BSC MODIFICATION P308 – ANALYSIS TO DEMONSTRATE POTENTIAL SCOPE AND CIRCUMSTANCES FOR AN INSURANCE PRODUCT – 'CATASTROPHIC SUPPLIER FAILURE'

Executive Summary

The Balancing and Settlement Code (BSC) Modification P308 'Alternative security product for securing credit under the BSC' proposes that the current BSC credit arrangements could be replaced or complemented by a new insurance product/scheme. This product or scheme would protect all BSC Parties from 'excessive' costs that may arise from a 'catastrophic Supplier failure event'

In order to help gauge the possible scale of costs that may need to be insured against, we analysed a hypothetical 'catastrophic Supplier failure' (more details to follow). Our analysis estimates the costs that may be borne by all other BSC Parties as a consequence of such an event. In particular we estimate that BSC Parties may be required to fund a failing Supplier's BSC Trading Charges of approximately £26m.

To complete our analysis, we simulated a 'catastrophic' failure for an actual medium sized Supplier using our experiences of Supplier insolvencies and, in order to make the scenario as realistic as possible, actual historical Settlement data from between 5 November 2015 and the present day. While we have used actual historical data to make the scenario as realistic as possible, we have applied a number of assumptions and adjustments to produce a 'catastrophic' effect and so must stress that our analysis is hypothetical.

Context

Imbalance Settlement: How does it work?

BSC Parties (e.g. Suppliers) who have customers (the general public) that use electricity, normally purchase electricity from generators ahead of time to meet their customers' demand. Suppliers purchase energy by agreeing power purchase agreements with generators. If they have contracted for less than what their customers actually consume, they have a deficit or 'short' of electricity. Conversely, if they have contracted for more than what their customers actually consume, they would have a surplus or be termed 'long'. Any deficit or surplus of electricity is regarded as an 'energy imbalance'.

Because BSC Parties often fail to match their contracts with actual consumption, National Grid as the System Operator, uses its Balancing Mechanism to buy or sell energy to ensure supply and demand are matched at all times.

In accordance with the BSC, the BSC Parties responsible for 'energy imbalances' buy or sell electricity to cover their imbalance through the Imbalance Settlement mechanism. This is Imbalance Settlement and the money paid or received by BSC Parties for their imbalances are called Imbalance Charges and are recovered through BSC Trading Charges.

The System Prices BSC Parties pay or are paid for their imbalances for every half hour Settlement Period are calculated based on the actual prices that National Grid pays or is paid to buy and sell energy using its Balancing Mechanism.

ELEXON calculates the BSC Trading Charges for every half hour Settlement Period. These half hourly charges are summed up and invoiced to BSC Parties on a per Settlement Day basis.

What are the current BSC credit arrangements?

Trading Charges for a given Settlement Day are typically billed to BSC Parties 29 calendar days later. This means that BSC Parties will always have approximately 29 days of accrued Trading Charges yet to be paid. If a BSC Party stops paying for these Trading Charges (either because they are unwilling or unable to do so), the charges would have to be recovered from other BSC Parties. As a safeguard, BSC Parties must lodge 'Credit' with ELEXON to cover the 29 days' worth of charges should they be unable to pay.

What do we mean by a catastrophic event?

In order to demonstrate the scope of an insurance scheme or product, we have modelled a catastrophic event to identify the scale of costs BSC Parties may be exposed to. This model is intended to demonstrate the effects of a single BSC Party being unable or unwilling to pay for its entire demand requirement through BSC Trading Charges. The basis of our modelled catastrophic event is that a Supplier fails to purchase energy on the wholesale market and relies on the Balancing Mechanism to cover its demand requirements.

In our model, we take into account two key factors that could have a significant impact on the costs BSC Parties may be exposed to.

- *Supplier failure* – A medium sized Supplier suddenly is unable or unwilling to purchase energy from the wholesale market. We have decided not to specify a particular reason for this failure but it may be driven by a number of things, e.g. poor business administration/accounting or acute exposure to effects of a failure/collapse in the energy or financial markets.

  Upon failing to purchase energy on the wholesale market, the Supplier stops submitting details of contracts (i.e. the power purchase agreements it would ordinarily have struck with generators) to ELEXON. Consequently the Supplier relies on the Balancing Mechanism to ensure its customers' demand is met. Therefore, the Supplier must pay Trading Charges at the prevailing System Price to cover its total demand requirement.

  We considered the effects of a larger Supplier (e.g. a Big 6 Supplier) failing to buy energy in the wholesale market and relying on the Balancing Mechanism. However, while plausible, these scenarios appeared to relate to such a large number of customers and have such a large financial impact that it would be likely that the Department for Energy and Climate Change (DECC) or Ofgem would intervene. For example, they could use powers accounted for in the Energy Supply Company Administration Rules 'to ensure the continued operation of a large energy supply company experiencing financial distress, and for which no buyer can be found.' In this case, the Energy Supply Company Administrator would ensure the Supplier could continue to trade with a view to winding up or selling on the supply business.

- *Demand Control Event* – is an event instructed by National Grid, acting as the System Operator, whereby demand customers are temporarily, involuntarily disconnected. Demand Control Events occur as a last resort to enable National Grid to reduce the demand for energy when there is insufficient supply. For the purposes of this narrative, we have assumed that the National Grid experiences a sudden, large loss of generating capacity (e.g. due to simultaneous unplanned outages at several large generating plants). This sudden loss of capacity is large enough to require that demand be disconnected as the system is at its tightest point. When a Demand Control Event occurs, National Grid send details of amount of demand disconnected to ELEXON so the System Price(s) for those disconnected periods take account of the volume and the value of the disconnected demand.

  While a Demand Control Event may only last minutes, possibly hours, the expectation of such an event happening or recurring can affect National Grid's calculation of Loss of Load Probability (LoLP) for the preceding and succeeding Settlement Periods. This is significant because LoLP values can have a strong influence on the calculation of System Prices. We have therefore assumed that LoLP values ramp up and down sharply in the periods preceding and succeeding a Demand Control Event.

Our Analysis

We selected a Supplier that consistently has a large trading volume among medium sized Suppliers to be the 'failing Supplier' in our analysis. For confidentiality reasons, we will not disclose the name of this Supplier but will instead refer to them as 'Supplier X'. Using Supplier X should allow us to model large imbalance volumes and Trading Charges, assuming they fail to purchase energy from the wholesale market.

In our analysis, we made several assumptions:

- Our System Prices are based on actual historical data, but with some parameters adjusted to reflect how System Prices will be calculated from November 2018. This is because, as required by approved BSC Modification P305, ELEXON will be implementing changes to certain parameters in 2018 to sharpen the calculation of prices, i.e. potentially make them more volatile and extreme[1].
- The 'catastrophic Supplier failure event' took place over the Christmas period in 2015, which, due to the number of non-working days, prolonged the time before ELEXON and the BSC Panel could take any remedial actions.
- Supplier X lodged credit with ELEXON to cover its typical Imbalance Charges and did not withdraw any of it.

Hypothetical Event Chain

We assumed that heading towards Christmas Day in 2015, Supplier X started to run into financial difficulties. It increasingly struggled to purchase energy from the wholesale market and relied more on the Balancing Mechanism to ensure supply to its customers. At a particular point in time, its situation became so acute that it could no longer meet any of its payment obligations (including its BSC Trading Charges) and had to appoint an administrator to wind the business up and sell its customer base to another Supplier (a trade sale). This left a considerable volume of unpaid Trading Charges that ELEXON would need to recover from other BSC Parties.

The table below describes the hypothetical chain of events that led to the demise of Supplier X. These events happened to take place across 4 non-working days (Christmas Day, weekend, Boxing Day), and therefore prolonged the time before any remedial actions could be taken.

Date	Event	Additional Info
pre 24/12/2015	Supplier X's financial situation gradually deteriorated. It struggled to secure funding to pay for new contracts with power generation plants and so purchased fewer forward contracts than they normally do in previous winters. Some of its long term power purchase contracts were not	The CCP is the ratio of Total Energy Indebtedness to Energy Credit Cover. In effect it is the ratio of total Trading Charges incurred over a 29 day period to the credit lodged by a BSC Party. The CCP shows whether a BSC Party has lodged sufficient credit to cover its debts incurred over 29 days should they default on their payments.

[1] P305 was approved by Ofgem to implement the recommendations of its Electricity Balancing Significant Code Review. In particular it sought to sharpen the calculation of System Prices to improve their cost reflectivity and provide a stronger signal and incentive to Parties to avoid being in imbalance. ELEXON implemented P305 on 5 November 2015 but with the intention of making additional changes in November 2018 to further sharpen the calculation of System Prices.

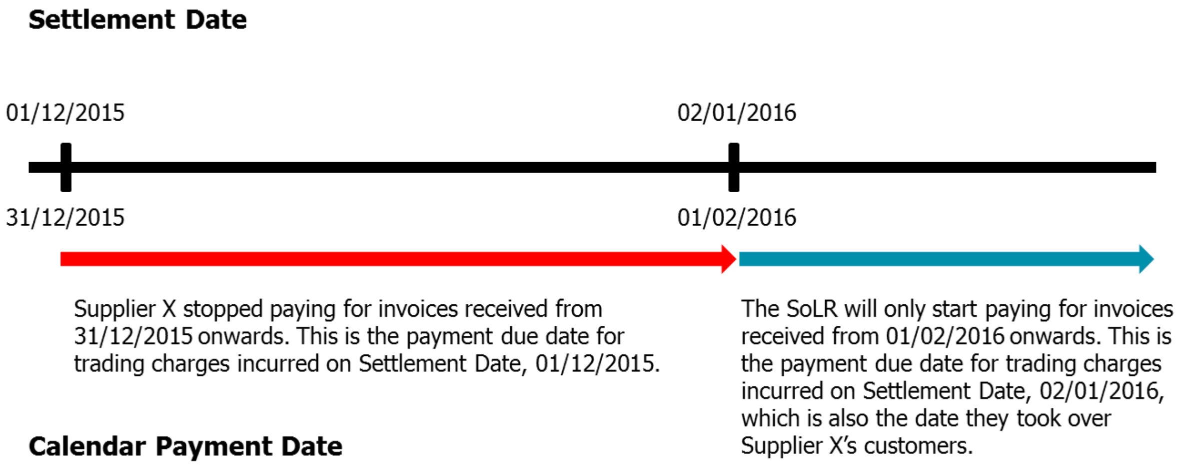
	renewed. ELEXON monitors Trading Parties' Credit Cover Percentage (CCP) on a daily and weekly basis. If it hits a high percentage (e.g. 80%), the team would immediately contact the Party to lodge extra credit or advise them to reduce their imbalances to reduce their CCP. However, there were no obvious signs to ELEXON of Supplier X's deteriorating situation. That is, Supplier X's CCP consistently remained below 80%. They also continued to promptly pay Trading Charges (incurred from earlier Settlement Dates). There was also no notification from Ofgem, market intelligence reports, or news in the media that could raise awareness of Supplier X's situation.	A higher (lower) CCP is an indication that a Party has lesser (more) credits to cover a potential default on trading charges which were incurred over a 29 day period. More specifically, Credit Cover Percentage is calculated as: CCP = Total Energy Indebtedness (MWh) / Energy Credit Cover (MWh) * 100 Where: 1.) Total Energy Indebtedness (MWh) = actual and/or estimated metered volume (MWh) - contracted volume (MWh) 2.) Energy Credit Cover (MWh) = Credit Cover (£) / Credit Assessment Price (£/MWh)
24/12/2015 00:00:00 (Thursday)	Supplier X suddenly cancelled all its remaining power contracts and stopped purchasing forward contracts altogether. They decided to depend entirely on the Balancing Mechanism and Imbalance Settlement to ensure supply to its customers.	
25/12/2015 00:00:00 (Friday)	Supplier X's decision to abandon all contracts and depend only on the Balancing Mechanism caused its contracted volume to fall to zero. This caused their CCP to jump from ~70% on 24/12/2015 to 100% at 0000. As Supplier X continued to rely on Imbalance Settlement and did not lodge further credit, its CCP continued to increase throughout the day. ELEXON called Supplier X's out-of-office contact to explain the consequences of breaching the 100% threshold, and advised that they lodge extra credit by lunchtime on the next working day, 29/12/2015. Supplier X nevertheless continued to pay BSC Trading Charges billed for on this day.	When a Party's CCP goes above 80%, they will trigger the Credit Default process, at which point it receives a default notice by phone and email. If the Party's CCP is above 100% by 14:00:00 on the next working day, the Party will immediately enter Level 2 Credit Default. Once this happens, a Party should take actions to reduce their CCP to below 90% within 2 working days. Otherwise, if a Party's CCP still remains more than 100% after 2 working days, the Party is considered to have defaulted under Section H of the BSC. This prompts the BSC Panel to consider a number of actions including expelling the Party from the BSC.
29/12/2015 (Tuesday)	Supplier X's CCP remained above 100% at 14:00:00, and entered Level 2 Credit	

	Default as a result. ELEXON contacted Supplier X to warn them that they will default under Section H of the BSC if they do not take actions to reduce their CCP to below 90% by 14:00:00 on 31/12/2015. Supplier X admitted that they were having financial difficulty, but were hopeful of putting a recovery plan in place by end of next day. ELEXON continued to monitor the situation. It also alerted the Panel to the possibility of a Section H default by Supplier X and to the need for an urgent Panel meeting should they default. Supplier X nevertheless continued to pay BSC Trading Charges billed for on this day.	
31/12/2015 (Thursday)	Supplier X failed to bring its CCP to below 90% by 14:00:00. As a result, it officially defaulted under Section H of the BSC. Supplier X also informed ELEXON that it will no longer meet any payments for Trading Charges due from this day onwards. This is the date when Trading Charges incurred for Settlement Date, 01/12/2015, is due. It also appointed an administrator on this day and informed Ofgem about it. Ofgem informed ELEXON that it intends to revoke Supplier X's supply licence and appoint a Supplier of Last Resort (SoLR) to take over Supplier X's customers. A BSC Panel meeting was urgently convened to decide the course of actions to be taken. The administrator also attended and stated that they were trying to find another Supplier to take over Supplier X's customer base. In the meantime, it was unable to secure finances to purchase energy contracts, meaning that Supplier X's customers' consumption would continue to be covered through Imbalance Settlement. Later in the evening, Ofgem issued a notice	Ofgem has the right to revoke a supply licence on 24 hours' notice if the licensee is unable to pay its debt or appoint an administrator. If a supply licence is revoked, Ofgem could appoint a SoLR to take over the failing Supplier's customers. Where a BSC Party has not been able to transfer its customer base beforehand, Ofgem can appoint a SoLR so that a failed Supplier's customers will continue to take their supply from a licensed Supplier.

	revoking Supplier X's electricity supply licence effective at 0000 on 02/01/2016. A SoLR would be appointed effective from the same time.	
02/01/2016 (Saturday)	A SoLR was appointed at 0000. All Balancing Mechanism Units (BMUs) that belonged to Supplier X were effectively transferred to the SoLR from that time. From this point, the SoLR would be responsible for those BMUs, and therefore also responsible for any ongoing Trading Charges relating to the supply of the customers through those BMUs.	The effective date and time of the appointment (the Appointment Day) of a SoLR usually coincides with when the Supply Licence is revoked, so the new Supplier can take responsibility for the failing Supplier's customers immediately.

Scenario - Part A - What would be the debt exposure based on this scenario?

On 31/12/2015, Supplier X defaulted on its Trading Charges. This is the date when payment is due for the Trading Charges incurred for Settlement Date, 01/12/2015. The appointed administrator also declared that they were unable to cover any Trading Charges or purchase energy contracts while they are in control. The SoLR took over Supplier X's customers on 02/01/2016 and would be liable for any Trading Charges incurred from this date onwards. Based on this situation, Supplier X would leave Trading Charges incurred from Settlement Dates 01/12/2015 00:00:00 to 01/01/2016 23:59:59 unpaid.



Consequently ELEXON will need to recover Supplier X's Trading Charges incurred from Settlement Dates 01/12/2015 to 01/01/2016. Firstly ELEXON uses Supplier X's credit to pay for as much debt as possible. ELEXON then recovers any remaining debt from all other BSC Parties using 'Default Funding Shares' (i.e. a means of recovering costs proportionately).

The scenario pointed out that Supplier X's CCP hits exactly 100% at 0000 on 25/12/2015. This is the point where the credit lodged by Supplier X was estimated to be enough to cover their Trading Charges accrued across 29 previous days. Furthermore, until this point, Supplier X had continued to pay its Trading Charges. Therefore in this case, we assume the credit lodged by Supplier X would be roughly enough to cover their Trading Charges incurred from 01/12/2015 to 24/12/2015. The amount of debt that ELEXON would recover from all other BSC Parties is Supplier X's totalled Trading Charges incurred from Settlement Dates 25/12/2015 to 01/01/2016.

How we modelled the scenario and what are the assumptions used?

To model the impact of this scenario, we took the Credited Energy Volume (i.e. what was actually consumed according to meter readings) of Supplier X for every Settlement Period within the affected dates (25/12/2015 to 01/01/2016) and multiplied it against the relevant System Prices for those Settlement Periods. Note that Supplier X stopped contracting for energy by 25/12/2015, hence we used their Credited Energy Volume (to reflect their entire consumption) instead of their actual historical imbalance volume (which takes into account any contracted volumes).

The System Prices were based on recalculated historical prices for Settlement Periods between 25/12/2015 and 01/01/2016 – that is prices were calculated using parameters that will be used from November 2018, e.g. the Price Average Reference (PAR) value was changed from 50MWh to 1MWh. A reduction in the PAR value should better reflect the marginal cost of balancing energy.

Note that the calculation of the System Prices used in our modelling does not take into account any behavioural change as a result of more marginal pricing. Also note that the System Prices used in our modelling are based on what they were between 25/12/2015 and 01/01/2016. However, we cannot say with certainty if the prices would remain at similar levels in the future. Systems Prices change over time as it could be influenced by other market conditions. For instance, if the system is consistently short of electricity or if oil prices rose significantly, the prices could escalate to levels that are higher than the ones used in our modelling.

Findings

Based on Part A of our scenario, ELEXON recovered (based on the totalled Trading Charges not covered by Supplier X's Credit Cover) £7,792,699.06 from other BSC Parties. We also worked out the share of the debt that ELEXON needs to recover from other BSC Parties. We calculated this Default Funding Share by revising every BSC Party's Annual Funding Share by removing Supplier X from the calculation, and then multiplying these revised shares by the debt due.

The table below shows the top 10 highest debt bearers. Due to their relatively large Default Funding Shares, they bore a significant proportion of the debt. Collectively, they would have to cover around 75% of the debt.

Name	Exposure	% of costs to cover
Large Supplier 1	£1,464,884.13	18.80%
Large Supplier 2	£790,030.87	10.14%
Large Supplier 3	£696,799.45	8.94%
Large Generator 1	£567,642.30	7.28%
Large Supplier 4	£554,268.84	7.11%
Large Supplier 5	£523,175.75	6.71%
Large Supplier 6	£492,935.95	6.33%
Large Generator 2	£343,921.97	4.41%
Large Generator 3	£229,693.33	2.95%
Non-physical trader 1	£189,716.50	2.43%

Scenario - Part B - What if a Demand Control Event took place?

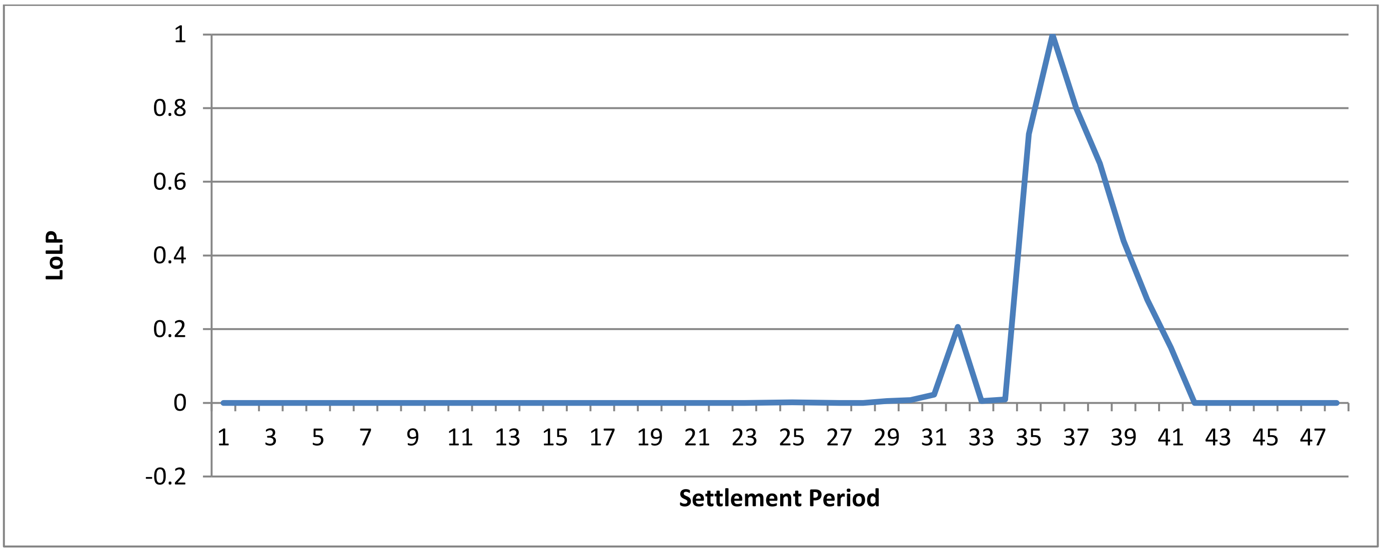
We also modelled the effects on Supplier X's debt if a Demand Control Event took place on one of the affected Settlement Dates. To do this, we further assumed that there is insufficient generation capacity during Settlement Periods 32 and 35 on 30/12/2015, hence the System Operator had to call upon STOR actions to increase electricity supply on those periods. However, this still proved to be insufficient, and as a last resort, the System Operator issued a 'Demand Control Instruction' to instruct the Licenced Distribution System Operators (LDSOs) to disconnect their consumers. The disconnection took place on Settlement Period 36, but consumers were reconnected by Settlement Period 37. However, there's still a risk of insufficient supply to cope with the demand requirements following the Demand Control Event, and the System Operator continued to utilise STOR actions from Settlement 37 to 41. The situation stabilised after Settlement Period 41.

To incorporate Part B of our scenario, we used the same set of Credited Energy Volume and System Prices data as in Part A. However, given our assumption that STOR and Demand Control actions were utilised on 30/12/2015, we adjusted the calculation of System Prices to reflect the value of these actions. That is we took account of the following factors:

- the Value of Lost Load (VoLL), which is a fixed parameter set at £6,000/MWh for every Settlement Period,
- the Utilisation Price of the STOR actions – the actual cost of providing STOR,
- the Loss of Load Probability (LoLP) – a variable calculated for each Settlement Period that reflects the probability that there will be insufficient generating capacity to meet demand, and
- the Reserve Scarcity Price (RSP), is the perceived value of STOR for a Settlement Period, which is determined as LoLP × VoLL.

We used historical LoLP data from 2013. This is because the actual LoLP data for the Christmas 2015 periods was subject to calculation errors. Therefore to provide a realistic but not necessarily specific set of base data we used the LoLP values of Settlement Date 08/07/2013. Because of the hypothetical nature of our analysis, we considered that it does not matter from when the LoLP data relates to, so long as we use it consistently.

To suit our scenario, we adjusted the actual, historical LoLP values for the affected Settlement Periods (when STOR and Demand Control actions were utilised, i.e. Settlement Periods 32 to 41) to reflect higher probability of insufficient supply. The chart below illustrates the LoLP values we used for 30/12/2015. To reflect typical behaviour, we kept LoLP values for most Settlement Periods low but ensured they spiked during the evening peak period, in particular at SP 36, to reflect the hypothetically tight system margin and that a Demand Control Event took place.



Findings

By combining Part A (Supplier Failure only) and B (Supplier Failure, STOR and Demand Control) of our scenario, the total unrecoverable Trading Charges incurred on 30/12/2015 significantly increased. Based on the complete scenario, the total debt that recovered from all other BSC Parties was £25,950,020.03. The table below shows the top 10 debt bearers.

Name	**Exposure**	**% of costs to cover**
Large Supplier 1	£4,878,126.61	18.80%
Large Supplier 2	£2,630,836.49	10.14%
Large Supplier 3	£2,320,371.86	8.94%
Large Generator 1	£1,890,273.07	7.28%
Large Supplier 4	£1,845,738.88	7.11%
Large Supplier 5	£1,742,197.56	6.71%
Large Supplier 6	£1,641,497.72	6.33%
Large Generator 2	£1,145,274.81	4.41%
Large Generator 3	£764,888.60	2.95%
Non-physical trader 1	£631,764.04	2.43%

Potential follow up analysis

It may be valuable to complete more detailed assessment of contagion amongst other BSC Parties, as a result of Supplier X failing and defaulting on its Trading Charges. That is, our analysis has shown the extra costs that would have been borne by individual BSC Parties. However it has not shown if these extra costs add significantly to other BSC Parties' Trading Charges and if these increased charges have the potential to cause further payment defaults, e.g. by smaller Suppliers, as a result of the additional financial burden.

Trading Charges for a given Settlement Date are typically billed to BSC Parties 29 calendar days later, but this is still subject to corrections at various stages over 14 months. This is partly because the data used to calculate the Trading Charges at the 29th day may be erroneous or based on estimates. ELEXON will recalculate the Trading Charges using updated data, and re-bill the BSC Parties to account for any difference between the recalculated Trading Charges and the ones originally calculated at the 29th day. Our analysis has not considered any potential corrections to the Trading Charges after the 29th day, and a follow up analysis may be needed to demonstrate if the Trading Charges would vary significantly.

We also made a conscious decision to only focus on a default on BSC Trading Charges, when in reality the failing Supplier would also default on other BSC Costs (e.g. Main & SVA Specified Charges). We focused our analysis because the current Credit arrangements only offer protection against a default on Trading Charges. Also BSC costs are calculated based on a fixed tariff (which is not dependent on imbalance volumes) and so were considered to be less significant and volatile. In order to complete a comprehensive analysis, follow up analysis may need to consider these additional BSC Costs.