to be met to permit the registration of an Intermediary. The initial decision (AIP/SEM/07/029) was published on 28th February 2007. These criteria were extended (SEM/07/11) on 10th December 2007. A special (time limited) exemption was issued (SEM/08/170) on 3rd November 2008 and a further extension under limited special circumstances (SEM-11-140) issued on 30th March 2011.

3. Is the Generator Unit to be included in the price setting process?

- – if the Generator Unit is Autonomous, it must be registered as a Price Taker
- – if the Generator Unit does not have Priority Dispatch[7] status, it must register as a Price Maker
- – if the Generator Unit does have Priority Dispatch status, it can choose to register as a Price Maker or as a Price Taker (and can change status between the two with 29 days notice)

Table 1 – Generator Units – generic settlement classes					
Decision 1	**Decision 2**		**Decision 3**	**Price Setting?**	
				Yes	*No*
				Price Maker	**Price Taker**
Dispatchable? *Yes*	**Variable?**	*No*	**Predictable**	▪ Predictable Price Maker ▪ Default	▪ Predictable Price Taker (Priority Dispatch only)
		Yes	**Variable** **Wind or run-of-river hydro**	▪ Variable Price Maker	▪ Variable Price Taker (Priority Dispatch only)
No		*n/a*	**Autonomous** **Not Dispatchable**	▪ N/A	▪ Autonomous

2.4.1.1 Special Units

Special provisions exist for certain types of Generator Unit. Table 2 outlines these Special Units, alongside a summary of their role in the Market and their settlement class.

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[7] Note that the basis for Priority Dispatch for a Generator Unit is not determined by the TSC, rather by the TSO Licences and the Grid Code

Table 2 – Special Units – roles and settlement classes		
Unit	**Role**	**Settlement Class**
Demand Side Unit	Demand site or several sites in the same Currency Zone[8] which offers an ability to deliver demand reduction in response to dispatch instructions	Predictable Price Maker Generator Unit
Energy Limited Generator Unit	Hydro-electric generator which has a physical energy limit	Predictable Price Maker Generator Unit
Interconnector Unit	Unit which allows Interconnector users to trade between SEM and BETTA	Predictable Price Maker Generator Unit
Interconnector Error Unit	Unit to which imbalance on an Interconnector is allocated for settlement	Autonomous Generator Unit
Interconnector Residual Capacity Unit	Unit which allows SO to utilise/trade spare Interconnector capacity	Predictable Generator Unit, but neither a Price Maker or a Price Taker
Pumped Storage Unit	Generator Unit within a pumped storage plant	Predictable Price Maker Generator Unit
Aggregated Generator Unit	Collection of Generators each with capacity not greater than 10MW and all in the same Jurisdiction	Predictable Price Maker Generator Unit

2.4.1.2 Netting Generator Units

A Netting Generator Unit must be registered as part of each Trading Site (see Section 2.5 for more details regarding Trading Sites). A Netting Generator Unit is a notional Generator Unit registered to facilitate settlement of a Trading Site. Netting Generator Units do not physically exist, have no meter associated with them and are treated as Autonomous Generator Units for most purposes.

2.4.2 Supplier Units

Supplier Units are a collection of demand sites (and, potentially, generators which are below the De Minimis Threshold and which are not classed as Generator Units) for which metered consumption (which can be positive or negative) is aggregated. The following specific variations of Supplier Units are highlighted in the TSC:

- Error Supplier Unit – each jurisdiction has an Error Supplier Unit for which loss-adjusted net demand in that jurisdiction, allowing for net transfers between jurisdictions, is calculated. Note that, as a result of the introduction of Global Settlement by Mod_34_09 in May 2011, such errors are now small and may be zero since error energy amounts are allocated pro-rata to Supplier Units.

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[8] Currency Zone means the Jurisdiction in which the Unit is Connected.

- Trading Site Supplier Unit – a Supplier Unit that contains only the demand within a Trading Site and is settled on a net basis against the Generator Units on that Trading Site.

- Associated Supplier Unit – a Supplier Unit which is recorded to a Trading Site but may also contain demand outside that Trading Site and has its demand settled on a gross basis with the Generator Unit(s) on that Trading Site.

2.5   Trading Sites

All Generator Units (except Interconnector Units) must be registered as part of a Trading Site. A Trading Site refers to one or more Generator Units (covered by a single connection agreement or located collectively on a contiguous site)and either a Trading Site Supplier Unit or an Associated Supplier Unit.

There are two types of Trading Site. The first, illustrated in Figure 1, incorporates an Associated Supplier Unit, which has no physical link to the Trading Site. Generation and demand linked to the Units within this type of Trading Site are settled on a gross basis. The intention behind these arrangements is to ensure that if a generator site is importing, it is settled as demand (within the Associated Supplier Unit) rather than as generation.

The second, illustrated in Figure 2, incorporates a Trading Site Supplier Unit, which is located within the Trading Site, which must be a contiguous site or covered by a single connection agreement. Generation and demand linked to the Units within this type of Trading Site are settled on a net basis. The intention behind these arrangements is to facilitate net settlement at qualifying sites with both generation and demand. This is set out in paragraphs 2.62 to 2.68.

Figure 1 – Trading Site with Associated Supplier Unit

Generator Unit 1

Generator Unit 2

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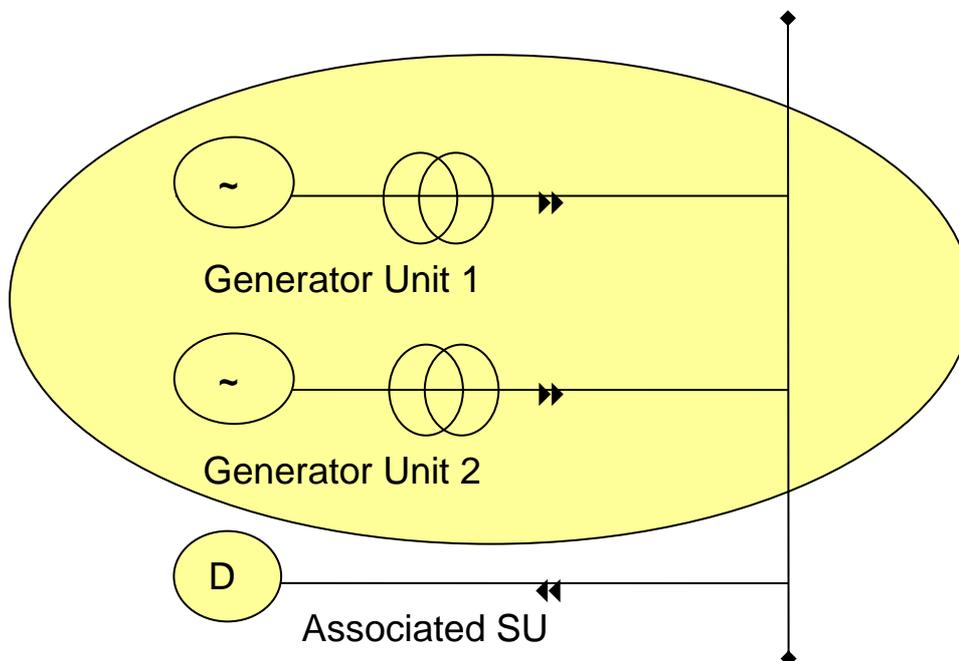
Associated SU

Figure 2 – Trading Site with Trading Site Supplier Unit
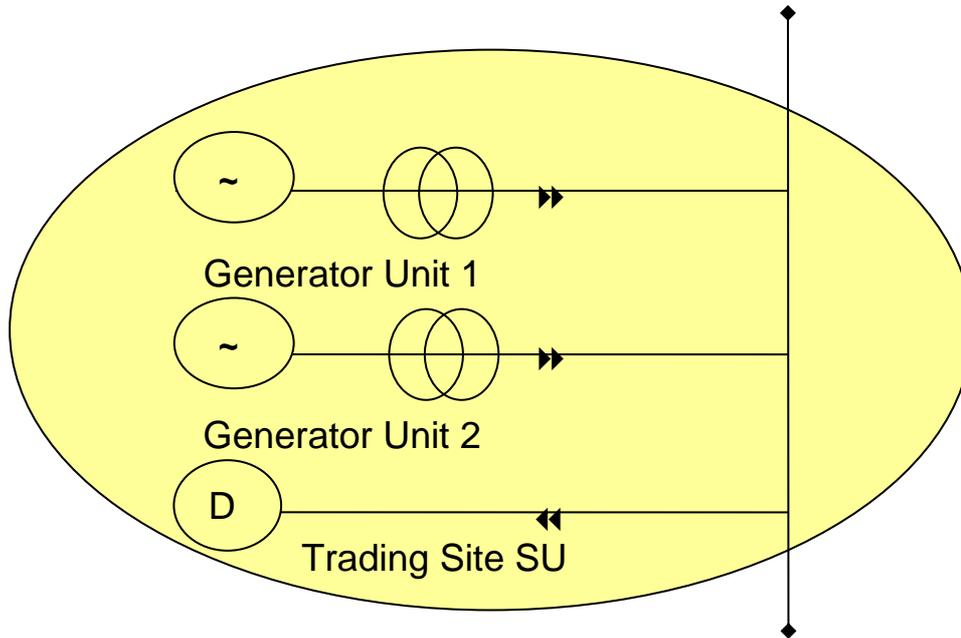
Each Unit within a Trading Site is registered to the same Participant, except for Associated Supplier Units which may contain demand from other Participants outside the Trading Site. There are special arrangements for generator sites with relevant metering to be registered as more than one Trading Site (see paragraphs 2.65 to 2.68). On registration of a Trading Site, SEMO registers a Netting Generator Unit for that site, as mentioned in Section 2.4.1.2 (above).

3.   MARKET OVERVIEW

3.1   Introduction

This section provides a high-level overview of the key features of the SEM, which are:

- mandatory gross Pool;

- day-ahead and within-day complex bidding;

- Ex-Post System Marginal Price (SMP) pricing (which excludes transmission, reserve and other constraints), with a single island-wide price for each Trading Period;

- central dispatch;

- separate Capacity Payments Mechanism; and

- transmission and distribution losses.

Section 5 builds on this to provide a day-in-the-life example of the operation of the market.

3.2   Mandatory gross Pool

Participation in the Pool is mandatory for licensed generators and suppliers, save for generators which have a maximum export capacity of less than 10MW (the De Minimis Threshold) for which plant direct participation is voluntary. As a consequence, almost all electricity generated has to be sold into and purchased from the Pool.

Under the Pool arrangements, the sale and purchase of electricity is conducted on a common basis, with all generators/suppliers receiving/paying the same price for the electricity sold into/bought via the Pool in each Trading Period. Bilateral financial contracting (e.g. contracts for differences) can still occur, but the arrangements for doing so are separate from, and not covered within, the TSC.

Logically the trade between buyers and sellers of electricity takes place at a notional balancing point (the Trading Boundary) in the middle of the Market which is defined by the application of losses to generation and to demand through the Combined Loss Adjustment Factor (see paragraph 4.44A). The Combined Loss Adjustment Factor (CLAF) is the combination of Transmission (TLAF) and Distribution (DLAF) losses. Such trades take place at the Trading Boundary (see paragraphs 4.39 and 4.45). The TSC defines the CLAF for all Supplier Units to be 1.0 (see paragraph 4.44B); that is, all losses are applied to generation.

The mandatory gross Pool arrangements discussed above are summarised in Figure 3.

Figure 3 – Mandatory gross Pool arrangements
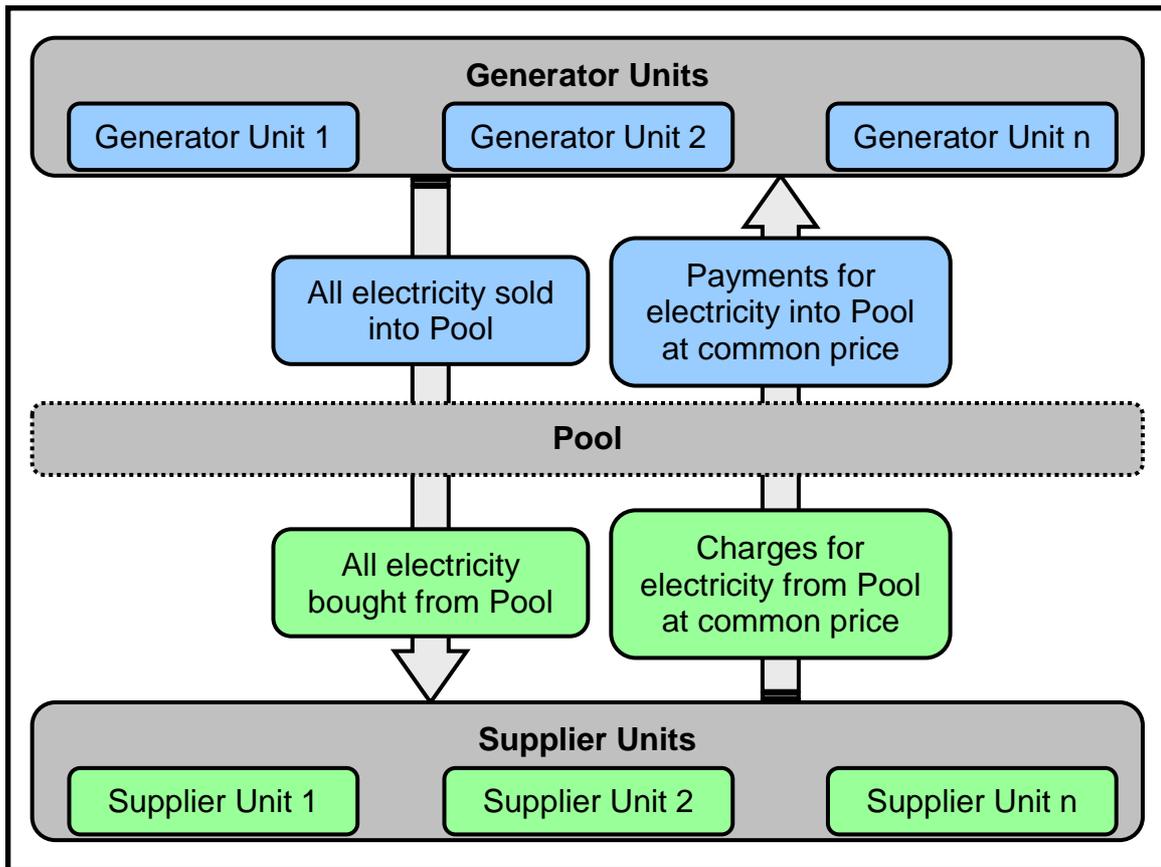
3.3 Complex bidding

The price (for each Trading Period) at which generators sell and suppliers buy is calculated by the Market Scheduling and Pricing (MSP) Software. There are five runs of the MSP Software in respect of each Trading Day; three runs: Ex-Ante One (EA1), Ex-Ante Two (EA2) and Within Day One (WD1) prior to the end of the Trading Day and two after more accurate data has been received, after the Trading Day: Ex-Post Indicative (EP1) and Ex-Post Initial (EP2). In respect of the first three runs, a Gate Window is defined during which Participants can submit Offer Data in respect of their Generator Units. The timing of these Gates is set out in paragraphs 4.3A and 4.3B. New Offer Data is not submitted for the Ex-Post SMP Software runs; the latest Ex-Ante data is used.

Participants are required to submit Offers into the Pool in respect of each Price Maker Generator Unit for each Trading Day. The data contained within Offers applies equally for all Trading Periods within the relevant Trading Day[9]. Offers must be submitted within the Gate Window for the relevant MSP Software Run. These Gate Windows are set out in paragraph 4.3A.

Offers consist of Commercial Offer Data and Technical Offer Data, as explained further below. The components of Commercial Offer Data and Technical Offer Data vary

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[9] Interconnector Units are an exception to this rule. Interconnector Units are able to submit individual Offers to apply for each Trading Period in order to enable effective interaction with interconnected markets.

depending upon the type of Generator Unit in question. Full details of the data required for each Generator Unit type are specified in Appendix I: Offer Data, of the TSC.

Offer Data is submitted in pounds sterling or euro depending upon the Currency Zone in which the relevant Generator Unit is registered (and connected). Where values are submitted in pounds sterling, the MO converts the values into euro on the basis of the Trading Day Exchange Rate, which is published at by 17:00 on the day prior to the EA1 Gate Window Closure.

For Interconnector Units, a different Unit is defined for each Gate. This is because the Market Schedule Quantity (MSQ) calculated by the MSP Software for each Interconnector Unit in the EA1 MSP Software Run is fixed into a Modified Interconnector Unit Nomination (MIUN) for that Unit. Any further capacity on the Interconnector can then be allocated based upon the Offers from Interconnector Units for the EA2 Gate, such allocation is again fixed into MIUNs for those Units and the remaining capacity (if any) can be allocated to Interconnector Units which make Offers for the WD1 Gate. This whole process is necessary to enable Interconnector Units to have a predictable trade volume to balance across the Interconnector (i.e. into or out of the adjacent market (BETTA)).

Technical Offer Data relates to the technical capabilities of the Generator Unit and consists of parameters such as ramp rates. Standard Commercial Offer Data consists of:

- **No Load Cost**: one No Load Cost, which is the element of operating costs which is invariant with the actual level of Output;

- **Start Up Costs**: a minimum of one and a maximum of three Start Up Costs, which reflect the costs associated with starting up the Generator Unit from cold, warm or hot states[10]; and

- **Price Quantity Pairs**: a minimum of one and a maximum of 10 Price Quantity Pairs, each of which sets out a Quantity up to and equal to which the associated Price applies. Price Quantity Pairs must be strictly monotonically increasing with only one Price for each Quantity. Price Quantity Pairs are bounded, in terms of Quantity, by the Minimum Output and Actual Availability of the Generator Unit from and, in terms of Price, by the Market Price Floor and the Market Price Cap (which are values set by the Regulatory Authorities). Examples of Price Quantity Pairs are shown in Figure 4.

The Offer Data submitted by Participants in respect of their Generator Units cannot be amended or adjusted by SEMO after its submission. There is one exception to this rule, which applies to Interconnector Units only. If an Interconnector Units submits Offer Data which would have the effect of making that Unit incur obligations to pay (e.g. in respect of exports from the SEM) and the Participant concerned has not lodged sufficient Credit Cover to ensure such payments, then SEMO will exclude bids such that obligations to pay are reduced to the level of the lodged Credit Cover.

In relation to all MW or MWh data submitted, the data is adjusted by the relevant Combined Loss Adjustment Factor (which is the combination of Transmission and Distribution Loss Adjustment Factors) before its use in the MSP Software.

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[10]   The definition of how long a unit takes to cool from hot to warm and to cold is defined within the submitted technical characteristics.

Figure 4 – Price Quantity Pairs
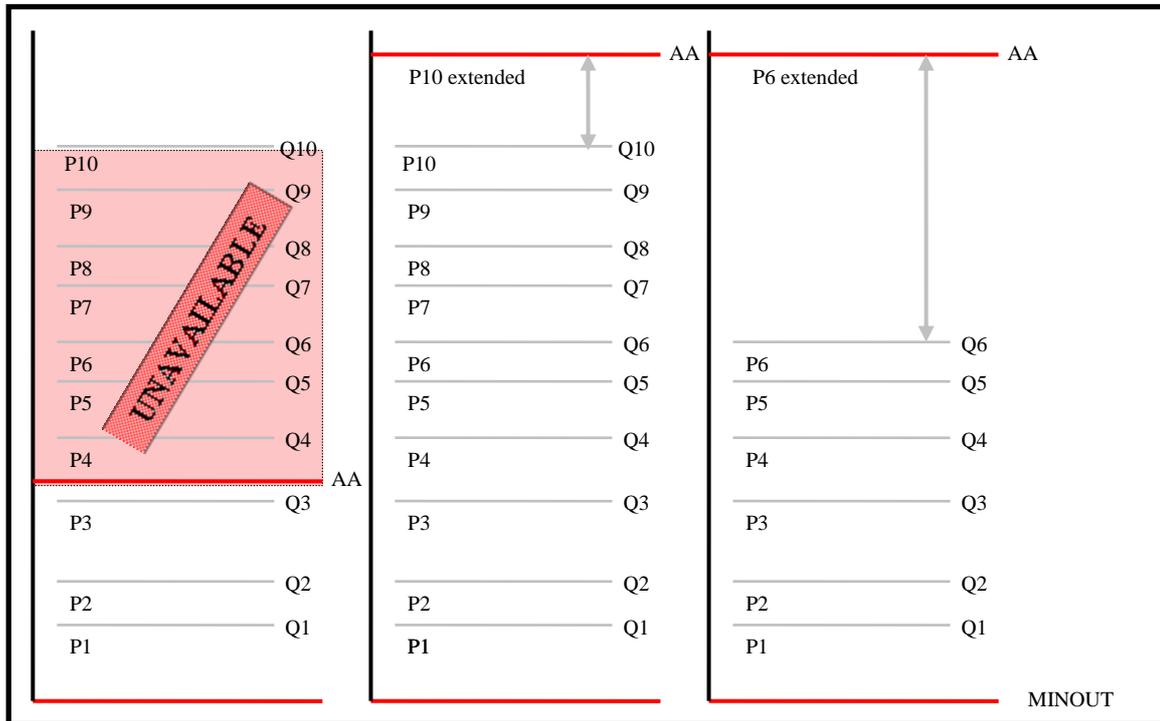
Table 3 and Table 4 identify, for the generic settlement classes discussed above, the data which must be submitted to represent Commercial Offer Data and Technical Offer Data. This shows that:

- Price Maker and Predictable Price Taker Generator Units submit Price-Quantity Pairs, No-Load Costs and Start-Up Costs of the nature outlined above only;

- Demand Side Units, which are Price Maker Generator Units, submit a Shut Down Cost instead of a Start Up Cost and do not submit a No Load Cost;

- Price Taker Generator Units submit Nomination Quantities, which outline the intended output of the Generator Unit in question during a Trading Period, and a Decremental Price, which must be set to zero, instead of or in addition to standard Commercial Offer Data;

- Autonomous Generator Units do not submit any Commercial Offer Data; and

- all Generator Units within the generic settlement classes submit the same categories of Technical Offer Data, except for Autonomous Generator Units which do not submit any Technical Offer Data.

Table 3 – Commercial Offer Data submission for generic settlement classes					
	Predictable Price Maker	**Predictable Price Taker**	**Variable Price Maker**	**Variable Price Taker**	**Autonomous**
PQ Pairs, start-up, no load costs	✓	✓	✓	✗	✗
Nomination Quantities, Decremental Price	✗	✓	✗	✓	✗

Table 4 – Technical Offer Data submission for generic settlement classes (sample)					
	Predictable Price Maker	**Predictable Price Taker**	**Variable Price Maker**	**Variable Price Taker**	**Autonomous**
Forecast Profiles (Availability, Minimum Output, Minimum Stable Generation)	✓	✓	✓	✓	✗
Min On Time, Max On Time, Min Off Time	✓	✓	✓	✓	✗
Ramp Rates, Soak Times, Dwell Times	✓	✓	✓	✓	✗

3.3.1   Default Data and Starting Gate Window Data

As part of the registration process, Participants are required to provide standing Commercial Offer Data and Technical Offer Data in respect of each of its Generator Units except Interconnector Units. This is referred to as Default Data. Participants are required to review the Default Data in respect of their Units at least once per quarter and to update it as appropriate to maintain its accuracy. Where Commercial Offer Data or Technical Offer Data are not submitted by Gate Closure for EA1, or, where such data are submitted and are not determined to be valid by SEMO, then Default Data shall apply for the relevant Trading Day. If no valid data is received for EA2, the default data is the data accepted for EA1. For WD1 the default data is the latest data accepted for that Trading Day.

For Interconnector Units, if no valid data is received, the Unit is treated as not wishing to use the Interconnector at that Gate. The Participant may, of course, submit data for a later Gate, if it has an Interconnector Unit for that Gate.

3.4   SMP Pricing

Under the Pool arrangements described above, all Generator Units receive and all Supplier Units pay the same energy component of price in a Trading Period for electricity; the System Marginal Price (SMP). The SMP is determined via the Market Scheduling and Pricing (MSP) Software, which is run by SEMO. A high-level overview of the workings of the MSP Software is set out below.

3.4.1   Outputs of MSP Software

The MSP Software is used to calculate:

- the SMP for each Trading Period; and

- the Market Schedule Quantity (MSQ) (being the quantity of Output scheduled by the MSP Software) for each Price Maker Generator Unit[11] for each Trading Period, ignoring transmission constraints and reserve requirements (i.e. assuming an unconstrained schedule).

The MSP Software runs for an Optimisation Time Horizon, which is a 30 hour period from 06:00 on the relevant Trading Day up to 12:00 on the subsequent Trading Day (other than on clock change days).

3.4.2   Principles of MSP Software

The MSP Software gives individual consideration only to Price Maker Generator Units which are not Under Test. No other Units are represented individually within the MSP Software (except during the calculation of Schedule Demand). Based on the Commercial and Technical Offer Data provided by Participants, the MSP Software seeks to identify the lowest total production cost solution at which Price Maker Generator Units provide sufficient generation to meet demand that is not met by Price Taker and Autonomous Generator Units and Generator Units Under Test.

The MSP Software calculates the SMP in each Trading Period to:

- reflect the cost of the marginal MW required to meet demand in a Trading Period within the context of an unconstrained schedule – this is the **Shadow Price** component; and

- recover operating costs associated with Start Up Costs and No Load Costs – this is the **Uplift** component.

The resultant formula for the derivation of SMP in a Trading Period is:

- SMP = Shadow Price + Uplift

SMP is bounded by a Market Price Cap and a Market Price Floor, which are set by the Regulatory Authorities.

3.4.3   High level processes associated with the operation of the MSP Software

3.4.3.1 MSP Software Run Types

As mentioned earlier, there are five MSP Software Runs in respect of each Trading Day:

- Ex-Ante One (EA1) MSP Software Run;

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[11]   Generator Units under test are effectively treated as price takers within the MSP Software.

- Ex-Ante Two (EA2) MSP Software Run;

- Within Day One (WD1) MSP Software Run;

- Ex-Post Indicative (EP1) MSP Software Runs; and

- Ex-Post Initial (EP2) MSP Software Runs

The EA1 MSP Software Run is performed by SEMO by 11:00 D-1 (i.e. 90 minutes after EA1 Gate Window Closure for the relevant Trading Day).

The EA2 MSP Software Run is performed by SEMO by 13:00 D-1 (i.e. 90 minutes after EA2 Gate Window Closure for the relevant Trading Day).

The WD1 MSP Software Run is performed by SEMO by 09:30 D (i.e. 90 minutes after WD1 Gate Window Closure for the relevant Trading Day).

For each of these runs there is a defined Trading Window which specifies the Trading Periods for which results shall be published. For EA1 and EA2, the Trading Window is the whole of the Trading Day (i.e. each half-hour starting at the one beginning at 06.00 and ending with the one beginning at 05.30 on the next day). For WD1, the Trading Window is that part of the Trading Day after 18.00 (i.e. the second half of the Trading Day) only.

It should be noted that, although there will always be an Ex-Ante One MSP Software Run, either or both of the EA2 and WD1 runs may be cancelled, if it becomes impossible for them to be completed in a timely fashion. The conditions under which such runs may be cancelled and the results of so doing are set out in paragraphs 4.82C to 4.82H.

The outputs of these runs are:

- indicative SMP and Shadow Price values;

- indicative values of MSQ for each Price Maker Generator Unit that is not Under Test in order to determine the Ex-Ante Indicative Market Schedule for Price Maker Generator Units that are not Under Test; and

- Interconnector Unit Nominations (being the quantity nominated for import or export for an Interconnector Unit) for each Interconnector Unit. These IUNs may subsequently be adjusted to take account of factors such as Interconnector Dead Bands (between minimum import and minimum export) to produce the Modified Interconnector User Nomination (MIUN) for each Interconnector Unit in each Trading Period[12].

The Ex-Post Indicative (EP1) MSP Software Run is performed by SEMO by 16:00 on the day after the start of the relevant Trading Day. The outputs of this run are:

- indicative SMP and Shadow Price values; and

- indicative values of MSQ for each Price Maker Generator Unit that is not Under Test. The MSQ values for Interconnector Units are the MIUNs determined following the relevant Ex-Ante MSP Software Run

The Ex-Post Initial (EP2) MSP Software Run is performed by SEMO by 17:00 four days after the start of the relevant Trading Day. The outputs of this run are:

- SMP and Shadow Prices ; and

- values of MSQ for each Price Maker Generator Unit that is not Under Test.

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[12] The Rules for the Calculation of Modified Interconnector Unit Nominations are set out in Appendix 2 of Agreed Procedure 2.

3.4.3.2 *Operation of the MSP Software*

The following steps are taken by the MSP Software in calculating SMP values and MSQ values, assuming an unconstrained schedule, for each Price Maker Generator Unit that is not Under Test for each Trading Period:

1. Determine the Unit Commitment Schedule for each Trading Period in the Optimisation Time Horizon, which denotes whether or not each Price Maker Generator Unit that is not Under Test will be scheduled to run.

2. Based on the Unit Commitment Schedule, determine the Shadow Price values and the MSQ values for each Price Maker Generator Unit that is not Under Test for each Trading Period in the Optimisation Time Horizon.

3. Calculate Uplift for each Trading Period in the Optimisation Time Horizon.

4. Calculate SMP for each Trading Period in the Trading Day based on the Shadow Price values plus the Uplift values, within the bounds of the Market Price Floor and the Market Price Cap.

In determining Unit Commitment Schedules and MSQ values, the high-level objective of the MSP Software is to minimise the sum of MSP Production Costs (being the production costs of each Price Maker Generator Unit that is not Under Test which is scheduled to run) subject to the following constraints:

1. to schedule output by Price Maker Generator Units that are not Under Test to meet demand;

2. the maintenance of MIUNs in respect of previous Ex-Ante MSP Software Runs in respect of that Trading Day (see Appendix N.55A and N.55B) and

3. to schedule each Price Maker Generator Unit that is not Under Test within its capacities and technical capabilities.

When calculating Uplift, the high-level objective of the MSP Software is to reflect the marginal cost of producing or consuming electricity during the Optimisation Time Horizon such that:

1. energy prices should be reflective of underlying Market dynamics such that the recovery of Start Up and No Load Costs through SMP should not deviate significantly from the Shadow Prices; and

2. revenue paid through Uplift should be minimised.

3.5 Central Dispatch

Under the SEM, Dispatchable Generator Units are dispatched centrally by the SOs, rather than autonomously through self-dispatch by the Generator Unit operator. Arrangements for dispatch are included in the relevant Grid Code and are not contained within the TSC.

As for the market schedule determined by the MSP Software, actual dispatch patterns are in principle based upon economics, and it is a reasonable expectation that the cheapest generation will scheduled to run first, whilst respecting the technical capabilities of the Generator Units. However, while the MSP Software produces Market Schedule Quantities on the assumption of an unconstrained system, ignoring the impact of, for example, transmission constraints, voltage and reserve requirements, the SOs must dispatch Generator Units taking system constraints and reserve requirements into account (and must also consider real-time issues on the system such as unplanned outages). Therefore, the actual dispatch schedule followed is likely to deviate from the Market Schedule Quantities produced by the MSP Software.

Following the Ex-Ante Two (EA2) MSP Software Run at 13:00 D-1, the SOs produce an Ex-Ante Indicative Operations Schedule at 16:00 D-1. This is a day-ahead schedule which takes system constraints and reserve requirements into account to give indicative MW outputs for the Trading Day. Actual dispatch is achieved through the issue of Dispatch Instructions throughout the Trading Day.

Any difference between the Market Schedule Quantities and the Dispatch Quantity for a Generator Unit will result in payments to or from the Participant (see Section 4 below).

3.6   Capacity Payments Mechanism

While SMP pricing ensures that the SMP reflects the value of energy, the Capacity Payments Mechanism attaches a value to the provision of capacity within the market. The Capacity Payments Mechanism is intended to strike a balance between providing the highest capacity prices at periods of highest loss-of-load probability or tightest margin in order to value the provision of capacity appropriately, and providing a stable set of investment signals.

Under the Capacity Payments Mechanism, Capacity Payments are made in respect of Generator Units based on a measure of their availability, and hence the provision of capacity. Capacity Payments are funded by Capacity Charges, which are levied in respect of Supplier Units based upon their electricity consumption.

The methodology by which Capacity Payments are derived and funded is summarised in simplified form in Figure 5.

Figure 5 – Derivation of Capacity Payments and Capacity Charges

```
                    ┌─────────────────────────────────────────┐
                    │   Annual Capacity Payment Sum set by RAs │
                    └─────────────────────────────────────────┘
                                         │
                                         ▼
                    ┌─────────────────────────────────────────┐
                    │ Divided into 12 Capacity Period Payment  │
                    │           Sums by RAs                    │
                    └─────────────────────────────────────────┘
```

One single component for Supplier Units; Fixed

Based on RA specified splits, divided into 3 separate components for Generator Units; Fixed, Variable and Ex-Post

Capacity Period Payment Sum (currently 100%)	**Capacity Period Fixed Sum (currently 30%)**	**Capacity Period Variable Sum (currently 40%)**	**Capacity Period Ex-Post Sum (currently 30%)**

Profiled into Trading Periods based on Forecast Demand in that Trading Period relative to the minimum Forecast Demand in the relevant Capacity Period. Profile determined before

Profiled into Trading Periods based on Forecast Demand in that Trading Period relative to the minimum Forecast Demand in the relevant Capacity Period. Profile determined before

Profiled into Trading Periods based on forecast Loss of Load Probability in that Trading Period relative to sum of forecast Loss of Load Probabilities for each Trading Period in the Capacity Period. Profile determined before start of

Profiled into Trading Periods based on Ex-Post Loss of Load Probability in that Trading Period relative to sum of Ex-Post Loss of Load Probabilities for each Trading Period in the Capacity Period. Profile determined ex-post, after Capacity Period

Fixed Capacity Payments Weighting Factor

Variable Capacity Payments Weighting Factor

Ex-Post Capacity Payments Weighting Factor

Calculate Capacity Payments Demand Price and scale based on the relative levels of SMP and the Value of Lost Load

Calculate Fixed/Variable/Ex-Post Capacity Payments Generation Prices and scale based on the relative levels of SMP and the Value of Lost Load

Capacity Payments Demand Price

Capacity Payments Generation Price

Multiply Capacity Payments Demand Price by the Supplier Unit's Net Demand

Multiply Capacity Payments Generation Price by the Generator Unit's Eligible Availability

Capacity Charges to Supplier Unit in Trading Period

Capacity Payments to Generator Unit in Trading Period

Key

Generator specific

Supplier specific

3.7　Transmission and Distribution losses

As mentioned earlier, all trading under the Pool is deemed to take place at the Trading Boundary. The Trading Boundary is the notional balancing point for generation and supply and is the point of sale for trading in the SEM at which the title for all products and services settled through the trading arrangements set out in the TSC transfers. Adjustments are made to all values expressed in MW, MW/min or MWh to reflect the losses incurred on the transmission and distribution system as electricity is transported to or from the Trading Boundary from or to the relevant point of connection to the transmission system for the Generator Unit or Supplier Unit. These adjustments are made through the application of Combined Loss Adjustment Factors (CLAFs) calculated by SEMO from the Transmission and Distribution Loss Adjustment Factors (TLAFs and DLAFs) provided by the SO for each Generator Unit for each Trading Period. The TSC specifies that CLAFs for Supplier Units will be set equal to 1.

3.8　Firm and Non-Firm Access

A Generator Unit can have Firm Access or Non-Firm Access. If a Generator Unit has Firm Access for a certain quantity of output, it has firm rights under a Connection Agreement to be able to export that quantity of output onto the system at its point of connection. Where a Generator Unit does not have Firm Access for its Maximum Export Capacity, it has Non-Firm Access for the quantity of output above that for which it has Firm Access rights, which limits its eligibility for compensation if its dispatch is constrained.

# 4. PAYMENTS, CHARGES AND SETTLEMENT

4.1 Introduction

This section provides a high-level overview of the following aspects of SEM:

- payments and charges to/from Participants;
- settlement; and
- credit cover.

4.2 Payments and Charges

Figure 6 and Figure 7 below illustrate the different elements payments and charges for Generator Units and Supplier Units.

Figure 6 – Generator Unit Payments

1 Energy Payments
Payment for (Ex-Post, unconstrained) scheduled energy volumes

4 Capacity Payments
Payment for availability

2 Constraint Payments
Compensation for differences between scheduled and dispatched energy volumes

Generator Unit Payments

5 Make Whole Payments
Guaranteed recovery of (submitted) costs of scheduled energy volumes (weekly)

3 Uninstructed Imbalances
Adjustment for differences between dispatched and delivered energy volumes

6 Charges
*Imperfections (for net demand)
Testing charges
MO Fixed charges*

Figure 7 – Supplier Unit Charges
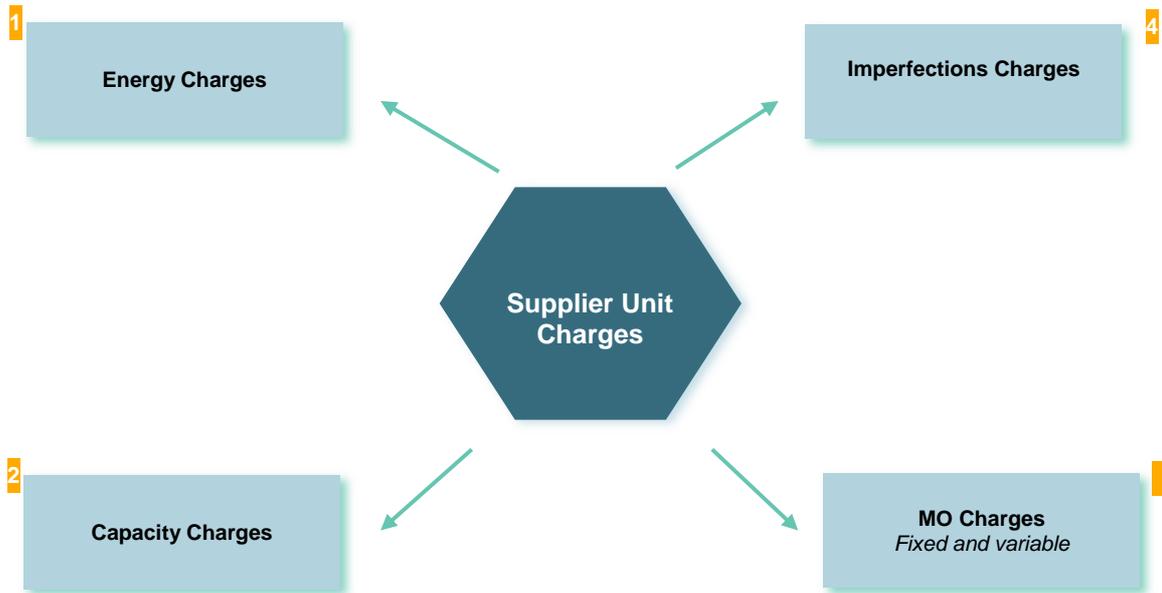
4.2.1 Generator Unit Payments

Generator Unit Payments fall into the following broad classes:

- **Trading Payments**: payments to Participants in respect of their Generator Units over a Billing Period (a week). Such payments will comprise Energy Payments, Constraint Payments, Uninstructed Imbalance Payments (all of which may be positive or negative) and Make Whole Payments less any Testing Charges, as discussed below; and

- **Capacity Payments**: payments to Participants in respect of their Generator Units over a Capacity Period (a month) as outlined in Section 4.2.1.5.

4.2.1.1 Energy Payments

An Energy Payment is made to a Participant for a Billing Period in respect of a Generator Unit based upon the energy sold by the Generator Unit over the Billing Period calculated as the product of MSQ and the prevailing SMP. Table 5 highlights the basis of the MSQ values for Generator Units belonging to the generic settlement classes discussed above.

	Table 5 – MSQ determination for generic settlement classes				
	Predictable Price Maker	**Predictable Price Taker**	**Variable Price Maker**	**Variable Price Taker**	**Autonomous**
MSQ	Calculated by MSP Software	Minimum of Nominated Quantity and Availability Profile (which is calculated as the time weighted average of Outturn Availability)	Calculated by MSP Software	Actual Output	Actual Output

4.2.1.2 Constraint Payments

A Constraint Payment is made to (or by) a Participant in respect of a Generator Unit in any Trading Period when its Dispatch Production Cost (being the implied cost incurred by a Generator Unit for producing the Dispatch Quantity (DQ) specified in a Dispatch Instruction, determined based on Commercial/Technical Offer Data submissions) differs from its Schedule Production Cost (being the implied cost incurred by a Generator Unit for producing the level of output in accordance with the MSQ, determined based on Commercial/Technical Offer Data submissions). Table 6 highlights the eligibility of Generator Units belonging to the generic settlement classes to receive Constraint Payments.

Note that where a generator is constrained down such that its Dispatch Quantity (instructed by the System Operator) is lower than its Market Schedule Quantity, it will receive energy payments for its Market Schedule Quantity (at SMP) and will typically **pay back** to SEMO a Constraint Payment, based on the saving in cost between the dispatch quantity and the MSQ. In this case, it retains any difference between the SMP and the costs which would have been incurred to deliver its MSQ.

If the Constraint Payment is zero (as for Predictable or Variable Price Takers which are constrained down), then there are no repayments and the generator retains the full energy payment even if its real dispatch is at a lower level.

	Predictable Price Maker	Predictable Price Taker	Variable Price Maker	Variable Price Taker	Autonomous
Table 6 – Constraint Payment eligibility for generic settlement classes					
Eligible: Constrained up payments (payments to generators)	✓ as outlined above	✓ as outlined above	✓ as outlined above	✗	✗
Eligible: Constrained down payments (payments from generators)	✓ as outlined above	(✓ - Zero) based on difference between MSQ and DQ multiplied by the Decremental Price (but as Decremental Price must be **zero**, Constraint Payment equals zero)	✓ as outlined above	(✓ - Zero) based on difference between MSQ and DQ multiplied by the Decremental Price (but as Decremental Price must be **zero**, Constraint Payment equals zero)	✗

4.2.1.3 Uninstructed Imbalance Payments

An Uninstructed Imbalance Payment is made to (or by) a Participant in respect of a Generator Unit when its Actual Output differs from its Dispatch Quantity (i.e. when an Uninstructed Imbalance occurs). Tolerance bands exist for both positive and negative Uninstructed Imbalances. When the Uninstructed Imbalance is outside specified tolerance bands, the imbalance above (or below as applicable) the tolerance band is charged for/paid for at a premium/discount.

If a Generator Unit's actual generation is above its Dispatch Quantity:

- for over-generation up to and including the Tolerance Band for over-generation the Unit is paid, for each MWh, at the minimum of SMP and its Dispatch Offer Price (DOP).

- for any over-generation over and above the Tolerance Band for over-generation the Unit is paid, for each MWh, at the minimum of SMP or DOP, less the Discount for Over Generation.

If a Generator Unit's actual generation is below its Dispatch Quantity:

- for under-generation down to the Tolerance Band for under-generation the Unit has to pay back, for each MWh, at the maximum of SMP and DOP.

- for under-generation below the Tolerance Band for under-generation the Unit has to pay back, for each MWh, at the maximum of SMP or DOP, plus the Premium for Under Generation.

Table 7 highlights the eligibility of Generator Units belonging to the generic settlement classes to receive Uninstructed Imbalance Payments.

Table 7 – Uninstructed Imbalance Payment eligibility for generic settlement classes					
	Predictable Price Maker	**Predictable Price Taker**	**Variable Price Maker**	**Variable Price Taker**	**Autonomous**
Eligible: Over/under generation payments = payments to/from generators)	✓ as outlined above	✓ as outlined above, but when Actual Output is greater than MSQ, DOP is set to equal SMP	✓ as outlined above only when dispatched to deliver reduced output	✓ as outlined above only when dispatched to deliver reduced output, but DOP is set to equal SMP	✗

4.2.1.4 Make Whole Payments

A Make Whole Payment is made to a Participant in respect of a Generator Unit designed to make up any difference between the total Energy Payments to the Generator Unit in a Billing Period and the sum of the Schedule Production Cost for that Generator Unit for each Trading Period within the Billing Period (where the difference is arithmetically positive calculated over the Billing Period). Table 8 highlights the eligibility of Generator Units belonging to the generic settlement classes to receive Make Whole Payments.

Table 8 – Make Whole Payment eligibility for generic settlement classes					
	Predictable Price Maker	**Predictable Price Taker**	**Variable Price Maker**	**Variable Price Taker**	**Autonomous**
Eligible	✓ as outlined above	✗	✓ as outlined above	✗	✗

4.2.1.5 Capacity Payments

A Capacity Payment is made to a Participant in respect of a Generator Unit in each Capacity Period on the basis of the Unit's Eligible Availability, which is based on the Unit's Availability Profile. This methodology for determining Capacity Payments is set out in section 3.5. Table 9 highlights the eligibility of Generator Units belonging to the generic settlement classes to receive Capacity Payments.

	Predictable Price Maker	Predictable Price Taker	Variable Price Maker	Variable Price Taker	Autonomous
Eligible Availability	✓ as outlined above	✓ with Availability Profile set equal to Actual Output	✓ with Availability Profile set equal to Actual Output when instructed to run or the maximum of Actual Output and the time weighted average of Outturn Availability when constrained down	✓ with Availability Profile set equal to Actual Output	✓ with Availability Profile set equal to Actual Output

Table 9 – Capacity Payment eligibility for generic settlement classes

4.2.1.6 Generator Charges

Participants face the following charges in respect of their Generator Units:

- Imperfections Charges (discussed further below) when in a position of net demand;

- Testing Charges for Generator Units which are Under Test; and

- Fixed Market Operator Charge (discussed further in Section 4.2.3).

4.2.2 Supplier Unit Charges

Supplier Unit Charges fall into the following broad classes:

- **Trading Charges**: charges required to be made in respect of a Supplier Unit during a Trading Period, comprising Energy Charges and Imperfections Charges; and

- **Capacity Charges**: charges to Participants in respect of their Supplier Units over a Capacity Period as outlined in Section 4.2.2.3.

4.2.2.1 Energy Charges

An Energy Charge is paid by a Participant for a Billing Period in respect of a Supplier Unit based upon the energy purchased by the Supplier Unit over the Billing Period calculated as the sum over the Billing Period of the product of Net Demand and the prevailing SMP in each Trading Period.

4.2.2.2 Imperfections Charges

An Imperfections Charge is paid by a Participant in respect of a Supplier Unit on the basis of the Unit's Net Demand in each Trading Period in a Billing Period multiplied by an Imperfections Price approved by the Regulatory Authorities. The Imperfections Charge is intended to recover (over the year as a whole) the payments in respect of Constraints,

Uninstructed Imbalances (less Testing Charges for Generator Units) over each Billing Period and any net differences between Energy Payments and Energy Charges.

4.2.2.3 Capacity Charges

A Capacity Charge is paid by a Participant in respect of a Supplier Unit in each Capacity Period on the basis of the Unit's Net Demand in each Trading Period. This methodology for determining Capacity Charges is set out in section 3.5.

4.2.3 Market Operator (MO) Charges

Market Operator Charges are levied on Participants in order to recover costs and expenses incurred by SEMO. The Market Operator Charge comprises:

- a Fixed Market Operator Generator Charge applicable to all Participants in respect of the registered capacity of each of their Generator Units;

- a Fixed Market Operator Supplier Charge applicable to all Participants in respect of each of their Supplier Units; and

- a Variable Market Operator applicable to all Participants in respect of their Supplier Units, which is calculated based on the Net Demand at Supplier Units multiplied by a Variable Market Operator Price approved by the Regulatory Authorities.

4.3 Settlement

Settlement refers to the financial settlement of the Pool through the determination of relevant payments and charges.

Settlement of all Trading Payments and Trading Charges is conducted on a Billing Period basis which is defined as one Week commencing at 00:00 on Sunday. Settlement of all Capacity Payments and Capacity Charges is conducted on a Capacity Period basis which is defined as one Month commencing at 00:00 on the first day of the Month.

Figure 8 highlights the settlement timelines under SEM. This separates out the timelines for energy payments/charges which are settled on the basis of a Billing Period and for capacity payments/charges which are settled on the basis of a Capacity Period.

It is worth noting that only the Ex-Post Initial (EP2) MSP Software Run (and any subsequent Settlement Reruns) have any effect on Settlement. The purpose of the Ex-Post Indicative Run is to enable Participants to raise Queries.

Figure 8 – Settlement timeline
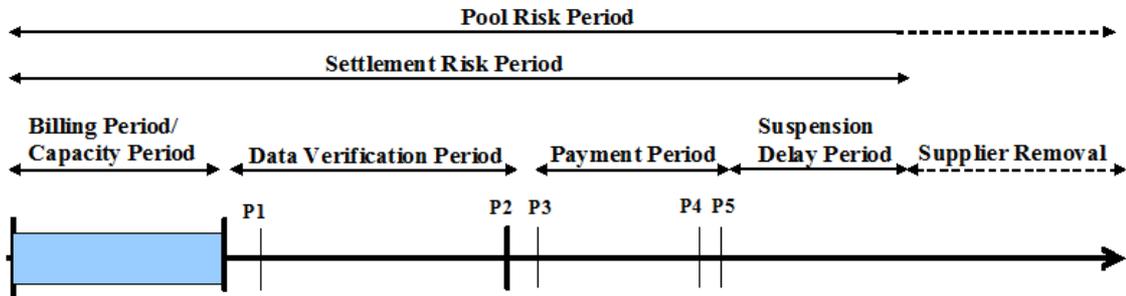
Settlement Period	P1 - ExP Indicative Settlement Statements	P2 - Verification Period Finished	P3a - Ex_-Post Initial Settlement Statements Sent	P3b - Invoice Sent	P4 - Invoice Due	P5 – Credit Due
Billing Period (Weekly)	SD+1WD by 17:00	SD+4WD by 17:00	SD+5WD by 12:00	BP+5WD by 12:00	BP+8WD by 12:00	BP+9WD by 17:00
Capacity Period (Monthly)	CP+3WD by 17:00	CP+6WD by 17:00	CP+7WD by 12:00	CP+7WD by 12:00	CP+10WD by 12:00	CP+11WD by 17:00

Focusing on Billing Period cycle, the key points along the timeline are as follows:

- Following the Ex-Post Indicative (EP1) MSP Software Run at 16:00 D+1 an Ex-Post Indicative Settlement Statement for the relevant Settlement Day is issued to each Participant in respect of their Units by 17:00 D+1WD.

- The issuance of Ex-Post Indicative Settlement Statements triggers the start of the Data Verification Period, during which time a Participant may raise a Data Query relating to any data included on the relevant Ex-Post Indicative Settlement Statement. The MO will seek to resolve any Data Queries within 3WD and must provide a determination within 10WD. The Data Verification Period for a Settlement Day closes at 17:00 D+4WD.

- An Ex Post Initial Settlement Statement for the relevant Settlement Day is issued to each Participant in respect of their Units by 12:00 D+5WD.

- By 12:00 BP+5WD, Invoices are issued to Participants outlining all payments which are to be made by Participants in respect of their Units for all Settlement Days in the Billing Period. At the same time, Self Billing Invoices are issued to Participants outlining all payments which are to be made to Participants in respect of their Units for all Settlement Days in the Billing Period.

- By 12:00 BP+8WD, Participants are required to pay the full value specified in the Invoice.

- Any Participant is entitled to file a Settlement Query and/or a Settlement Dispute based on its Initial Settlement Statements and/or Invoices/Self Billing Invoices up until 5WD after the last timetabled Settlement Rerun. Such a Query or Dispute does not affect a Participant's obligation to pay an Invoice in full and on time.

Similar steps apply to Capacity Payments/Charges in accordance with the timescales outlined in Figure 8.

There are two Timetabled Settlement Reruns for each Billing Period and for each Capacity Period. The first Timetabled Settlement Rerun occurs in the fourth month after the Billing Period (BP+4M)/Capacity Period (CP+4M) and the second Timetabled Settlement Rerun occurs in the 13th month after the Billing Period (BP+13M)/Capacity Period (CP+13M).

4.4 Credit Cover

Credit Cover is required under the TSC to protect creditors (normally Participants with Generator Units) from the effects of the financial failure of a debtor leading to Unsecured Bad Debt. The level of Credit Cover required of Participants under the TSC is a balance between protecting creditors on the one hand and avoiding raising barriers to entry to the Market (particularly for suppliers) through requiring high levels of Credit Cover to be provided. The level of Required Credit Cover is determined in part by the value set by the Regulatory Authorities for the Supplier Suspension Delay Period. This is because the calculation of the Required Credit Cover for each Participant is based upon the following elements of actual and potential debt:

- Amounts invoiced but not paid: Amounts presently owed – basically, the SEM's receivables.

- Amounts calculated but not invoiced: Settlement amounts which have been calculated, but not yet included on an invoice. These may include Ex-Post Indicative Settlement Statement and Ex-Post Initial Settlement Statement amounts (depending upon the latest information available).

- Exposure incurred but not calculated: Exposures related to a period that has passed (and electricity has been consumed), but the Ex-Post Indicative Settlement Statement amount has not yet been determined (generally due to time lag in receiving metering data and/or determining price).

- Potential exposures during the time until the Participant might cease to incur further liabilities. This period of time cannot be precisely determined, because the processes required to force a Participant's removal from the Market involve regulatory decisions which cannot be time limited. In addition, even if the time could be precisely determined, it is not possible to put a financial cap on the liabilities that could be incurred because of future uncertainty about prices. It is therefore not possible to protect Pool creditors fully from the risk of a failing debtor.

- Resettlement exposures: Additional exposures that may result from Resettlement of an already settled period.

Credit Cover is collateral required to be posted as a protection against a Participant's Credit Risk in the SEM. However, a guarantee cannot be achieved and the level of protection is determined in part by the value for the Supplier Suspension Delay Period (currently 14 calendar days) that is determined by the Regulatory Authorities. This is because the Undetermined Exposure Period calculated by SEMO ends at the end of the Supplier Suspension Delay Period. In the event of a payment default, this Credit Cover

can be utilised by the MO to satisfy the Participant's outstanding financial obligations in the SEM. Because of the potential for Resettlement, a Participant's Required Credit Cover includes an element of Fixed Credit Cover (which applies to both Generator and Supplier Units) which is intended to cover the possibility of changes in payments after Resettlement leading to the possibility of further debt. A Participant withdrawing from the Market will not receive a return of the Fixed Credit Cover in respect of each of its Units until the Resettlement period (currently 14 months) has passed since the Unit was Deregistered.

Because of the Pool arrangement a Participant's Generator Units are natural creditors (i.e. are likely to be owed money, whereas its Supplier Units are normally debtors (i.e. likely to owe money). The Credit Cover for a Participant is calculated to offset its Supplier Unit expected debts with its Generator Unit expected credit if registered in this manner.

The Credit Cover for Interconnector Units is determined differently. Because of the process for determining the Modified Interconnector Unit Nomination for each Interconnector Unit at EA1, EA2 and WD1 MSP Software Runs, it is difficult to anticipate future liabilities or credits (depending on whether it is exporting or importing). Instead the liability implied by the MIUN is determined for each MSP Software Run and so long as the Participant concerned holds sufficient Credit Cover for these liabilities (and any others flowing from its other Units) no action is taken. If however the Credit Cover is insufficient, the Offers in respect of that Interconnector Unit are excluded to reduce the liability to the level where it is less than the Credit Cover held.

Credit Cover for use in the SEM must be posted in the form of either:

- Cash (in the designated Currency of the Participant) in a SEM Collateral Reserve Account; or

- Letter of Credit (LC) from a Bank that meets the Banking Eligibility Requirements and in the form set out in the TSC (see Appendix A).

A Participant may meet its Credit Cover requirements by posting a combination of these types of Credit Cover. In the event of a Shortfall, being the failure of a Participant to pay an Invoice in full, Posted Credit Cover will need to be accessible in a timely manner such that SEMO can meet all payment obligations of the SEM. For this reason, Letters of Credit are required to be capable of being drawn for "same day value".

Required Credit Cover Reports are published by 14:30 each Working Day.

4.5   Settlement reallocation

The Settlement Reallocation process offers benefits to Participants, in terms of cash flow and credit risk management, allowing Participants to reduce Credit Cover requirements by offsetting debits and credits and also to reduce circular flows of money.

When two Participants have a Settlement Reallocation Agreement in place with SEMO, one Participant (called Debited Participant) will effectively transfer an amount in respect of payments due to this Participant from the MO to another Participant (called Credited Participant) through their payments (Trading Payments or Capacity Payments). This amount shall also have an affect on the Required Credit Cover calculation for the two Participants.

4.6   Unsecured Bad Debt

If a Participant fails to pay an invoice in full, SEMO attempts to make good the debt by calling on the Participant's Credit Cover. If the Credit Cover does not cover the debt in full

(this is very unlikely until a Participant has failed to pay several bills), the next port of call is to reduce any payments that would otherwise be due to that Participant in respect of its Generator Units. It is only when both of these avenues have been used that Unsecured Bad Debt results. Such Bad Debts are covered by reducing (pro-rata) the payments due to other Participants in respect of their Generator Units.

4.7   Default, Suspension and Termination

A Participant will be in Default in the event it is in any material breach of the TSC or the Framework Agreement. A Participant can be deemed as a Defaulting Participant in the event it has not paid an Invoice by the Invoice Due Date or has not met its Credit Cover obligations.

Suspension means the process whereby SEMO suspends a Participant from trading in the Pool in respect of some or all of its registered Units in accordance with a Suspension Order issued or the process whereby SEMO suspends an Interconnector from importing energy to the Pool and from exporting energy from the Pool. A Suspension Order means an order from SEMO to a Participant stating that its participation in respect of any or all of its Units will be suspended in accordance with the terms of the Suspension Order or an order from SEMO stating that an Interconnector will be suspended.

The process of Suspension of a Supplier Unit is complex because it is necessary to ensure that a supply of electricity can continue to be provided to its associated customers. For this reason, the Suspension of a Supplier Unit cannot take place until the Regulatory Authorities have assured themselves that the customers of the Supplier concerned have been moved to another Supplier.

Termination means the termination of a person's status as a Party to the TSC. A Termination Order means an order from SEMO to a Party stating that the Party will be Terminated, and that all of its Units will be Deregistered.

4.8   Currency Costs

As the Participant's currency is Jurisdictional, SEMO will be faced with Currency Costs. These are the cost or benefit of converting the currency necessary to pay Participants given the funds received.

Currency Costs can arise in the context of Energy Payments and Capacity Payments based on the difference in currency rates between:

- Gate Closure and the actual payment of Invoices and Self Billing Invoices, in the case of Energy Payments/Charges; and

- the annual determination of capacity costs in respect of Capacity Payments and Capacity Charges and the actual payment of Invoices and Self Billing Invoices, in the case of Capacity Payments/Charges.

The costs/benefits associated with Currency Costs are distributed across all Participants.

4.9   Banking Arrangements

SEMO is required to set up four bank accounts with the SEM Bank to manage the transfer of funds in the Pool. These are a SEM Trading Clearing Account in euro and one in pounds sterling and SEM Capacity Clearing Accounts, again one in pounds sterling and one in euro. In addition, SEMO sets up accounts for holding Market Operator charges.

SEMO also sets up a SEM Collateral Reserve Account for any Participant that wishes to provide some or all of its Credit Cover in cash (rather than solely in the form of a Letter of Credit). Although all of these accounts are in the name of SEMO, SEMO holds the monies in these accounts in trust for the Participant.

The SEM Trading and SEM Capacity Clearing Accounts are interest bearing, but any interest paid on these accounts is paid to SEMO, which will take account of such income in proposing the value of the Market Operator Charges, so that the interest flows to the Participants in the form of reduced Market Operator charges.

The Participants' SEM Collateral Reserve Accounts are also interest bearing and any such interest paid into these accounts is paid to the Participant on a quarterly basis.

5. OPERATION OF THE MARKET – DAY IN THE LIFE

5.1 Introduction

On the basis of the market overview provided above, this section outlines a day-in-the life description of the main operational timescales of the SEM from the perspective of a Participant as defined by the TSC. This focuses on key operational activities in the run up to the relevant Trading Day, on the relevant Trading Day and after the relevant Trading Day. As has been explained above, the processes are somewhat different for Interconnector Users.

5.2 Before the Trading Day

5.2.1 Before D-1

- **From D-29**: Commercial Offer Data and Technical Offer Data for the relevant Trading Day can be submitted from this point onwards by Participants in respect of their Generator Units up to EA1 Gate Window Closure.

- **10:00 D-2**: the MO must publish the Available Transfer Capacity (import and export) for each Interconnector.

5.2.2 On D-1 and on the Trading Day

- **17:00 D-1**: Daily Trading Day Exchange Rate published by SEMO.

- **By EA1 Gate Window Closure**: the Interconnector Administrator provides Active Interconnector Unit Capacity Holdings Data to SEMO.

The following steps apply to each MSP Software Run on or before the Trading Day and the timing of the steps are shown in Table 10 below:

- **SEMO** carries out the MSP Software Run.

- based on the output of the MSP Software Run, SEMO determines Interconnector Unit Nominations (IUNs)

- **SEMO** calculates Modified Interconnector Unit Nominations (MIUNs) and provides them individually to each Interconnector User.

- **SEMO** issues Aggregated Modified Interconnector Unit Nominations (AMIUNs) to the relevant SO.

- based on the output of the MSP Software Run, SEMO publishes indicative SMP values.

- based on the output of the MSP Software Run, SEMO issues Participant specific details of the Market Schedule Quantities (i.e. MSQ values for Price Maker Generator Units) to each Participant.

- based on the output of the MSP Software Run, the SEMO publishes a market schedule summary.

▪ MSP Software Run	EA1	EA2	WD1
Gate Window Opening	10.00 D-29	09.30 D-1	11.30 D-1
Participants submit Offer Data	09.30 D-1	11.30 D-1	08.00 D
Gate Window Closure	09.30 D-1	11.30 D-1	08.00 D
MSP Software Run	11.00 D-1*	13.00 D-1*	09.30 D*
SEMO determines IUNs	11.00 D-1*	13.00 D-1*	09.30 D*
MIUNs issued to IUs	11.00 D-1*	13.00 D-1*	09.30 D*
AMIUN issued to TSO	11.00 D-1*	13.00 D-1*	09.30 D*
SMP published	11.00 D-1*	13.00 D-1*	09.30 D*
MSQs issued to Participants	11.00 D-1*	13.00 D-1*	09.30 D*
Market schedule summary issued	11.00 D-1*	13.00 D-1*	09.30 D*
In the event that ATC is changed:			
• MIUNs recalculated	Asap	Asap	Asap
• MIUNS issue to IUs and IA	Asap	Asap	Asap
• AMIUN issued to TSO	Asap	Asap	Asap

*Completed by

- **16:00 D-1**: Ex-Ante Indicative Operations Schedule produced by SO and published by SEMO.

5.3   During the Trading Day

Dispatch Instructions are issued by the SOs to Generator Units in real time in accordance with the Grid Code.

5.4   After the Trading Day

5.4.1   D+1

- **16:00 D+1**: SEMO carries out the Ex-Post Indicative (EP1) MSP Software Run.
- **16:00 D+1**: Daily Ex-Post Indicative Market Schedule Summary published by SEMO.
- **17:00 D+1**: Ex-Post Indicative Market Schedule by Participant issued by SEMO.

5.4.2   D+4

- **16:00 D+4**: SEMO carries out the Ex-Post Initial (EP2) MSP Software Run.
- **16:00 D+4**: Daily Initial Market Schedule Summary published by SEMO.
- **17:00 D+4**: Initial Market Schedule by Participant issued by SEMO.

5.5   Settlement

The Settlement timescales are outlined in Section 4.3.