2014
SEM PARAMETERS FOR THE DETERMINATION OF REQUIRED CREDIT COVER

Table of Contents

Document History

Version	Date	Author	Comment
1.0	27th August 2013	SEMO	Issued to Regulatory Authorities

1. BACKGROUND

1.1 INTRODUCTION

- **Purpose**

Under Section 6.174 of the Trading & Settlement Code (referred to as 'the Code'), the Market Operator (MO) is required to propose parameters used in the calculations of Required Credit Cover at least 4 months before the start of a Trading Year. This document provides the MO's proposals for these parameters for the Trading Year 2014.

- **Audience**

The target audience for this document is Market Participants and the Regulatory Authorities.

- **Scope**

This document provides proposals for the following parameters for the determination of Required Credit Cover for Trading Year 2014.

  - Historical Assessment Period for Billing Period
  - Historical Assessment Period for Capacity Period
  - Analysis Percentile Parameter
  - Credit Cover Adjustment Trigger
  - Fixed Credit Requirement

- **Background**

The Trading & Settlement Code sets out the rules for the calculation of Required Credit Cover for Participants. The calculation recognises that the Required Credit Cover for each Participant is made up of known and unknown exposures. The known exposure is based on invoiced amounts and published settlement values. The unknown exposure, called the Undefined Exposure (UDE), is based on statistical analysis of known historical settlement values in the case of Standard Participants. For New or Adjusted Participants the Required Credit Cover is calculated using forecast volumes, as historical settlement values are not available or are not reflective of current levels of settlement.

In each of these calculations, and in the day to day credit risk assessment process, a number of parameters are used. These parameters are as follows:

- *Historical Assessment Period for Billing Period (HAPB)* – this sets the number of historical days over which the analysis of Trading Payments and Trading Charges will be carried out for credit purposes.
- *Historical Assessment Period for Capacity Period (HAPC)* – this sets the number of historical days over which the analysis of Capacity Payments and Capacity Charges will be carried out for credit purposes.
- *Analysis Percentile Parameter* – this sets the percentile confidence value in the statistical analysis used for New, Adjusted and Standard Participants.
- *Credit Cover Adjustment Trigger* –a Participant will be classed as an Adjusted Participant under the Code if the Participant's trade volumes increase or decrease by a percentage greater than this value.
- *Fixed Credit Requirement* – this sets the value of Required Credit Cover that must be in place for each registered Supplier Unit or Generator Unit in the Single Electricity

Market (SEM) in order to meet resettlement charges that may arise up to 13 months after the initial settlement.

Although these parameters are considered variable, under the Code, they will be set from year to year.

In light of approved Mod 54_08 and related changes to sections 6.174 and 6.181 of the Trading and Settlement Code, SEM-O will not be reporting on the maximum level of the Warning Limit anymore. The default limit of 75%, as set in section 6.181, will be maintained until a revision or a change to the Code is required.

1.2 OBJECTIVES

The objectives of this report are to:

- determine the proposed value for each parameter to be used in the day to day credit risk assessment process for 2014;
- verify the effectiveness of current parameters based on market analysis;
- suggest any appropriate course of action as necessary.

2. SUMMARY OF RECOMMENDATIONS

Based on the analysis performed, the credit parameters shown in Table 1 are proposed by the MO for use in Trading Year 2014. These proposed values are considered to be the best combination to ensure appropriate levels of Credit Cover in SEM.

The Market Operator's recommendation is that the parameters for 2014 remain unchanged to those agreed for 2013.

Credit Cover Parameter	2013 Approved Value	2014 Proposed Value
Historical Assessment Period for Billing Period	100 days	100 days
Historical Assessment Period for Capacity Period	90 days	90 days
Analysis Percentile Parameter	1.96	1.96
Credit Cover Adjustment Trigger	30%	30%
Fixed Credit Requirement for Supplier Units based on rate of 8.77€/MWh of average daily demand subject to a minimum value of €1,000 and a maximum of €15,000	Min. of€1,000 with max. of €15,000[#1]	Min. of€1,000 with max. of €15,000
Fixed Credit Requirement for all Generator Units including Interconnector Units	€5,000	€5,000
Fixed Credit Requirement for Netting Generator Units	€1,000	€1,000

Table 1 - Proposed 2014 Credit Cover Parameters

As noted by the Regulatory Authorities approval of Modification 26_08 "Definition of Adjusted Participant", and made clear in the consultation on Suspension Delay Periods (26/07/2008), the market is not and cannot be fully collateralised. The parameters provided above attempt to provide a balance between maintaining a low level of risk of bad debt in the SEM while not over burdening Participants with credit cover requirements which could be seen as a barrier to entry or a barrier to continuation of trade.

1 - Average daily demand will be calculated for Standard Participant based on their historical demand in previous year and for New or Adjusted participants on their projected forecast demand

3. ANALYSIS OF CREDIT RISK PARAMETERS

The following section provides the context, analysis, conclusions and recommended values for each of the credit cover parameters proposed by the MO for Trading Year 2014.

In the modelling and analysis the focus was on the UDE period as this, along with resettlement, forms the only unknown exposure within SEM. The known exposure of invoiced and settled not invoiced amounts is exactly known and included in the credit cover requirements of a Participant as a matter of course

Throughout this document references will be made to the 'UDE Variance'. This is not a Code term, but is a comparison value defined as the percentage difference between the calculated UDE (as defined in the Code credit cover calculations) and the realised UDE. The realised UDE being the actual exposure that the Participant had for the UDE period (calculated retrospectively once settlement values are available).

The important aspects of the UDE Variance comparison value are:

- Where the UDE Variance percentage is > 0%, the calculated UDE is greater than the realised UDE and the calculation of Credit Cover for the Participant would have been over estimated.
- Where the UDE Variance percentage < 0%, the calculated UDE is less than the realised UDE and the calculations of Credit Cover for the Participant would have been under estimated.

3.1 HISTORICAL ASSESSMENT PERIOD FOR BILLING PERIOD (HAPB)

3.1.1 CONTEXT

The Code sets out two methods of calculation of the UDE for Participants[1]. The Standard Participant method uses statistical analysis of settlement values for Trading Payments and Charges, and Variable Market Operator Charges. The second method used for New or Adjusted Participants uses statistical analysis of historical System Marginal Prices (SMP) in the Market combined with forecast volumes provided by the Participants.

In both of these methods, the analysis is conducted over a period of time known as the Historical Assessment Period for Billing Period (HAPB). This is a period of recent history of the Participant in the SEM and can have a significant impact on how accurately the calculated Credit Cover mirrors the realised Credit Cover Requirement.

The UDE for the Billing Period refers to the UDE generated in the Energy Market.

Since the introduction of Intraday Trading in July 2012, Interconnector Units no longer have UDE but instead have future exposure restricted to their Available Credit cover at each new Gate Window closure.

[1] Since the introduction of Intraday Trading in July 2012, Interconnector Units no longer have UDE but instead have future exposure restricted to their Available Credit cover at each new Gate Window closure. This is known as “Traded Exposure”

3.1.2 ANALYSIS

To eliminate the effects of variations in demand, the analysis for the HAPB was based on actual settlement volumes, from Jan 2010 through to the end of July 2013, for a typical Supplier in the SEM with steady demand. The results are based on a Typical Undefined Exposure of 16 days, which include 14 days of Suspension Delay Period plus two days typical unsettled period at the time of Required Credit Cover Calculation.

As noted by the Regulatory Authorities approval of mod 26_08 and made clear in the consultation on Suspension Delay Periods (26/07/2008), the market is not and cannot be fully collateralised. Events where there is a sudden increase in average daily SMP are one of the main reasons that the concept of full collateralisation of the SEM is not possible.

From a risk mitigation perspective it is crucial to ensure the UDE and Credit Cover calculations of Suppliers are as accurate as possible, without representing a burden for Participants. This is due to the fact that Suppliers typically owe money to the SEM as a result of initial settlement and typically have a positive Credit Cover requirement. Generators on the other hand are more likely to be owed money by the SEM as a result of initial settlement and typically have a negative Credit Cover requirement. Typically Generators in SEM only need to provide the Fixed Credit Requirement which covers resettlement.

Based on this higher Supplier risk, the analysis below concentrates on Suppliers with steady demand profiles

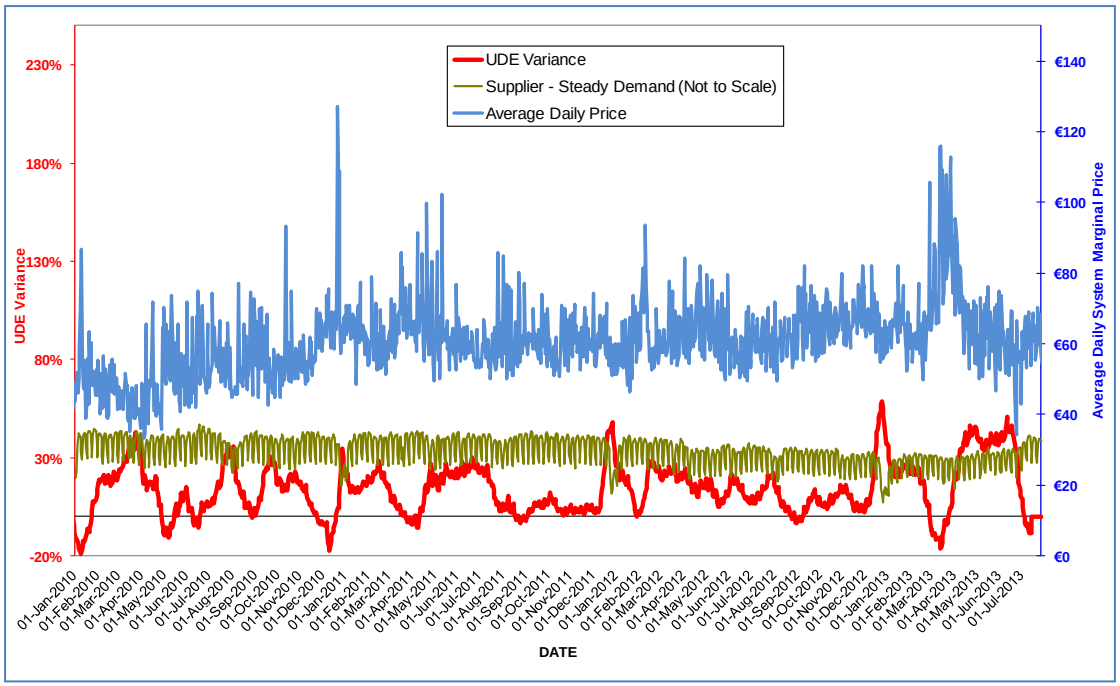

Figure 1 - Effect of Price and Demand on UDE Variance

Figure 1 illustrates that the SMP, represented as an average daily SMP, has a significant influence on whether the calculated UDE for a Participant is under or over estimated, in the case of demand being stable. The demand values shown are normalised values, not to scale, for a standard supplier with steady demand. Where the calculated UDE is greater than the realised UDE (i.e. the UDE Variance is greater than 0%), the Participant will have excess Credit Cover in the SEM. Where the calculated UDE is less than the realised UDE (i.e. the UDE Variance is less than 0%), the Participant will have under estimated Credit Cover in the SEM.

There is a strong correlation in Figure 1 between under-estimation and sudden increase in the average daily SMP in the SEM. This is illustrated in the periods around December 2010 and February-March 2013. This is further emphasised by the fact that during these same periods of under-estimation the demand profile of the Supply Participant remains steady indicating demand is not a contributing factor.

Figure 2 below illustrates how the UDE Variance changes with different HAPB values. Each of the profiles is for the same Participant (Supplier – steady demand) over the same period with different HAPB being the only variable.

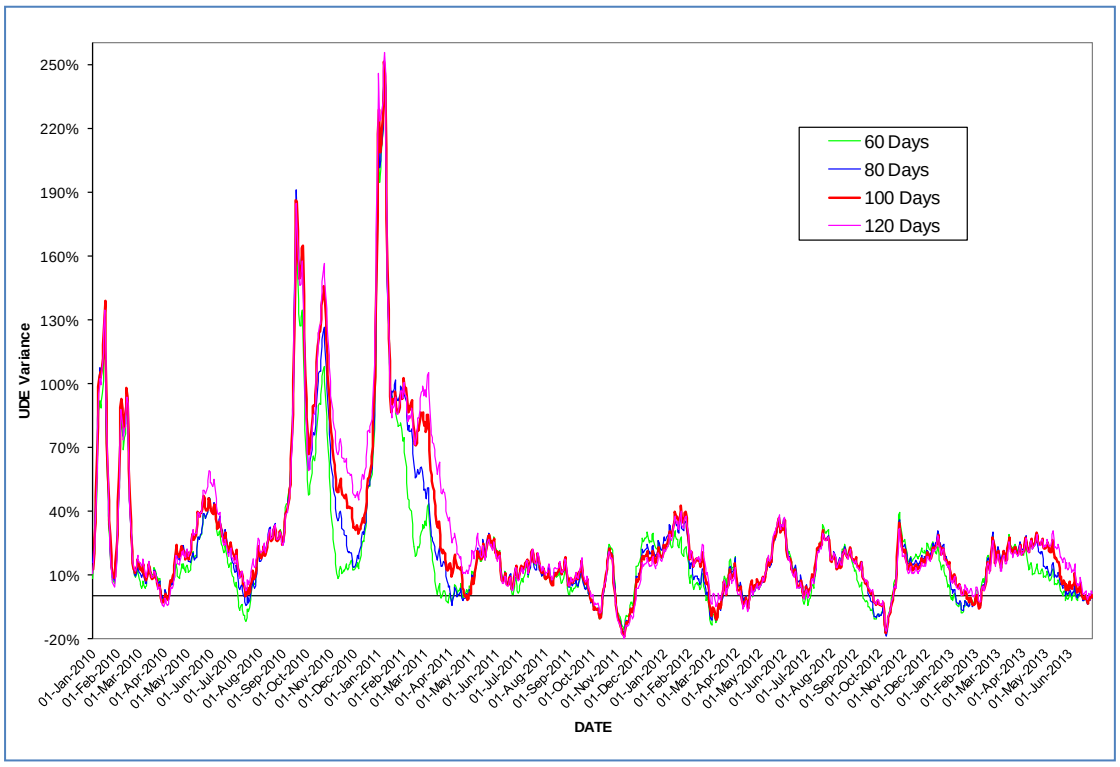

Figure 2 - Effect of Different HAPB on UDE Variance for Supplier with Steady Demand

Figure 2 shows that small differences arise when changing the HAPB value. It confirms, as per analysis carried out in previous years, that the smaller the HAPB the higher the number of events and the magnitude of under-estimation (i.e. graph lines dropping below 0%). A small HAPB makes the UDE variations more exposed to SMP variations. A larger HAPB would react more slowly to sudden changes in SMP reducing the effects on the under-estimation but increasing periods of over-estimations.

Although differences appear to be very small, we see no issue with the HAPB at the current level of 100 days, which appears to continue to provide the best compromise solution between reducing instances of under-estimation and avoiding excessive over-estimation. This HAPB has very few days where credit cover is under-estimated (as opposed to HAPB of 60, 80 and 90 days which have a higher proportion of days under-estimated) while avoiding excessive over-estimation (as occurs for the HAPB of 120 days).

As shown in previous years' reports a variable demand only tends to accentuate the peaks and troughs of the UDE Variance without changing the observation made on the different values of HAPB.

3.1.3 CONCLUSIONS

From a risk mitigation perspective it is important to ensure Suppliers UDE, and therefore total credit risk exposure, is calculated in a way that reduces the number of occurrences where UDE is under-estimated.

The SMP in the SEM, and particularly brisk price increase events, has the largest impact on whether the calculated UDE adequately models the realised UDE. Variance in Supplier demand has a lesser effect on Credit Cover UDE calculation adequacy.

Different HAPB values lead to different UDE Variance profiles. Using a larger HAPB tends to smooth changes in the UDE variance, and tends to reduce the number of days Participant Credit Cover is under-estimated. However increasing the HAPB any further than the current level would increase the amount of excess Credit Cover on most days, without the benefit of a significant reduction in the number of under-estimation events.

3.1.4 RECOMMENDATION

Based on the analysis, the current HAPB of 100 days is recommended for 2014 as it still provides a good compromise allowing risk mitigation without being excessively onerous on Suppliers in terms of over-estimation of credit cover requirements.

3.2 HISTORICAL ASSESSMENT PERIOD FOR CAPACITY (HAPC)

3.2.1 CONTEXT

The HAPB, outlined in section 3.1 relates to the SEM Energy Market. In addition to this the Code also uses a Historical Assessment Period for Capacity Period (HAPC) as part of the UDE calculations for the Capacity Market.

3.2.2 ANALYSIS

Similar data sets, modelling and assumptions were used for the HAPC as were used for the HAPB. Refer to section 3.1 for further details.

The outcome of this modelling for the Supplier with steady demand is shown in Figure 3 below.

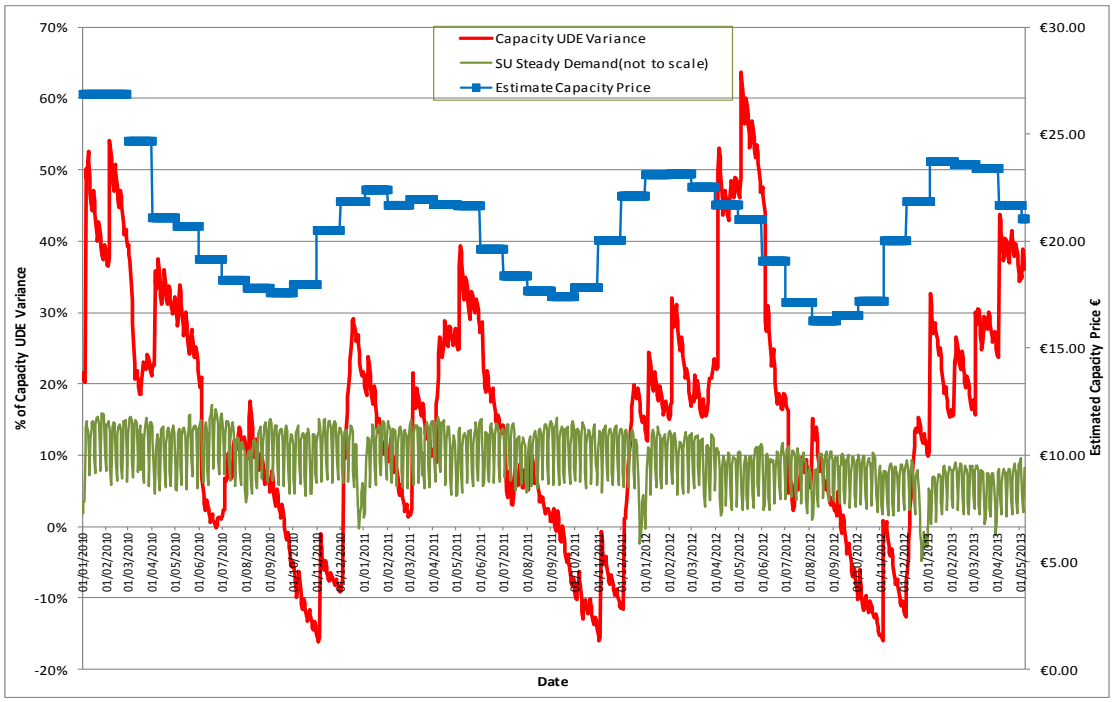

Figure 3 - Effect of Price on Capacity Calculated Undefined Exposure

Figure 3 illustrates that the Capacity UDE Variance is greatly influenced by the Estimated Capacity Price (ECP) in the SEM. The step changes in the UDE Variance can be attributed to the ECP as the demand is steady and therefore has no impact. The ECP values are only available on a monthly basis after the indicative Capacity settlement is completed. The general trend is when the ECP increases the step change in Capacity UDE Variance is upward. Where the ECP drops the Capacity UDE Variance is downward.

As described in the HAPB analysis, from a risk mitigation perspective it is crucial to ensure that the Credit Cover calculations of Suppliers for UDE are as accurate as possible. This is due to Suppliers being more likely to owe money to the SEM from initial settlements and typically having a positive Credit Cover requirement. Generators on the other hand are more likely to be owed money by the SEM from initial settlement and tend to have a negative Credit Cover requirement.

As for the HAPB, Figure 4 illustrates how the UDE Variance varies with different HAPC values. Each of the profiles is for the same Participant (Supplier with steady demand) over the same period with different HAPC being the only variable. Where the percentage is greater than zero the Participant is over-estimated and where the percentage is less than zero, the Participant is under-estimated.

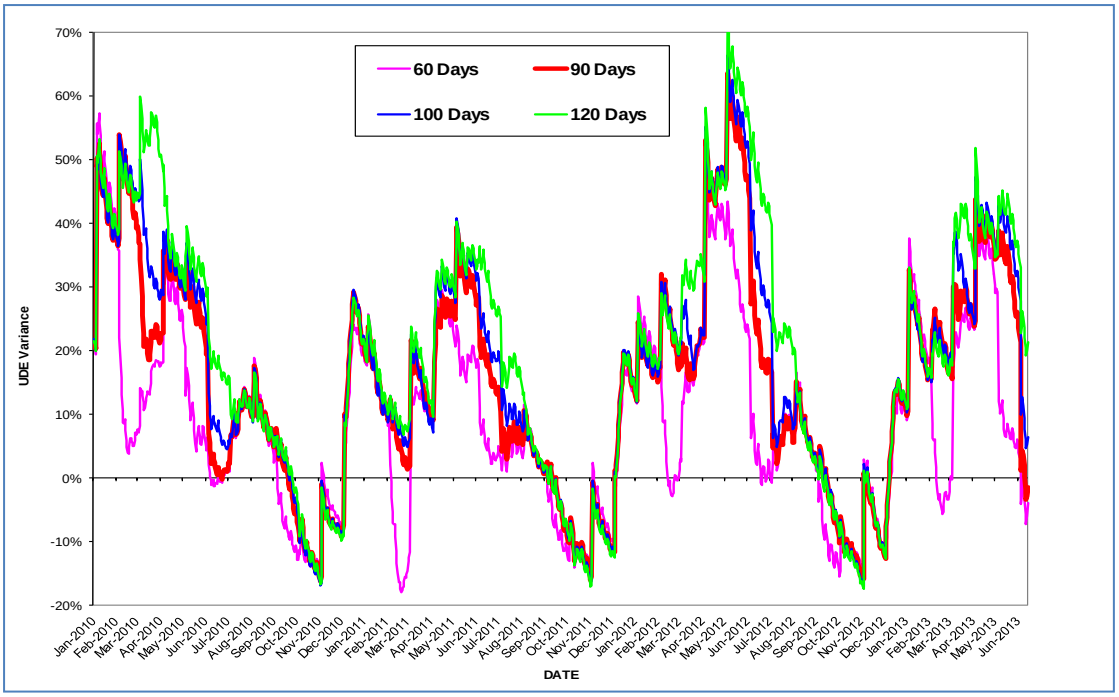

Figure 4 - UDE Variance with Different HAPC

Based on Figure 4 the use of a HAPC of 90 days continues to be a good compromise between reducing the occurrence of under-estimation and reducing excessive over-estimation. It also has practical advantages when Participants becomes an 'Adjusted Participant', due to a step change in their demand/generation, and they need to provide forecast data for the longer of the two HAPB or HAPC. Keeping the HAPC and HAPB aligned closely, but not equal, appears to be a sensible course of action. The change from forecast to historical data for Capacity can only occur in approximately 30 day increments as settlement of amounts occurs. This means that, with any HAPC of 100 days, the actual elapsed time of approximately 120 days must occur before a Participant can become standard and use historical data. Using a HAPC of 90 will mean that Participants would not be exposed to an additional 20 days before switching to historical data which should provide a more accurate calculation of UDE.

Figure 4 shows that the profile for 90 days generally provides a lower level of over-estimation than the 100 or 120 day HAPC and virtually the same level of under-estimation. Reducing the HAPC to 60 shows a definite increase in instances and volumes of under-estimation.

3.2.3 CONCLUSIONS

From a risk mitigation perspective it is important to ensure Suppliers UDE, and therefore total credit risk exposure, is determined in a way that reduces the number of occurrences where calculated exposure is less than realised exposure.

The Estimated Capacity Price set in the SEM has the largest impact on whether the Capacity calculated UDE, adequately models the realised UDE. Different HAPC values lead to varying UDE Variance.

Using a HAPC of 90 days aligns well with the proposed HAPB of 100 days and will provide an adequate level of Capacity UDE calculation while allowing for the practicalities of market operation.

3.2.4 RECOMMENDATION

The MO would recommend the HAPC for 2014 be maintained at 90 days.

3.3 ANALYSIS PERCENTILE

3.3.1 CONTEXT

The statistical calculation of UDE for Standard Participants is based on the choice of a percentile value. As part of this calculation the standard deviation of the samples is multiplied by the Analysis Percentile Parameter and then added to the mean UDE in order to arrive at the UDE Credit Cover Requirement. Depending on the Analysis Percentile used, the resulting value can be said to be approximately the 90th, 95th or 98th percentile.

Analysis Percentile	Analysis Percentile Parameter
90	1.645
95	1.96
98	2.33

Table 2 – Analysis Percentile Parameters

3.3.2 ANALYSIS

The modelling was performed on the typical steady demand profiles described previously in Section 3. Taking the UDE Energy variance an example, Figure 5 below illustrates two key points.

- As the Analysis Percentile Parameter increases, the UDE Variance tends to shift upward just slightly and Participants Credit Cover becomes only marginally less frequently under-estimated.
- With a HAPB held constant at 100 days, as used in Figure 5, the Analysis Percentile Parameter has really little impact on the UDE Variance overall.

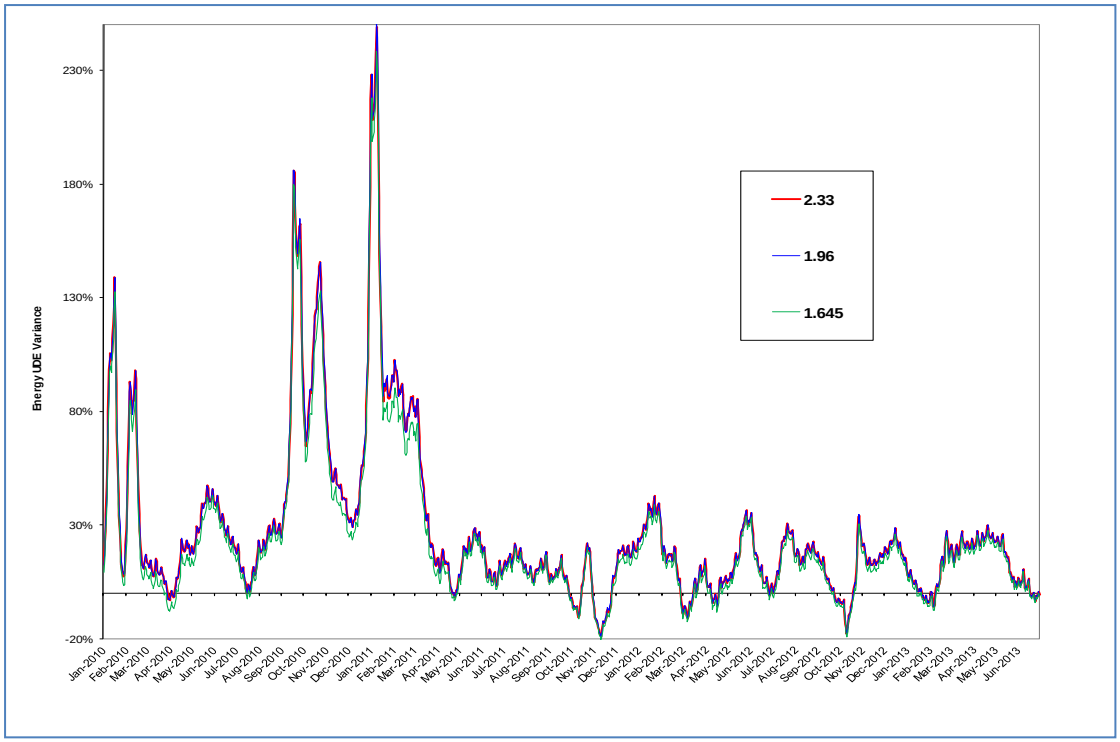

Figure 5 - Different Analysis Percentiles Effect on UDE Variance with HAPB of 100 days

3.3.3 CONCLUSIONS

Generally, as the Analysis Percentile Parameter increases, the number of occurrences of under-estimation is reduced. However, this also increases the percentage of time that Participants are over-estimated. Variances, however, are so small as to be considered irrelevant

The Historical Assessment Period has a more significant effect on the UDE Variance than the Analysis Percentile Parameter used in the Credit Cover calculations.

3.3.4 RECOMMENDATION

Given that Analysis Percentile Parameter provides minimal change in the UDE Variance, the MO would recommend that the current value of 1.96 is maintained for 2014.

3.4 CREDIT COVER ADJUSTMENT TRIGGER

3.4.1 CONTEXT

The statistical calculations for Standard Participants, as set out in the Code, assume a normal distribution and, as such, work to a reasonable effectiveness when Participant volumes of trade are not subject to major fluctuations. However, this assumption is not maintained under certain market conditions.

The statistical calculations are intended to accommodate small changes in Participants demand/generation profiles. However, where a significant step change in the demand/generation profile occurs the statistical basis will not be effective.

In accordance with Section 6.182 of the Code, a Participant is required to notify the MO if they reasonably expect that a step change in their demand/generation profile will occur. The trigger for a step change is when the change is expected to be greater than the Credit Cover Adjustment Trigger. The Participant would then be classed as an Adjusted Participant and forecast volumes provided by the Participant would then be used for Credit Cover calculations rather than the statistical calculations based on historical settlement data.

A step change in the demand/generation profile of a Participant may be caused by a number of events including but not limited to:

- acquisition of new assets
- winning significant new customers in the retail market
- significant Generator planned outage
- taking advantage of additional capacity on the Interconnector

It is assumed that Participants, in the events listed above, would have perfect foresight of the changes affecting their metered values, which would cause their forecast volumes for the next billing periods, to be incorrect if based on their past performance.

The Code definition for when a Participant should be considered Adjusted is:

- The Participant reasonably expects that, compared with the time-weighted average of metered quantities across all of the four most recent Billing Periods, the forecasted averaged metered quantities with respect to its Units will increase or decrease by more in absolute terms than the Credit Cover Adjustment Trigger.

Where a step change occurs in the demand/generation profile of a Participant, this will have an effect on the Credit Cover calculations until either the Participant informs the MO and they become an Adjusted Participant or, if they do not become an Adjusted Participant, it will affect the Credit Cover calculations until sufficient time has passed so that the step change event is outside the HAPB.

It is in the best interest of both the Participants and the Market to make sure that the Credit Cover is based on the best available data.

3.4.2 ANALYSIS

Extensive analysis has been performed in previous years to determine the Adjustment Trigger level. The MO has seen no significant changes in the market in 2013 that would warrant revising the trigger level in 2014.

There have been no instances of the Adjustment Trigger being triggered in the period January 2012 to May 2013.

3.4.3 CONCLUSION

Different types of Units will have varying demand/generation profiles. Some of these Unit types will have significant difficulty in predicting forecast demand/generation in order to identify if they should declare themselves as Adjusted, namely, wind and low demand Supplier Units.

The Adjustment Trigger used in the SEM needs to be a compromise of ensuring the Credit Cover calculations are based on representative demand/generation.

A balance is required for triggering Participants to be Adjusted for changes in demand/generation that are significant and predictable step changes, without unduly burdening Participant with constantly having to submit updated forecast data for minor changes in demand/generation profile.

3.4.4 RECOMMENDATION

The MO would recommend the Adjustment Trigger be maintained at 30% for 2014 as this would reasonably cover step change events that are foreseeable for both Supplier and Generator Participants.

3.5 FIXED CREDIT COVER REQUIREMENTS

3.5.1 CONTEXT

The Trading & Settlement Code provides for a Fixed Credit Cover Requirement (FCCR). This is an amount set separately for Generator Units and Supplier Units.

The intention of the FCCR is to provide a sufficient level of Credit Cover for Participant liabilities resulting from Resettlement of the market 4 months (M+4) and 13 months (M+13) after Initial Settlement.

3.5.2 ANALYSIS

Energy Resettlement amounts published between Jan 2012 and May 2013, which included M+4 from Sept 2011 to Feb 2013 and M+13 from Dec 2010 to Apr 2012, were used in this analysis.

These were split in two groups in order to compare how the FCCR has fared for the relevant period:

- Resettlement run in 2012:
  - M+4 between Sept 2011 and Aug 2012
  - M+13 between Dec 2010 and Nov 2011
- Resettlement run in 2012:
  - M+4 between Sept 2012 and Feb 2013
  - M+13 between Dec 2011 and April 2012

This is to allow a full year's worth of data to be compared with the FCCR provided for the year 2012, and the most up to date values available for the portion of 2013 run to date.

A total of 98 Participants were considered as being effective throughout the period analysed; 59 were Generator's businesses and 39 Supplier's for a total of 495 units.

Suppliers and Generators have been analysed separately.

Should a Participant, on any given day, be suspended or de-register from the Market, the Fixed Credit Cover should adequately cover all resettlement up to 13 months.

In 2012 the Fixed Credit Cover was sufficient to cover the Resettlement requirements in 88% of cases for Generators and 74% of cases for Suppliers. Generator Units create a considerable lower risk to the Market at the Initial Settlement stage as they are mostly creditors to the Market. At the Resettlement stage this not always true, however it is still demonstrated that the volumes affected are considerable lower than Suppliers. In fact the average Resettlement total amount by Participant not covered by the FCCR for the whole year, was approximately €78,000 for Generators while just over 1 million for Suppliers.

In the first 5 months of 2013 although Suppliers FCC was sufficient for 90% of cases versus 83% of Generators, the amounts again show the higher risk that they pose to the market. For Generators the average amount potentially not recovered by FCC was approximately €36,000, while for Suppliers it was €510,000.

This confirms that the current cover mechanism is sufficient in the vast majority of cases and when variances occur, these are too large due to the scale of the Participants, and could only be covered with a level of cover that would impose an undue burden on the Participant.

Currently Interconnector Units are considered in the same manner as standard Generators for Resettlement. The analysis shows that while in 2012 there were no Interconnector Participants with a total of negative Resettlement amounts (therefore no liability was created in the Market), in 2013 eight out of the 16 Participants in the Market showed a negative resettlement amount with an average of €5,100.

Netting Generators Units continue to show a trend of minimal Resettlement with only two instances of values above FCC in 2012 and none in the 5 months of 2013. The average amount was just €6,600.

Finally, the number of resettlement defaults with reference to the same period, were also reviewed and found that 56 of the 80 instances of defaults were for less than €1, twelve were between €1 and €20 and the remaining twelve ranged from approximately €70 to €59,000. These were all covered by excess cash collateral in most instances and late payments in 13 cases. This is further indication that FCCR has been more than appropriate to cover any one-off payment defaults that have occurred in the sample period.

3.5.3 CONCLUSION

Different types of Units have varying Resettlement profiles and liabilities. Therefore it is still appropriate to have a range of Fixed Credit Cover Requirements in place based on the different degrees of risk that each category poses to the Market.

Supplier Units still show the highest level of negative Resettlement amount. While the FCCR in place in 2012 and 2013 has so far covered the majority of cases efficiently. The MO considers the current method based on a rate of 8.77€/MWh of average daily demand subject to a minimum value of €1,000 and a maximum of €15,000, adequate to capture the majority of cases without undue burden.

Generator Units do not generally pose a risk at Initial Settlement as they are normally due money from the market. However Resettlement amounts can be either positive or negative. The amounts involved however, are significantly lower than Suppliers and current level of FCCR at €5,000 is sufficient to cover the majority of cases. As with Supplier Units those that are not covered, are amounts too large and would require a significant increase.

While Interconnector Units do not pose any risk to the Market at the Initial Settlement stage since the introduction of Intra-Day Trading (IDT), they can also be subject of Resettlement amounts which can be either positive or negative. Although in 2012 only positive total amounts were calculated, there is a significant proportion of Interconnector Participants (50%) in 2013 with negative requirements. This makes it difficult to justify a decrease of the current level of credit cover in place.

Netting Generator Units continue to have very limited amounts of Resettlement; the current level of FCCR at €1,000 still appears to be sufficient and adequate.

3.5.4 RECOMMENDATION

Based on the analysis carried out, the MO proposes that the 2014 Fixed Credit Cover Requirements remains unchanged from those of 2013 and namely:

- For Supplier Units the FCCR should be calculated by using a rate of €8.77/MWh multiplied by the average daily demand of each unit subject to a minimum value of €1,000 and a maximum of €15,000
- For Generator Units the FCCR value of €5,000 should be maintained
- For Interconnector Units the FCCR value of €5,000 should be maintained
- For Netting Generator Units the FCCR value of €1,000 should be maintained

The parameters provided above have been demonstrated to date to provide a balance between maintaining a low level of risk of bad debt in the SEM while not over burdening Participants with credit cover requirements which could be seen as a barrier to entry or a barrier to continuation of trade.