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Gas Security of Supply Significant Code Review – Impact Assessment for the Proposed Final Decision

Statutory Impact Assessment and Response to Draft Impact Assessment

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Overview:

The aim of the Gas Security of Supply Significant Code Review (Gas SCR) is to establish whether changes to the current gas market arrangements are required to enhance security of supply and, if so, what these reforms should be.

This impact assessment (IA) sets out key factors that were taken into account in reaching the proposed final decision. We summarise our key findings from the draft IA, outline stakeholder feedback and set out our response to this feedback as well as our revised assessment. Responses to this IA and responses to our proposed final decision will inform the Authority's decision on the cash out reform proposals.

We consider our proposed final decision will strengthen the incentives on market participants to deliver adequate gas supplies by reforming the cash-out arrangements in an emergency.

Context

We launched the Gas SCR on 11 January 2011. On the same day we published our initial consultation document which outlined our initial proposals to enhance gas security of supply. Following feedback from stakeholders on our proposals we published for consultation our draft policy decision setting out a number of reform options and our preferred option as well as a draft IA. We also held several stakeholder events and meetings to elicit feedback on our draft policy decision. We have considered this feedback and developed and revised our reform proposals.

This IA sets out our analysis of the potential impact of the reform options outlined in the proposed final decision. In this document, we summarise the key findings of the draft IA, we outline and respond to stakeholder feedback and the changes that we have made to the IA as a response to this feedback. We also seek representations on the assessment in this document.

Our draft policy decision also recommended investigating further measures to enhance gas security of supply. The government supported this view and requested Ofgem to undertake a review of medium to long term security of supply and explore the range potential further measures which could be undertaken in addition to cash-out reform. We have agreed with government that we will submit the report on gas security of supply this autumn.

Associated documents

Proposed Final Decision – Gas Security of Supply Significant Code Review, July 2012 (Reference number 111/12):
http://www.ofgem.gov.uk/Markets/WhlMkts/CompandEff/GasSCR/Documents1/120731_GasSCR_pfd.pdf

Redpoint Energy, Gas Security of Supply Significant Code Review: Modelling Report for Proposed Final Decision, July 2012:
http://www.ofgem.gov.uk/Markets/WhlMkts/CompandEff/GasSCR/Documents1/120731_GasSCR_RP.pdf

Draft Policy Decision - Gas Security of Supply Significant Code Review, November 2011 (Reference number 145/11):
http://www.ofgem.gov.uk/Markets/WhlMkts/CompandEff/GasSCR/Documents1/Draft%20Policy%20Decision%20Gas%20Security%20of%20Supply%20Significant%20Code%20Review.pdf

Redpoint Energy, Gas Security of Supply Significant Code Review: Modelling Report, November 2011:
http://www.ofgem.gov.uk/Markets/WhlMkts/CompandEff/GasSCR/Documents1/Redpoint%20Energy,Gas%20Security%20of%20Supply%20Significant%20Code%20Review%20-%20Economic%20Modelling.pdf

London Economics, Estimating the Value of Lost Load – Final Report to Ofgem, July 2011:
http://www.ofgem.gov.uk/Markets/WhlMkts/CompandEff/GasSCR/Documents1/London%20Economics,%20Estimating%20Value%20of%20Lost%20Load%20-%20Final%20Report%20to%20Ofgem.pdf

London Economics, Estimating the Value of Lost Load – Annexes, July 2011:
http://www.ofgem.gov.uk/Markets/WhlMkts/CompandEff/GasSCR/Documents1/London%20Economics,%20Estimating%20Value%20of%20Lost%20Load%20-%20Annexes.pdf

Opinion Leader, Ofgem Consumer First Panel Year 3. Report on Value of Lost Load (VoLL), May 2011:
http://www.ofgem.gov.uk/Sustainability/Cp/CF/Documents1/Ofgem%20Consumer%20First%20Panel%20Year%203%20-%20Report%20on%20Value%20of%20Lost%20Load.pdf

Launch Statement – Gas Security of Supply Significant Code Review, January 2011:
http://www.ofgem.gov.uk/Markets/WhlMkts/CompandEff/GasSCR/Documents1/Launch%20Statement%20-%20Gas%20Security%20of%20Supply%20Significant%20Code%20Review.pdf

Initial Consultation - Gas Security of Supply Significant Code Review, January 2011 (Reference number 02/11):
http://www.ofgem.gov.uk/Markets/WhlMkts/CompandEff/GasSCR/Documents1/Initial%20Consultation%20-%20Gas%20Security%20of%20Supply%20Significant%20Code%20Review.pdf

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Executive Summary

Background

For a number of years, Ofgem has expressed concerns about the ability of the current market arrangements to deliver secure gas supplies, particularly as our domestic gas supplies decline and dependence on international markets increases. We are particularly concerned that the cash-out price (the price faced by those shippers that do not balance their gas supplies to and off-takes from the system) is currently frozen upon entry into a Gas Deficit Emergency (GDE). A frozen cash-out price may not provide the necessary price signals to incentivise investments in security of supply and attract imports in an emergency. Under current arrangements, firm customers (customers with a non-interruptible gas supply contract) that would be interrupted are not paid for the involuntary demand side response (DSR) service they provide. Therefore, currently, the risks of supply interruptions sit mainly with individual consumers who are less able to manage these risks than shippers.

We intend to sharpen the incentive on gas shippers to enhance security of supply in GB by reforming the gas cash-out mechanism. Under our proposals cash-out would be set at £20 per therm (an estimate of domestic customers' Value of Lost Load or VoLL) in a GDE once gas supplies to firm customers are interrupted. Firm customers would be paid £20 per therm for each day they are without gas due to firm load shedding (ie they are instructed to stop consuming gas). If physical network isolation occurs (when parts of the network stop receiving gas), affected firm customers would be paid £20 per therm for the first day of an interruption only. Shippers would not be liable for cash-out charges in respect of isolated customers after the first day of network isolation.

Our analysis indicates that when compared with alternatives, this reform option is expected to bring about the most significant benefits to existing and future consumers.

Impact of reform options

Following extensive consultations with stakeholders and further analysis, we have made a number of changes from our draft impact assessment (IA). This includes revising some of the assumptions made for the modelling exercise undertaken for the IA. The key results of our assessment are summarised in table 1. This document sets out for consultation Ofgem's impact assessment on the proposals for cash out reform.

We largely confirm our assessment of the November 2011 draft IA that the current emergency arrangements are becoming less effective in providing security of supply due to depleting domestic gas reserves. Furthermore, no payments for involuntary DSR services are made to firm consumers should they be interrupted. Therefore, we conclude that the risks of a GDE are largely with customers.

The updated modelling suggests that the probability of firm interruptions has decreased compared to our previous analysis and that while cash-out reform is effective at enhancing security of supply, there is a correspondingly smaller

differential to current arrangements than estimated previously. The modelling indicates that the greater the assumed risk to security of supply, the greater the benefits of cash out reform.

Given the limitations of modelling low probability, high impact events, we still consider the qualitative analysis and economic rationale to be key. In particular, a more dynamic cash-out price will provide strong incentives to attract imports in an emergency and will strengthen shippers' incentives to take measures to enhance security of supply. This could take many forms including arranging interruptible contracts with consumers, diversifying supplies, investing in storage, and ensuring an appropriate mix of long-term and short-term contracts with producers.

However, we find that exposing shippers to the full cost of firm interruptions by reflecting customer's full VoLL in the cash-out price (option 1) could adversely affect competition (eg as a result of any risk of financial distress). When parts of the network have to be physically isolated, shippers have little influence over the restoration process which could take several weeks or months to complete. Therefore, we conclude that shippers' liability should be capped when parts of the network have to be physically isolated (option 2).

Compared to current arrangements, the modelling estimates the net benefit for option 1 to be £41 million and £65 million for option 2 until 2030. We estimate that an average annual consumer bill would increase by £0.46 for option 1 and £0.11 for option 2. The bill impact could be greater or smaller if shippers responded to the incentives created by investing in mitigating measures to enhance security of supply.

Table 1: Assessment of reform options compared to current arrangements

Key criteria	Option 1 Cash-out rises to full VoLL	Option 2 Cash-out rises to capped VoLL
Security of supply		
Payment for involuntary DSR services		
Consumer prices		
Competition and Market Efficiency		

 Positive impact Moderate impact  Negative impact

Overall, our analysis indicates that, compared to the current arrangements and alternative reform options, allowing the cash-out price to rise to capped VoLL is likely to bring about the most significant benefits to existing and future consumers. We consider that the risks of supply interruptions should not sit with consumers as they currently do and our proposals are intended to transfer these risks to shippers who are better placed to manage these.

However, our proposals still leave consumers with some risks as we propose to cap shippers' liability in the case of network isolation. Therefore, the potential for further measures to enhance security of supply, which could further transfer and mitigate

risks, is currently being assessed as part of our Gas Security of Supply Report to the Department of Energy and Climate Change. However, such measures are not a substitute for cash-out reform. Getting the price signals right by pricing in the cost of interruptions is pivotal.

1. Background and Objectives

Chapter Summary

This chapter outlines the rationale for the Gas Significant Code Review (Gas SCR) and our approach to assessing the impacts of the reform options.

Reason for the Gas SCR

1.1 In 2010 Ofgem published Project Discovery which noted that the consequence of freezing the cash out price is that the incentive to bring gas to the UK is weakened at precisely the time when we would need the incentive to be the sharpest. Given our increasing reliance on imports, managing an emergency by instructing domestic supplies to flow may also not be sufficient to get us out of an emergency. The introduction of the new Significant Code Review (SCR) process allows us to take a leading role on this issue and to take a holistic approach to reviewing the arrangements that are designed to enhance gas security of supply.

1.2 Our key objectives for this Gas SCR are to:

- minimise the likelihood of a gas deficit emergency (GDE) occurring by encouraging gas shippers and suppliers to undertake sufficient investment to enhance security of supply;
- minimise the severity and duration of a GDE, if one ever occurred, by sharpening incentives to attract gas into Great Britain (GB); and
- ensure that firm consumers are paid for any involuntary demand side response (DSR) services that they provide in an emergency.

Reform options

1.3 The proposed final decision outlines the reform options that we have considered. We have outlined in our workshops that the Gas SCR focuses on cash-out reform going forward as the work on further measures is taken forward in the Gas Security of Supply Report that we will submit to DECC this autumn. Therefore, for the purpose of this IA, we have focused on - and responded to stakeholder feedback to - cash-out reform. Hence, the two options we are outlining in this IA are:

- Option 1: Cash-out is set at domestic customers' value of lost load (VoLL) – which we have assessed as £20 per therm – when customers have to be interrupted in a Gas Deficit Emergency (GDE). Shippers have to pay cash-out for affected volumes for all days of firm load shedding (where individual large

consumers are required to reduce their gas demand) and for all days of network isolation (where parts of the network stop receiving gas).[1] Firm customers receive VoLL if they have been interrupted for the involuntary demand side response (DSR) services they provided.

- Option 2: Cash-out is set as under option 1 but shippers' liability is capped as cash-out charges are only accrued for the first day of any new network isolation (cash-out continues to be set at £20 per therm rather than a multiple thereof). For the days after a given network isolation has occurred, these isolated volumes will not be factored into shipper imbalance calculation. Customers affected by network isolation would only receive £20 per therm for the first day of this isolation.

1.4 We have assessed both options against current arrangements. Under current arrangements, cash-out is frozen at stage 2 of an emergency and remains frozen for the duration of the emergency. National Grid Gas (NGG) suspends its activities on the On-the-day Commodity Market (OCM) though shippers can continue to trade out their imbalances. At the same time the Network Emergency Coordinator (NEC) can direct shippers to maximise flows. The Secretary of State also has the ability to direct physical delivery of supply. This role can be delegated to the NEC and shippers are obliged to comply with the instructions of the NEC under their licences. When non-daily metered (NDM) customers have to be interrupted (during firm load shedding or network isolation), the affected volumes are effectively taken out of shippers' imbalances, with the effect that shippers become longer (or less short). Customers are not paid for the involuntary DSR services they provide.

1.5 We considered and subsequently rejected the possibility of setting cash-out at different levels of VoLL during firm load shedding (when only large customers would be curtailed) as well as introducing a Force Majeure clause to lift shippers' obligations in certain circumstances. A discussion on these is set out in the proposed final decision and to some extent in this IA.

Our approach to this impact assessment

1.6 This document builds on the Authority's draft IA. This IA sets out key factors that were taken into account in reaching the proposed final decision. It aims to identify the likely impacts, costs and benefits of the reform options we have considered and compares these with the current arrangements. We consider the quantitative results of our modelling, together with a qualitative assessment of the impacts. This IA is not intended to repeat the analysis in the draft IA but rather

[1] Setting cash-out prices is less straightforward at the stage when parts of the network are physically isolated as outages are likely to last for several weeks or months. For this reason, if cash-out is to reflect the full (minimum) costs of the interruption to the individual, it should rise to some multiple of domestic VoLL. For the purposes of modelling the impact of option 1, 14 days was chosen to represent the minimum time that it would take to reconnect firm customers (this equates to £280 per therm). If we pursued option 1 we would undertake further consultation to determine a minimum outage duration for firm NDM customers. This would then be used to set the multiple which would be applied to VoLL for firm NDM customer interruptions.

amend and revise the assessment where necessary in response to stakeholder feedback and our own further analysis. Therefore, the draft IA and this IA should be considered in parallel.

1.7 Section 5A Utilities Act 2000 (UA 2000) imposes a duty to undertake impact assessments in certain cases. This duty arises in cases where it appears that a proposal is important (unless the urgency of the matter makes it impracticable or inappropriate to comply with the statutory requirements). It is our view that the proposal in relation to cash out reform is important for the purposes of section 5A UA 2000. As such, this IA is being prepared in accordance with section 5A UA 2000 and is intended to help inform the Authority's decision.

1.8 We commissioned Redpoint Energy to review and revise their quantitative modelling undertaken for the draft IA. The review is informed by stakeholder feedback and additional analysis conducted by Ofgem and Redpoint. Together with our draft IA, we published Redpoint's modelling report[2] which explains the modelling approach, underlying assumptions and key findings. Redpoint have produced a final modelling report[3] which illustrates the changes made to the modelling and shows the revised results. This IA shows a high level summary of these changes and the revised results.

1.9 In chapter 1 of the draft IA we outlined the limitations and complexities of modelling low probability, high impact events in the context of a global gas market. We stress again that the modelling is only intended to be one source of information to supplement rather than substitute our qualitative economic analysis. We outlined our qualitative analysis in the draft IA and we have revisited this in this IA in response to stakeholder feedback.

1.10 In chapter 2 of this IA, we outline changes that we have made to the modelling in response to stakeholder feedback and further analysis. Chapter 3 sets out the likely impacts of the reform options compared to current arrangements. Chapter 4 concludes the analysis. Annex 1 outlines in more detail stakeholder feedback to the modelling and our response.

[2] See Redpoint Energy, *Gas Security of Supply Significant Code Review: Modelling Report*, November 2011: http://www.ofgem.gov.uk/Markets/WhlMkts/CompandEff/GasSCR/Documents1/Redpoint%20Energy,Gas%20Security%20of%20Supply%20Significant%20Code%20Review%20-%20Economic%20Modelling.pdf

[3] See Redpoint Energy, Gas Security of Supply Significant Code Review: Modelling Report for Proposed Final Decision, July 2012: http://www.ofgem.gov.uk/Markets/WhlMkts/CompandEff/GasSCR/Documents1/120731_GasSCR_RP.pdf

2. Modelling Review

Chapter Summary

This chapter outlines Redpoint's modelling approach and changes made to the modelling in response to stakeholder feedback and further analysis.

2.1 The quantitative impacts of the reform options have been modelled using a stochastic model of the GB gas market. The model contains a full representation of the GB gas supply infrastructure and demand segments, together with a representation of the GB electricity sector. The model constructs an annual supply profile for a given demand curve at monthly granularity. It generates day-by-day simulations incorporating stochastic variations in gas demand, gas supply availability, and infrastructure outages.

2.2 The model runs numerous simulations for each modelled year based on these variables using a within day optimisation that tries to meet total demand at least cost using available supplies. In any given day, the level of each exogenous variable is determined stochastically based on the distribution assumptions for that variable. There is no foresight of this stochastic variation in the model. This generates some simulations in which the combination of variables results in a gas deficit emergency (GDE) and curtailment of firm load at one or more points during the year. Statistics on the probability and expected size of events under current arrangements and with the various reform options are produced. Particular simulations can be examined to see the impact of the various reform options in situations where a GDE occurs under current arrangements.

2.3 Stakeholders provided feedback on the modelling which we analysed further. Appendix 1 summarises the feedback and our response to this. We commissioned Redpoint to revise the modelling based on this analysis. Redpoint's final report is published alongside this IA and shows the detailed modelling changes. In summary, Redpoint have made the following key changes to the modelling:

- Revised and generally reduced the duration and magnitude of some of the risk assumptions used in the model (eg risk of infrastructure outages).

- Revised the dynamics underlying gas flows through interconnectors as a response to price differentials through calibration against historic hub differentials and removed any assumed effect that Public Service Obligations (PSOs) might have on price differentials. Removed the assumed maximum flow limit of 8bcm per year in 2012 for the Balgzand Bacton Line (BBL).

- Enhanced the modelling of LNG and continental price assumptions to improve calibration against historic price levels.

- Included combined cycle gas turbines (CCGT) with distillate back-up as a new tranche of demand that is now assumed to stop consuming gas and switch to distillate before firm customers are interrupted. Further, it is now assumed that all CCGT would be interrupted before any other firm demand. This reflects the actual order of emergency curtailment that would apply in a GDE more accurately.

- The quantitative cost-benefit analysis (CBA), now includes the cost of paying interruptible customers. It is assumed that these customers receive payments in the order of their individual VoLL for interruptions (this could be in the form of a permanent gas price reduction or an exercise price or a combination of the two). This change affects retail costs but it does not affect the net benefit as payments to customers are assumed to be recovered from all customers in the long-run. Further, Redpoint included changes to the total cost of gas (this can be in the form of higher costs for importing extra gas in an emergency due to cash-out reform, or lower costs due to increased demand side response provided by customers with interruptible contracts). Finally, given the change in the treatment of CCGTs noted above, the quantitative CBA now includes payments for involuntary DSR services to gas-fired power generators that are interrupted during firm load shedding.

- For the draft IA, we assumed that if NDM customers have to be interrupted due to network isolation, the minimum size of this curtailment would be 20mcm. After discussing this further with distribution network operators (DNOs) and National Grid Gas, it has become clear that DNOs can isolate much smaller parts of the network. Therefore, we removed the assumption around minimum size.

- We have changed demand, supply and price assumptions in line with new information available (eg updated forward curves and the new Ten Year Statement published by National Grid Gas). In the course of this, we also updated some of the assumptions made in Project Discovery. These are outlined in the Redpoint report. We have however run a sensitivity based on the old assumptions.

2.4 In general, given the inherent uncertainty of modelling low probability, high impact events and given the difficulty in predicting future external factors and risks, we have run a number of sensitivities. These assume for example that a market for interruptible contracts will not emerge and that risks to security of supply will be higher than what we assumed in the base case.

3. Impact of Reform Options

Chapter Summary

This chapter outlines the potential effects of the reform options. We outline the impact of the options on consumers, competition, sustainable development and health and safety as well as potential risks and unintended consequences. In all instances, we summarise the key arguments made in the draft IA, outline stakeholder feedback in particular on the qualitative assessment as well as our response to this feedback and the revised modelling results.

Impacts on consumers

3.1 While we have never had a gas deficit emergency (GDE), if one did occur, the costs could be very substantial and the consequences significant for both domestic and business consumers as well as the wider economy in Great Britain (GB). In particular, during winter when a GDE is most likely, the consequences for vulnerable consumers could be considerable.

3.2 The Gas Significant Code Review (Gas SCR) aims to minimise the likelihood as well as the duration and severity of a gas emergency occurring. It also aims to ensure consumers that have their gas supply interrupted as a result of a GDE are paid for the service that they are providing. These three objectives go to the core of our statutory duty under the Gas Act 1986 to protect existing and future consumers.

3.3 At a high level, our analysis of the impacts on consumers of our reform options leads us to consider that cash-out reform will improve security of supply for firm customers. The revised modelling demonstrates this particularly for daily metered (DM) customers and to a lesser extent for non-daily metered (NDM) customers. Compared to the draft IA, the modelled impact of cash-out reform is lower relative to current arrangements, primarily due to the reduced underlying risk assumptions.

Security of supply

3.4 As outlined in the draft policy decision, we believe that the current arrangements do not provide sufficient incentives to market participants to invest in measures that will improve gas security of supply. Further, a frozen cash-out price might be too low to attract additional gas from outside GB. As GB becomes more dependent on gas imports, these concerns are exacerbated as the Network Emergency Coordinator's (NEC) ability to order the maximisation of supplies might be less effective. Finally, under current arrangements, the interruption of NDM customers (including large NDMs during firm load shedding) would result in shippers imbalances becoming more positive (longer or less short). This in turn undermines the incentives that the cash-out mechanism is intended to provide for industry to meet customer demand.

3.5 We outlined in the draft IA in detail that economic rationale suggests that a more dynamic cash-out price reduces the likelihood as well as duration and severity of firm customer interruptions. Cash-out reform can act to increase shippers' potential cash-out liabilities in an emergency and provides more certainty around the cost of interruptions. Therefore, shippers have stronger incentives to take measures to enhance security of supply and to avoid being short during an emergency. This could include seeking storage provision, diversifying supplies, arranging interruptible contracts with customers and ensuring an appropriate mix of long-term and short-term contracts with producers. Further, a more dynamic cash-out price could attract more gas from outside GB prior to and in an emergency. As the cash-out price will only rise to a capped VoLL under option 2, we would expect this option to be less effective in reducing the duration and severity of a GDE than option 1.

3.6 To ensure that the curtailment of firm customers is treated as a balancing action, we propose to use cash-out payments to pay interrupted customers for any involuntary demand side response (DSR) services provided to the industry. Currently, any residual money due to the cash-out regime is re-distributed to industry through neutrality. If all the additional money raised through cash-out charges were returned to industry, incentives to invest would be undermined.

3.7 By providing incentives for the increased use of interruptible contracts, options 1 and 2 are aimed at incentivising a more efficient order of interruptions. By encouraging the discovery of the individual VoLL of customers through interruptible contracts, we expect that this would provide greater security to customers with a higher VoLL and in particular, firm customers who are unable or unwilling to arrange interruptible contracts.

3.8 The revised modelling results are shown in tables 2 to 4. The tables include the probability of interrupting marginal gas-fired power generators that are necessary to supply electricity customers (ie interrupting gas supplies to those generators would lead to electricity outages). Tables 2 to 4 show how effective the modelling suggests that options 1 and 2 are in reducing expected energy unserved, the probability of outages as well as outage size if an emergency occurred.

3.9 The modelling suggests that cash-out reform can effectively reduce energy unserved for firm DM customers. As already pointed out in the draft IA, the main driver behind enhancing security of supply of firm DM customers in the model is our assumption that there will be an increased use of interruptible contracts to provide demand side response (see Redpoint report for results of our sensitivity analysis assuming that no DSR will occur).

3.10 The base case results suggest that the Gas SCR has no impact on the actual probability of NDM interruptions; but reduces the extent of such interruptions (ie reduces average outage size as well as expected energy unserved). As pointed out by some stakeholders, the figures for the probability of NDM interruptions coming out of the model need to be treated with caution given the very low probability of such interruptions occurring.

3.11 Compared to the draft IA, the modelling shows a lower probability of interruptions under the current arrangements. This is mainly driven by our revised assumption around risks (in particular assuming a lower duration and magnitude of infrastructure outages than before). While the modelling suggests that cash-out reform is effective at enhancing security of supply, the impact relative to current arrangements is less than estimated in the draft IA. This is mainly because of a generally lower probability and magnitude of interruptions and removing the assumption that Public Service Obligations in Europe make importing gas in emergencies more difficult.

3.12 Further, electricity interruptions are more likely than assumed in the draft IA. This is driven by the change in the order of interruptions whereby gas-fired power generators are now assumed to be interrupted first – before any other firm demand. This more accurately reflects the actual order of emergency curtailment that would apply in a GDE. Compared to the draft IA, the revised modelling results suggest that the impact of options 1 and 2 are relatively similar.

3.13 Assuming higher and more severe risks leads to a higher probability and magnitude of interruptions (see sensitivity results in table 5) under current arrangements. In such instances, the model indicates that cash-out reform has a greater impact on the probability of NDM interruptions as well as expected energy unserved of firm customers. This indicates that the greater the risks to security of supply, the greater the benefit of cash-out reform. This is an important finding given the inherent difficulties in quantifying risks to security of supply accurately.

3.14 In reality, we expect cash-out reform to be more effective at reducing the likelihood and impact of emergencies than predicted by the modelling, as the model does not account for expectations of rising gas prices. We would expect prices to rise to higher levels under cash-out reform compared to current arrangements before any firm customers are interrupted. This is because there would be an expectation that prices would potentially rise to VoLL; in particular in slowly developing emergencies. We anticipate that this would attract additional available supplies of gas into GB which could be sufficient to allow supplies to firm customers to be maintained.

3.15 The model suggests that investing in new short range storage facilities is estimated to be uneconomic under the base case for a risk neutral shipper who wants to avoid cash-out charges in an emergency. This is similar to our findings in the draft IA for option 2, while the draft IA estimated some investment response for option 1. We note that the result may be different under a different set of circumstances and will in reality depend on a range of factors, such as shippers' assessment of and attitude to risks.

3.16 Shippers have a range of options to respond to the incentives created by cash-out reform, eg diversifying supplies and ensuring an appropriate mix of long-term and short-term contracts with producers. Modelling this accurately is difficult because it requires making complex assumptions about how individuals and firms respond to risk through their pricing behaviour. Such complexity is beyond the model constructed for this IA. Therefore, an increased use of interruptible contracts was used as one of the ways we would expect the market to respond to the incentives

created. In reality, industry might also respond to these incentives through other measures.

Table 2: Expected annual energy unserved in therms (average over the years 2012, 2016, 2020, 2030) [4]

Options	Gas-fired power generators	Firm DM (non-power generating)	Firm NDM interruptions
Current arrangements (frozen cash-out)	101,000	254,000	722,000
Option 1: Cash-out rises to full VoLL[5]	30,000	26,000	642,000
Option 2: Cash-out rises to capped VoLL	30,000	26,000	618,000

Table 3: Probability of outages in years (average over the years 2012, 2016, 2020, 2030)

Options	Gas-fired power generators	Firm DM (non-power generating)	Firm NDM interruptions
Current arrangements (frozen cash-out)	1 in 34	1 in 55	1 in 167
Option 1: Cash-out rises to full VoLL	1 in 74	1 in 128	1 in 167
Option 2: Cash-out rises to capped VoLL	1 in 75	1 in 128	1 in 167

[4] Gas-fired power generators are shown separately from DM customers that are not generating electricity. Firm load shedding of gas-fired power generators is only deemed to set in once the first tranche of firm electricity customers has to be interrupted. Hence, the interruption of gas-fired power generators shown in these tables would, in the model, lead to electricity outages.

[5] We note that the modelling suggests that option 1 is slightly less effective at reducing energy unserved for NDM customers than option 2 under the base case. Redpoint advised that this is due to small differences in optimisation results that are occasionally amplified when they affect a threshold event such as interruptions. However, they conclude that there are no fundamental differences in the modelling results for capped cash-out and uncapped cash-out.

Table 4: Average outage size in millions of therms if interruptions occur (average over the years 2012, 2016, 2020, 2030).

Options	Gas-fired power generators	Firm DM (non-power generating)	Firm NDM interruptions
Current arrangements (frozen cash-out)	3.5	13.9	116.2
Option 1: Cash-out rises to full VoLL	2.4	3.5	104.1
Option 2: Cash-out rises to capped VoLL	2.4	3.5	101.2

Table 5: Sensitivity modelling results assuming higher risks (2020 only)[6]

Options	Gas-fired power generators	Firm DM (non-power generating)	Firm NDM interruptions
Current arrangements (frozen cash-out)	326,000 (1 in 13)	1,059,000 (1 in 21)	2,546,000 (1 in 54)
Option 1: Cash-out rises to full VoLL	90,000 (1 in 28)	101,000 (1 in 47)	1,286,000 (1 in 63)
Option 2: Cash-out rises to capped VoLL	89,000 (1 in 28)	107,000 (1 in 48)	1,438,000 (1 in 60)

Note: Expected annual energy unserved is shown in therms. Number in brackets shows the probability of interruptions in years.

3.17 Some stakeholders argued that options 1 and 2 will lead to more financial security rather than physical security. It was argued that low probability, high impact events ("outliers") are discounted down when making investment decisions. As pointed out in the draft IA, such concerns and the fact that we are proposing to cap cash-out has led us to investigate the need for further measures.

3.18 We note that some shippers have argued that a Force Majeure (FM) clause should be introduced when revising cash-out arrangements while some consumer representatives argued against it. This is further discussed in the proposed final decision. A factor we have considered is who should bear responsibility for managing FM events. We do not consider it appropriate that individual customers bear these risks as generally they have the most limited means to manage their exposure. Further, shippers can take measures in response to cash-out reform which would also reduce shippers' exposure in FM events.

[6] Under this sensitivity we doubled the probability, duration and magnitude of infrastructure outages. We note that this is not intended to suggest that there is a high risk of outages at these facilities. This is rather meant to reflect a whole range of risks including geo-political uncertainties.

3.19 We note that an FM exemption clause does not exist in the current cash-out arrangements. We think that applying an FM exemption clause would undermine incentives to invest in security of supply by limiting shipper's exposure, and placing that exposure on customers instead. Applying an FM exemption to cash-out would also create significant uncertainty during a GDE. We are concerned that any confusion or uncertainty around the level of the cash out price could undermine incentives for the efficient delivery of additional gas imports during an emergency.

3.20 Some stakeholders suggested that introducing VoLL into the cash-out price might reduce liquidity prior to an emergency. It was argued that VoLL could act as a target price prior to customer interruptions, with producers and importers potentially holding back gas, knowing that they will receive a guaranteed higher price once interruptions occur, and thus increasing the likelihood of firm outages.

3.21 As we have outlined in our draft IA, we consider this outcome unlikely. The price available for additional gas would probably be very high and there would be no guarantee of achieving a higher price than the prevailing market price. There is also a question as to whether any supplier of gas holds enough market power to force firm interruptions. There could be competition among imports given that prices prior to an emergency are likely to be high. Moreover, any supplier that did withhold gas in such a circumstance could see their reputation damaged if their behaviour was made public. Shippers could also be in breach of their licence obligations if they pursue a course of conduct which is likely to prejudice the safe and efficient operation and balancing of the system. Furthermore, shippers could potentially be in breach of their obligations under the Regulation on Energy Market Integrity and Transparency (REMIT).

Market for interruptible contracts

3.22 A large number of stakeholders were concerned that cash-out reform might not lead to the development of an efficient market for interruptible contracts. Some customer groups argued that there is scope for more DM customers arranging interruptible contracts and pointed out that several sites had interruptible contracts with distribution networks (DNs) before Uniform Network Code (UNC) modification 90[7] was implemented. But they also point out that many DM customers might not be able to sign such contracts if they have no back-up capabilities and if gas is critical for the safe operation of their processes.

[7] Uniform Network Code (UNC) modification proposal 90 (Mod 90) changed the approach to purchasing and offering interruption services for transportation constraints on gas distribution networks. Before Mod 90, distribution networks did not determine the volume and location of the interruption they receive and cannot influence a customer's decision to become interruptible. Customers with an Annual Quantity (AQ) greater than 200,000 therms decided annually whether to be interruptible on standard terms. The standard terms were 45 days of interruption each year in return for a 100% discount on exit capacity charges. Customers received additional payments if they were interrupted for more than 15 days a year. With the implementation of Mod 90, distribution networks now specify the volume and location of the interruption they want and customers will offer, via annual tenders, volumes of potential interruption at particular prices. Tenders are held up to three years in advance for interruption contracts of up to five years in length. For details see http://www.gasgovernance.co.uk/0090

3.23 A large number of shippers argued that customers generally prefer to be firm and might therefore be unwilling to sign such contracts. It was argued that attempts have been made several years ago to offer such contracts to customers and that the take-up was very low. It was argued that shippers cannot offer a high enough permanent reduction on bills or a high enough exercise price to incentivise such contracts. Further, it was argued that short contracting periods might be an obstacle to arranging such contracts. Others argue that the number of interruptible contracts will increase but potentially not enough to significantly improve security of supply. In particular it was argued that customers would seek to agree exercise prices that are close to £20 per therm following the introduction of the Gas SCR.

3.24 We note that our proposed final decision is based on an assumption that a market for interruptible contracts will develop in the industrial and commercial sector. However, the Gas SCR relies on market mechanism and economic incentives to reach economically optimal solutions and does not prescribe specific tools to enhance security of supply. For some shippers it might be sensible to arrange interruptible contracts while other shippers might choose to respond, for example, by diversifying supplies. We note that we asked industry for evidence to show that a market for interruptible contracts will not emerge but we have not been presented with convincing evidence to this effect.

3.25 We believe that we have indications that suggest that such a market can develop further, in particular:

- As detailed in our draft policy decision, London Economics (LE) in its study for Ofgem showed that the VoLLs of DM customers are in most cases below domestic VoLL. This suggests that it would be economically efficient for shippers and customers to arrange interruptible contracts that provide for an interruption price at or above the customers' VoLL but below domestic VoLL.[8] The customer benefits by receiving a permanent price discount and/or by being more likely to receive an exercise price at or above its VoLL (as they would be more likely to be interrupted than firm customers). Shippers benefit from avoiding a short position and/or being able to sell excess gas at higher prices. Further, changes to the cash-out regime include a new arrangement whereby shippers benefit even if customers are interrupted by transporters at the instruction of the Network Emergency Coordinator during a GDE. This should provide strong incentives for shippers to arrange interruptible contracts.

- Before the introduction of Uniform Network Code (UNC) Modification 90, a significant number of customers had interruptible contracts with distribution network operators. In 2007, an annual quantity of 8bcm was covered by such contracts. This corresponds to about 2/3 of DM demand in local distribution

[8] A key reason why we selected domestic VoLL to set the cash-out price in an emergency is to maximise the scope for VoLL discovery of DM customers.

zones.[9] While these arrangements had flaws (eg some customers did not know that they had such a contracts) and were therefore changed, this example nevertheless gives some indication that DM customers are not unresponsive to price incentives offered in return for agreeing interruptible contracts.

- Global Insight (2005)[10] estimated the willingness and potential for business customers to provide DSR in periods of high prices. They found that theoretically, business customers should reduce their demand by 41% following a week of high prices of £1 per therm (based on a break-even assumption, real 2005 prices). However, because many contracts do not provide such incentives (eg because customers are not exposed directly to changing wholesale prices in the short term) demand for this group is only reduced by 27% (which is in line with their empirical observations). Interviews with business customers suggest that these customers would even reduce consumption by around 55% if they were exposed to gas prices of £1 per therm for one week. Whilst this study is several years old and analyses DSR more generally rather than interruptible contracts, it nevertheless provides interesting insights into gas customers' willingness to respond to price incentives.

3.26 These are indications that a market for interruptible contracts is highly likely to develop, and these are even stronger when matched with the increased incentive our proposals provide for suppliers to offer interruptible contracts.

3.27 We note the low probability of a GDE could limit the level of discount shippers are willing to offer. However, we think that efficiently priced interruptible contracts would reflect both the consumer's cost of interruption and expectations of the likelihood of an emergency occurring.

3.28 Many respondents considered that using domestic VoLL as the administered price for all customers failed to recognise the different characteristics of DM customers. Several stakeholders thought £20/therm would significantly over-pay the vast majority of DM customers for their involuntary DSR services if suppliers did not enter into interruptible contracts with these customers.

3.29 We considered the option of setting VoLL at a different level during firm load shedding (when only large customers would be curtailed) – a "two-step" VoLL. This would mean that the administered cash-out price could be lower during load shedding and higher when parts of the network have to be physically isolated.

[9] This also corresponds to approximately 41% of demand of all large customers (DM as well as NDM customers with an annual consumption of above 732Mwh) within an LDZ and 14% of total LDZ demand. The analysis is based on data published in National Grid Gas' Ten Year Statement 2008, http://www.nationalgrid.com/uk/Gas/TYS/archive

[10] Global Insight. Estimation of Industrial Buyers' Potential Demand Response to Short Periods of High Gas and Electricity Prices. Report for DTI and Ofgem, May 2005: www.bis.gov.uk/files/file33152.pdf

However, we consider this would weaken incentives for interruptible contracts to be arranged, leading to lesser security of supply benefits than a single VoLL.

3.30 We think it is important to provide an opportunity for the interruptible market to develop and our proposed emergency cash-out price of £20 per therm provides a strong incentive for this to occur. However, we note that if these arrangements have been in place for some time and there is evidence that there are clear obstacles to a market for interruptible contracts developing which are outside of the control of industry, then we would consider carefully any proposal for the level of the emergency cash-out price to be modified.

Payments to firm customers if their gas supplies are interrupted

3.31 The third objective of the Gas SCR is to ensure that firm consumers are paid for any involuntary demand side response (DSR) services that they provide in an emergency.

3.32 We have outlined in the draft IA that interruptions to gas supply will tend to have real cost impacts for firm gas customers. For example, businesses might have to close and domestic customers might need to find alternative heating and cooking sources. Under the current arrangements, these costs would be borne by consumers. We believe that in principle firm customers should be paid for the involuntary DSR services they provide if a supply shortage leads to their gas supply being interrupted. To achieve this, we propose to introduce a payment for involuntary DSR services. This acknowledges the fact that firm customers are, in essence, providing a service to the system by being interrupted involuntarily in an emergency.

3.33 London Economics, on behalf of Ofgem, estimated the value that various types of gas users place on secure gas supplies. The analysis suggests that domestic customers are, on average, willing to accept a payment of approximately £20 per therm for each day they are interrupted. We would expect that introducing payments for involuntary DSR services to interrupted customers help mitigate the risks that consumers currently face.

3.34 Table 6 shows the payments for involuntary DSR services as proposed under the different reform options. Option 1 provides the highest payments to firm customers since the level is set at an approximation of full domestic VoLL for interruptions occurring when parts of the network have to be physically isolated[11] while being uncapped during firm load shedding. Capping shippers' liability as under option 2 will reduce this effect, meaning that consumers would have to bear some of the costs.

[11] For the purposes of modelling this, we assumed that the minimum period that NDM customers would be interrupted for would be 14 days. If we were to implement option 1, this would need to be assessed further.

Table 6: Payments to firm customers for involuntary DSR services, in pounds sterling per therm

Stage of an emergency	Option 1: Cash-out rises to full VoLL	Option 2: Cash-out rises to capped VoLL
Firm load shedding (per day)	£20	£20
Physical network interruptions (lump sum)	£280	£20

3.35 In the draft policy decision we explained that it might take several months before payments reach customers as the impact of any non-payment of emergency cash-out charges needs to be taken into account. In the workshops, the payment terms were discussed and some stakeholders thought that customers should receive these payments sooner.

3.36 We have looked into shortening the payment timescales. However, this is difficult to implement and could have adverse consequences; it is likely to affect the risk of financial distress of the industry as a whole and/or might require a significant increase of the overdraft limit of the neutrality facility. This would have associated costs for NGG that would ultimately be borne by consumers. The proposed final decision now proposes a process of paying consumers after 4 months. If funds are insufficient to pay consumers the full £20 per therm, payments would be pro-rated and any residual payments would be made at a later stage.

3.37 To address customers' concerns to some extent, we intend to oblige suppliers to inform customers of the payments they will receive which they might be able to use as supporting information when seeking short-term financial support (in line with the arrangements under the Guaranteed Standards of Service). We also note that introducing such payments is a significant improvement to the current arrangements where no payments are made to consumers.

3.38 Further, some stakeholders argued that VoLL "overpays" some customers, in particular DM customers. We are using domestic VoLL at £20 per therm as a figure that is likely to sit above the VoLL for most DM customers, and therefore of the customers who are likely to be interested and able to enter into interruptible contracts. This maximises the scope for an efficient market for interruptible contracts to emerge, allowing the market to reveal the "true" VoLL of individual DM customers.

3.39 Others have argued that using domestic VoLL is insufficient in particular for vulnerable customers given that under option 2 the level of DSR payments is capped. We acknowledge that implementing option 2 rather than option 1 affects domestic customers in particular as they would only receive a payment for the first day they are interrupted. However, given that shippers are largely unable to influence the speed of the restoration process, we have concerns around implementing option 1.

Consumer bills

3.40 Enhancing security of supply is likely to come with additional costs. Cash-out reform might increase the cash-out price during an emergency (even though it is not known what the price would be under current arrangements). Shippers and suppliers have several options to respond to these potential costs. They could, for example, invest in mitigating measures or decide to accept these risks and not invest at all. Reforming the cash-out arrangements will either increase suppliers' investment costs and/or expected balancing costs. For cash-out reform, the costs of paying interrupted customers, as well as changes in the cost of gas supplies are included in the calculation of the expected annual consumer bill impact in table 7.[12]

Table 7: Increase in average annual consumer gas bills in real 2012 pounds sterling

Options	Annual consumer bill increase
Current arrangements (frozen cash-out)	0.00
Option 1: Cash-out rises to full VoLL	0.46
Option 2: Cash-out rises to capped VoLL	0.11

3.41 The modelling suggests that retail costs are likely to increase slightly. Expressed in average annual consumer bills, this would be £0.46 for option 1 and £0.11 for option 2. This is largely in line with our findings in the draft IA. We note that this calculation does not include any implementation costs. For example, we acknowledge that shippers and suppliers might have to brief and train staff and revise processes.

3.42 Xoserve will have to change its systems but these costs are relatively low and we would therefore not expect this to significantly impact on bills (see below for estimates of these implementation costs).

3.43 We have argued above that we would expect prices to rise to higher levels under cash-out reform compared to current arrangements before any firm customers are interrupted. Cash-out reform is likely to have a greater impact in such circumstances in particular if this helps to attract additional available supplies of gas into GB which could be sufficient to allow supplies to firm customers to be maintained. However, it should be noted that this would also come with higher costs of gas for consumers.

[12] In the draft IA, we showed a range based on different calculations of storage costs. This was not repeated here as no storage obligation was modelled for this IA.

3.44 Finally, shippers might take alternative mitigation measures, such as diversifying supplies, agreeing different supply contracts or investing in storage which could further impact costs in both directions (if those measures lead to more secure gas supplies, then the risk of paying cash-out at VoLL in an emergency would decrease).

Impacts on competition

3.45 In the draft IA, we assessed the impact of the reform options on competition in the gas market. We found that option 1 could lead to a significant risk of financial distress that industry might not be able to manage due to their inability to influence the restoration process when parts of the network have to be physically isolated. Capping cash-out (option 2) can address this to some extent but would nevertheless transfer risks to shippers that they are better placed to manage than customers. We have received several responses to the draft IA in this area which will be discussed in this section of this IA.

Financial distress and credit requirements

Draft impact assessment

3.46 In the draft IA, we outlined that credit implications are important to consider as they affect the competitiveness of the gas industry. Credit implications arising from the proposed reform options are particularly important for small market players. To reflect transferred risks placed on suppliers and/or shippers, financial institutions could charge higher premiums for credit or require a better credit rating or more collateral. Industry might seek to revise credit arrangements to insure against shippers defaulting after an emergency. Hence, the reform options may act to increase credit requirements as they are intended to shift risks from consumers to shippers/suppliers.

3.47 In the draft IA, we argued that introducing uncapped cash-out (option 1) would increase the risk of financial distress to a level that we judged to be detrimental to competition. This is because shippers have little influence over the duration of the restoration process once parts of the network are physically isolated. We do not believe that at this point, shippers are better placed to manage the risks of a GDE, and their ability to respond to directions of the Network Emergency Coordinator in an emergency could be inhibited.

3.48 We acknowledged that this means that consumers will be paid less than the true value of the involuntary DSR services they provide. Capping cash-out will significantly lower risks for shippers and the financial institutions funding them compared to uncapped cash-out if an emergency occurred. We outlined that we believe that the remaining risks can be better managed by industry than customers. For example industry could diversify imports, ensure an appropriate mix of long-term and short-term contracts with producers, arrange DSR contracts with consumers and invest to enhance security of supply.

Stakeholder feedback

3.49 Stakeholders have generally acknowledged that capping cash-out as proposed reduces the risk of financial distress and the risk of and need for increase credit requirements compared to uncapped cash-out. However, shippers generally felt that even with cash-out capped, the risks would be substantial for industry and that shippers – in particular smaller ones – may not be able to pay such cash-out liabilities nor afford increased credit requirements. This might also affect their ability to respond to instructions from National Grid Gas in an emergency. It was pointed out that in the past, even modest gas price increases have led to shippers defaulting.

3.50 Some shippers have suggested that Ofgem should revise industry's credit arrangements under the Uniform Network Code (UNC) following the introduction of cash-out reform with the aim of reducing the risk to industry of shippers defaulting in an emergency. It was argued that cash-out reform might lead to shippers setting up "shell companies" designed to allow them to easily leave the market in an emergency.

3.51 Furthermore, it was emphasised that shippers should not be required to pass on money to suppliers and customers before they have received those payments from Xoserve (after the recovery of those payments from short shippers). Some shippers argued that there might be a significant funding shortfall in that payments that need to be made (in particular DSR payments to customers and long cash-out payments to shippers) might be significantly greater than money received from short shippers. Therefore, long and balanced shippers might be penalised in an emergency as they would have to pick up the payment shortfall.

Response to feedback and revisions to impact assessment

3.52 We recognise that shippers' financial risks might increase by moving risks from consumers to shippers if they fail to respond to the incentives created. However, we note that these risks exist already and are currently mainly borne by consumers who are generally unable to manage such risks. We believe that shippers can manage such risks through a range of measures as outlined above. We note that we asked industry repeatedly for evidence as to its claims regarding the effect of cash-out reform on financial distress and credit arrangements. Unfortunately, little evidence was submitted.

3.53 We recognise that options 1 and 2 could potentially affect the cost of credit[13] and collateral requirements for the payment of balancing charges and gas trades. In particular, should an emergency occur and cash-out be set at VoLL, counterparties and third parties (eg trading platforms) might ask for more cash or collateral.

[13] We have noted in the draft IA that the financial institutions' approach to risk is dependent on a range of factors including the risk grade of the shipper; the number of facilities that the client has with the bank; the term of the bond; if the facility is cash covered; the nature of the instrument; and the structure of the facility.

Further, options 1 and 2 might lead industry to invest in measures to mitigate against the risk of an emergency. This is likely to require more capital which could come at greater costs if the marginal cost of acquiring extra funding increases.

3.54 Industry was particular concerned about the credit requirement for the payment of Energy Balancing Invoices (EBIs). We note that following the introduction of the Gas SCR, shippers will not have to lodge more credit for the payment of EBIs as the credit requirements are based on historic cash-out liabilities. In particular, new cash-out liabilities are incorporated in the credit calculation ten days after they have been accrued. Hence, cash-out liabilities on a GDE day would be incorporated in credit calculation ten days after the event.

3.55 Our discussions with Xoserve have shown that there might be an issue if shippers receive two calls to lodge more credit or cash. In this case, a "further security process" would kick in which would lock away the additional credit lodged for a period of 90 days. This means that it could not be used to pay the subsequent EBI which would be issued 23 days after the start of the next months. This could create cash flow challenges for shippers. Further, if the cash-out price for long shippers rises to a level close to VoLL, once it is included in the credit calculation then it is possible that the credit limit for long shippers would reduce significantly. This might mask the real balancing risk exposure of those shippers.

3.56 We note that the risk of shippers defaulting is with the industry as a whole (through the neutrality mechanism). If industry does not think that the current credit arrangements are fit for purpose (eg to discourage the creation of shell companies), then industry can use existing processes that allow participants to suggest changes and Ofgem will consider these if raised.[14] We believe that the industry is better placed to review and potentially propose changes to these arrangements.

3.57 We note that the cash-out price can currently rise to any level, even above £20 per therm in extremely tight market conditions. Further, industry has generally pointed out that current arrangements are sufficient and a GDE extremely unlikely. Our modelling and economic rationale suggests that with cash-out reform in place the probability of a GDE occurring is even lower. This reduces the likelihood of shippers having to cope with the consequences of an emergency (eg financial distress) compared to current arrangements.

3.58 However, cash-out reform is intended to transfer risks from consumers to shippers. The industry would therefore have to pay firm customers if they have to be interrupted through the cash-out mechanism. The modelling indicates that those

[14] We further note with regards to the issue of setting up "shell companies" that any company becoming insolvent in an emergency as well as related businesses may have difficulties applying for a new shipping license. As part of granting new gas shipping licenses, we check the license history, including when licenses have been revoked. This affects the applicant as well as related persons or any parent or holding companies, directors, shareholders, person in control, partners etc. We further check the applicant's "insolvency history". The outcome of these checks may affect our decision whether to grant or refuse the license applied for.

payments can be substantial if an emergency occurred. Figures 1 and 2 show the modelling results with regards to shippers' total exposure to cash-out at £20 per therm which would be used to pay firm customers. The results show all interruptions observed in the 6,000 simulations over the four spot years modelled (2012, 2016, 2020, 2030). We note that shippers might have to face further costs, such as paying customers with interruptible contracts but this will depend on contractual arrangements.

3.59 The modelling suggests that the maximum exposure of the shipper community to cash-out at VoLL in an emergency is approximately £5,675m under Option 1. This is effectively reduced to £976m under option 2.[15] The modelling suggests that the average exposure during a GDE is £1,120m for option 1 compared to £267m for option 2. While it is difficult to quantify all potential risks, this indicates that capping cash-out can address some of industry's concerns. However, we note that these residual risks remain with customers. These figures give an indication of industry's exposure. However, we would not know in advance which shippers are affected during a GDE and their ability to pay cash-out charges (neither under current arrangements nor with cash-out reform in place).

3.60 In general, we note that any payments would only have to be made if the industry failed to secure gas supplies to meet customer demand. We further note that industry argues that the risk of such an emergency occurring (and thus of having to make such payments) is very low. Finally, we note that these risks exist already but they are currently with consumers. It is highly likely that the actual costs of a GDE exceed the costs of interrupted customers significantly, which indicates that even under option 1, not all risks of a GDE are transferred to shippers (see next section). We believe that shippers are in a better position to manage such risks than consumers. In particular, shippers can avoid any cash-out charges in an emergency by taking mitigating measures.

[15] The maximum is calculated over 1,500 years simulated for each of the spot years modelled and then an average is taken over the maxima calculated for the four spot years. Note that total exposure within a given year can be due to more than a single outage event. In the draft IA, the estimated maximum exposure was £8bn for option 1 and £1.2bn for option 2. The maximum ever observed exposure in the four spot years modelled is £7,606m for Option 1 and £1,390m for Option 2.

Figure 1: Financial exposure of industry to VoLL at £20 per therm to pay firm customers for involuntary DSR services under option 1

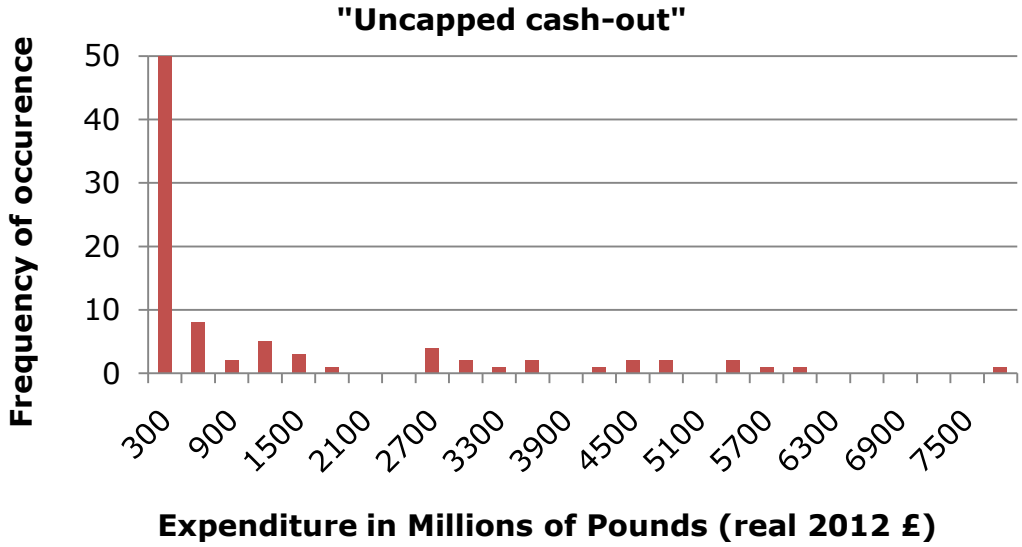
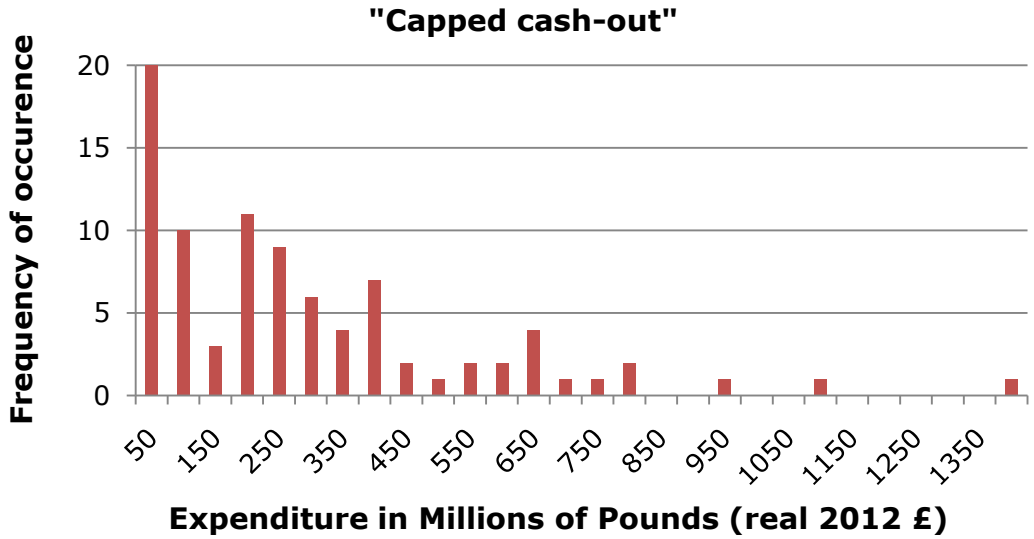


Figure 2: Financial exposure of industry to VoLL at £20 per therm to pay firm customers for involuntary DSR services under option 2



3.61 In our workshops we discussed the option of allowing shippers more time to pay any outstanding cash-out charges following an emergency to further decrease the risk of any financial distress and any potential effects on shippers' ability to respond to National Grid's instructions during an emergency. However, almost all industry representatives disagreed with this proposal due to fears that potentially insolvent shippers could continue trading for weeks or months causing a high degree of uncertainty in the market.

3.62 We agree with industry that it would be highly detrimental to competition if suppliers were asked to make DSR payments to customers within a specified timeframe before they have received those payments from Xoserve. It would not necessarily be the shippers that were short during the emergency that would need to pass on these payments but rather those that have had their firm customers interrupted. Hence, obliging suppliers to pay customers at this stage could create a significant risk of financial distress that those suppliers cannot manage. Therefore, we have acknowledged that it would take several months before customers can be paid.

3.63 We have also further investigated the risk of there being a significant funding shortfall after a GDE has occurred in that payments that need to be made (in particular to customers and long shippers) exceed cash-out payments from short shippers. We note that the more long shippers there are (in terms of volume) the fewer customers have to be interrupted (and less DSR payments have to be made). It is the system's net gas imbalance that would cause the interruption of customers.

3.64 There are however extreme circumstances where a larger payment shortfall could occur, for example, if NGG for safety reasons had to interrupt significantly more customers than might be necessary from a gas imbalance perspective. A greater payment imbalance could also be caused by a larger within-day gas shortage than end-of-day shortage. Targeting the entire imbalance at short shippers might not be justified because a payment shortfall might have been caused by other shippers that were short during the day but are balanced or long at the end of the day. Therefore, we have outlined in the proposed final decision document a process whereby any shortfall is targeted at short shippers in the first instance through a volume-weighted average approach. The remainder would be recovered from the industry as a whole.

3.65 We note that if shippers default, the shortfall would be greater and the risk would be with the industry as a whole. Any non-payment of balancing charges will follow the current non-payment process, which means that any charges to neutrality in respect of these will be picked up by industry.

3.66 Overall, we recognise that any potential shortfall in DSR payments caused could ultimately affect other shippers as well, including long or balanced shippers through the existing neutrality arrangements. While this could adversely affect incentives, we consider that long shippers in particular should benefit greatly from the reforms by potentially being able to sell excess gas at a price close to £20 per therm and therefore we would expect cash-out reform to greatly incentivise increasing supplies. We note as above that industry can review credit arrangements and propose changes that Ofgem would consider.

Liquidity

3.67 Liquidity in the wholesale gas market is important to deliver effective competition. We noted in the draft IA that cash-out reform could affect liquidity. For example, trading companies tend to have trading limits in place to limit the exposure

of shippers to any market movements and unauthorised trading. If cash-out rises to VoLL during an emergency, this could result in shippers and traders having to delay trades to obtain approval from senior management or to lodge more credit. We have argued that traders as well as shippers and suppliers could put the necessary arrangements in place, such as revisiting approval processes to allow for a case when cash-out rises to VoLL. Further, cash-out reform is aimed at enhancing security of supply. Hence, we expect it to reduce the likelihood of ever getting into an emergency.

3.68 Some shippers have argued that the cash-out arrangements proposed under the Gas SCR would disincentivise contracting for physical delivery of gas as such contracts around the world generally contain Force Majeure (FM) clauses. Hence, if upstream parties to such contracts (ie importers/sellers) do not deliver gas in an FM event, downstream parties (ie GB shippers/buyers) could not pass their cash-out exposure upstream.

3.69 Therefore, some shippers argue that they will be more likely to buy at the National Balancing Point (NBP) where they are not exposed to FM clauses and the risk is therefore with the seller rather than the buyer. This would lead to fewer physical contracts and would increase NBP trading. It was also argued that GB might be seen as a less attractive place to deliver gas to following the introduction of the SCR due to greater risks created. Others argue that because the risk of being out of balance (due to non-delivery of contracted gas) for NBP trades is with the gas seller, sellers would be less willing to sell at the NBP which would lead to a reduction in liquidity.

3.70 We believe that the market can price in any transferred risks created by the Gas SCR. If the risk of being out of balance is with the buyer of gas in the case of physical contracting but with the seller in the case of NBP trade agreements, then economic rationale would suggest that the cost of buying at the NBP should rise relative to the cost of buying gas through physical contracts. This is because sellers at the NBP would want to receive a "risk premium" and buyers should be willing to pay a premium because they shift the risks to the seller.

3.71 Higher NBP prices relative to prices for physical contracting should again make the agreement of physical contracts for domestic shippers more attractive. If overseas gas exporters can demand FM clauses in their contracts, it is unclear why they should be disincentivised from shipping to GB. Overall, we believe that the market can price in the transferred risks created by the Gas SCR and lead to an optimal mix of NBP and physical contracting.

Market distortions

Barriers to entry

3.72 We have noted in the draft IA that new regulations and market interventions may risk distorting markets. For example, interventions might favour incumbent shippers over new entrants by raising barriers to entry. On the other hand,

interventions can enhance market efficiency by allocating risks and responsibilities to those market players that are better able to manage those risks.

3.73 The implications for credit, risk of financial distress and liquidity outlined above may affect smaller shippers and new market entrants disproportionately. We noted in the draft IA that uncapped cash-out charges in an emergency as proposed under option 1 are likely to cause significant financial distress for smaller market players even though the restoration process is outside of the control of those companies. This is a key reason why we have proposed to cap cash-out. Compared to current arrangements, the effect is somewhat unclear as cash-out prices could already rise to very high levels in an emergency and potentially above £20 per therm.

3.74 As noted above, we expect cash-out reform (whether capped or uncapped) to increase incentives for shippers to arrange interruptible contracts with customers. Many smaller shippers supply gas to DM customers. These shippers should be in a good position to mitigate any transferred risk of financial distress created by the Gas SCR as they could potentially arrange interruptible contracts with their customers and thereby agree a price for interruptions. This would allow these shippers to sell gas to the market at potentially higher prices in or prior to an emergency.

3.75 The impact is likely to be greater for smaller shippers with a portfolio of mainly NDM customers as these shippers cannot arrange interruptible contracts with their customers. However, they might potentially be able to trade such contracts and make alternative arrangements if they needed to further mitigate their risks of being short (such as diversifying supplies, investing in storage capacity or contracting at NBP to avoid being short as some stakeholders suggested). Further, shippers in general might benefit if customers with interruptible contracts are interrupted first as this would decrease the risk of entering into an emergency.

3.76 We noted in the draft IA that any increased credit requirements would be likely to affect companies' available cash flow. This is likely to be particularly important for small players whose cash flow is often key to growing their business. Therefore, if industry decided to propose changes to credit arrangements following the implementation of the Gas SCR, Ofgem would give due consideration to the impact of the proposed changes on smaller market players.

Market efficiency

3.77 The reform options under consideration might also impact on the efficiency of the gas market. We have outlined in the draft IA that we believe that cash-out reform enhances the efficiency of the market because it transfers the risks associated with a GDE to those who are better able to manage those risks (ie shippers). Under the current arrangements, risks are largely with customers. Interruptions can occur even though customers may be willing to pay more to retain a secure gas supply. Cash-out reform attempts to redress the balance of risk by making short shippers liable for at least some of the costs associated with firm customer interruptions.

3.78 Further, under current arrangements, the interruption of NDM customers (including large NDMs in stage 2 of an emergency) would result in shippers imbalances becoming more positive (longer or less short). This leads to an inefficient outcome where the consequences of interrupting customers are ignored. Cash-out reform as outlined in the proposed final decision seeks to address this inefficiency by ensuring that NDM customer interruptions are taken into account when calculating shippers' imbalance positions (similar to the current "Emergency Curtailment" process for DM customers).

Impact on international competitiveness

3.79 We explained in some detail in the draft IA the importance of security of gas supply for the competitiveness of businesses in GB. A GDE is most likely to impact on DM customers. For safety reasons, larger customers would tend to have their demand curtailed first. The analysis conducted by London Economics on behalf of Ofgem shows the high value that businesses place on secure gas supplies. Small and medium sized enterprises are willing to pay 6.7 per cent more for gas per year to avoid a one week interruption in winter that occurs every 20 years. London Economics' calculation for DM customers is based on a value at risk analysis. It shows, for example, that the VoLL for the vehicle industry is in the range of £17.08 to £22.77 per therm. For the chemical industry, they estimate VoLL is in the range of £2.72 to £3.62 per therm. These examples illustrate the significant risks businesses can face when having their gas interrupted. This indicates that when discussing shippers' risk of financial distress, one needs to take into account the risk of financial distress that business customers currently face when their gas supplies are interrupted even though they might have limited possibilities to manage this risk.

3.80 We noted in the draft IA that gas interruptions can have wider economic knock-on effects. Such costs result, for example, from indirectly affected businesses. In particular, a gas disruption is likely to affect suppliers (upstream) and consumers (downstream) of interrupted businesses.[16]

3.81 We argued in the draft IA that cash-out enhances security of supply for firm DM customers by reducing the likelihood and potential impact of a GDE. Further, it incentivises the arrangement of interruptible contracts. However, we acknowledged that a cash-out price of £20 per therm does not attempt to mirror any social costs of a GDE but only the VoLL of directly affected users. We have also argued that introducing payments for involuntary DSR services is intended to mitigate the impact on businesses should a GDE occur.

[16] In the draft IA we showed the analysis of ILEX Energy Consulting 2006: *Economic implications of a gas supply interruption to UK industry.* ILEX estimated that a six week complete and nationwide gas interruption would have cost the UK economy up to 0.81 per cent of GDP in 2006. This is made up of 0.18 percentage points of direct costs to interrupted businesses and 0.02 percentage points to upstream businesses as well as 0.61 percentage points to downstream companies. The results indicate that the entire economic costs of a GDE could be a multiple of the direct costs of those consumers that have had their gas supplies interrupted

3.82 During consultation, business customers were particularly concerned about long payment timescales and questioned whether stronger cash-out incentives would be sufficient to incentivise industry to enhance security of supply. Some argued that further measures such as a DSR auction might be beneficial. Further, some business customers pointed out that their VoLLs are above the VoLL of domestic customers. This indicates that even if we were to introduce a different VoLL to set cash-out during load shedding, it would be difficult to find an appropriate VoLL. Therefore, we believe it is better to provide appropriate incentives (through option 1 or 2) to discover the real VoLL of customers through the arrangement of interruptible contracts.

Impacts on sustainable development

Ensuring a secure and reliable gas and electricity supply and managing the transition to a low carbon economy.

3.83 We outlined in the draft IA that there are important interactions between the electricity and gas markets that need to be understood when considering gas supply security. Gas-fired generation currently forms around 40 per cent of the GB electricity generation mix, and is a valuable source of flexible capacity.

3.84 In Project Discovery, we noted our concern that in the imbalance arrangements for both gas and electricity, customers could have their load curtailed before cash-out prices reach their VoLL. Ofgem will be launching an SCR this summer on electricity cash-out which will consider these interactions and the potential for introducing measures to reflect electricity VoLL.

3.85 In an emergency, ensuring secure gas supplies to firm DM and NDM customers may be prioritised over electricity supplies for safety reasons. In all but the most sudden emergencies we would expect a significant reduction in demand from gas-fired electricity generators ahead of an emergency in response to the increasing wholesale price as a result of tight supply/demand margins. Those gas fired generators that had not taken a commercial decision to reduce load may be firm load shed in the event that the Network Emergency Coordinator needs to take action to reduce demand.

3.86 It is likely that gas-fired power generators would be among the first customers to be firm load shed given the amount of gas that they consume. Gas-fired generators effectively provide a 'buffer' against firm DM and NDM customer interruptions. Some stakeholders also argue that electricity generation might be affected earlier to maintain the stability of the network.

3.87 We argued above that we would expect DM customers to arrange interruptible contracts with their suppliers under options 1 and 2. This would provide an additional buffer before gas-fired power generators have to be interrupted. We note that one stakeholder commented that interruption contracts are unlikely to emerge between power generators and shippers given that they are often the same company (which is in line with the modelling assumptions).

3.88 Some stakeholders asked for more information on how electricity is modelled and argued that gas-fired power generators with distillate back-up should be included as a new tranche of supply (see Appendix 2). Redpoint have made several changes to the modelling of electricity supply in response to stakeholder feedback and further analysis, in particular by including gas-fired power generators with distillate back-up which are assumed to switch to distillate before being interrupted. Further, all gas-fired power generators are now assumed to come off before any other firm gas customer (see Appendix 2).

3.89 Table 8 shows the modelling results with regards to the probability of interrupting electricity customers due to a gas shortage. In line with economic rationale, the modelling suggests that cash-out reform can effectively reduce the probability of electricity interruptions due to a reduced need to interrupt gas-fired power generators. This is mainly due to the fact that customers with interruptible contracts provide a buffer.

3.90 We would not expect our proposals to have a material impact on the environment.

Table 8: Probability of power interruptions to electricity customers in years caused by insufficient gas supplies, based on an average of the years 2012, 2016, 2020, 2030

Options	Firm industrial and commercial customers	Domestic customers and small and medium enterprises
Current arrangements (frozen cash-out)	1 in 34	1 in 91
Option 1: Cash-out rises to full VoLL	1 in 74	1 in 333
Option 2: Cash-out rises to capped VoLL	1 in 75	1 in 333

Eradicating fuel poverty and protecting vulnerable consumers

3.91 Ahead of our draft policy decision and impact assessment we held discussions with our Consumer First Panel to elicit panellists' views on the importance of gas security of supply for domestic customers.[17] Panellists noted that price implications

[17] See chapter 6 of the Draft Policy Decision for more information on the Consumer First Panel. The panel report is available here: http://www.ofgem.gov.uk/Sustainability/Cp/CF/Documents1/Ofgem%20Consumer%20First%20Panel%20Year%203%20-%20Report%20on%20Value%20of%20Lost%20Load.pdf

are a crucial consideration since higher consumer prices can increase the number of people in fuel poverty. We note that increased security of supply comes at a cost. Our modelling estimates that consumer prices will increase by 11 pence expressed in average annual consumer bills, following the introduction of capped cash-out.

3.92 We argued in the draft IA that all types of vulnerable customers will benefit from the reform options outlined in this document as they reduce the likelihood and impact of firm interruptions. Further, options 1 and 2 would introduce payments for involuntary DSR services that can help vulnerable consumers cope with the consequences of gas interruptions.

3.93 However, by capping cash-out to one day of interruption we noted that these payments are unlikely to cover the full costs of an interruption to NDM customers. In addition such payments are likely to be paid some time after the outage has occurred (eg as a rebate on the next gas bill). This might affect the ability of vulnerable consumers to make adequate alternative arrangements in the short term.

Impacts on health and safety

3.94 As outlined in the proposed final decision, our approach to cash-out would retain the powers of the Network Emergency Coordinator (NEC) to direct physical delivery of supply in a GDE. For this reason we would expect the impact of the reforms on the NGG and NEC safety cases to be limited. This is because the safety case focuses on the physical activities of NGG. The cash-out reforms set out relate more to the commercial arrangements for providing incentives to reduce the likelihood and duration/severity of an emergency. As such, the reforms would not require a change to the NEC's safety case beyond those already required as part of Exit Reform.

3.95 The Health and Safety Executive (HSE) supports Ofgem's approach and has indicated that it is broadly satisfied that the approach will have no adverse effect on the health and safety standards associated with preventing or managing a network gas supply emergency.

Risks, unintended consequences and other impacts

European Interaction

3.96 We outlined in the draft IA that many European countries have measures in place that provide stronger incentives to enhance security of gas supplies such as public service obligations (PSOs). PSOs could potentially have adverse effects on European market liquidity since gas may not flow freely within Europe in specific circumstances. This is important as higher prices in GB can only attract more gas from Europe if gas can flow freely and is not, for example, held as strategic storage. Hence, a sharper price will be of limited effect in an emergency if no physical gas can be imported due to PSOs or other measures applied in other countries.

3.97 Some respondents have argued that we might be overestimating the degree of flexibility that shippers have in an emergency to respond to higher prices. PSOs in Europe were named as one reason. Further, one stakeholder argued that we should further analyse the effects of the reform options on shippers supplying gas to customers in GB as well as to customers in other jurisdictions with different VoLLs, specifically in Ireland. Finally, some respondents have argued that we are already meeting the security of supply standard as set out in Article 8 of the EU Security of Supply Regulation and that we therefore do not need cash-out reform.

3.98 With regards to PSOs, we note that a number of European measures and agreements are looking to remove obstacles to cross border trade. The Third Energy Package and the Gas Target Model as well as the Gas Security of Supply Regulation are looking to improve cross border efficiency by removing barriers to trade and increasing cross border capacity and trading efficiency. The intention is to ensure that gas can flow to those countries where it is most needed based on price differentials. These developments should therefore lessen some of the issues discussed above and increase the potential for gas trading to ensure that gas flows to those markets where it is most needed based on price differences.

3.99 Regarding interactions with other markets and the impacts on shippers operating in those markets, we discussed the reform options with our colleagues in Northern Ireland and the Republic of Ireland in particular to ensure that they are aware of our proposals and to discuss any potential concerns. Further, the Gas SCR was explained in the Risk Assessment that the Department of Energy and Climate Change (DECC) published and submitted to the European Commission in November 2011 to raise awareness of our proposals.[18]

3.100 We note that DECC's Risk Assessment indicates that the UK supply infrastructure is resilient in the short to medium term but that there are challenges in the medium to long term. In terms of measures to enhance security of supply, it specifically refers to the Gas SCR and its intention to sharpen cash-out incentives. Cash-out reform intends to enhance shippers' incentives to meet customer demand. If those incentives are not sufficiently robust, for example, because cash-out can be frozen at a low level or because the interruption of NDM customers means that shippers imbalance positions become more positive, then it is our statutory duty to implement measures to address these concerns in order to protect consumers.

Implementation, compliance and monitoring costs of the proposed arrangements for stakeholders

3.101 We argued in the draft IA that we do not expect the new cash-out arrangements to require significant resources to monitor compliance, neither for us

[18] See *Risk assessment for the purpose of EU Regulation 994/2010 on security of gas supply*, Department of Energy and Climate Change, November 2011, available at http://www.decc.gov.uk/assets/decc/11/meeting-energy-demand/energy-security/3428-risk-assessment-eu-reg-sec-supply.pdf

nor for industry. The implementation will however require one-off investments from Xoserve and the industry to ensure that the appropriate structures, including IT systems, are in place and staff are trained. This might result in some additional costs for the industry.

3.102 Some stakeholders have argued that we have given insufficient consideration to implementation costs, in particular where industry processes have to change. We have been in discussion with NGG and Xoserve and have now received an estimate of Xoserve's costs to implement our proposals. Xoserve estimates these costs to be at least £129,000 but probably not more than £427,000 with an annual test exercise expected to cost £3,200 per year. Shippers also noted that they might face further implementation costs, mainly through training staff and revising processes.

Post-implementation review

3.103 As part of our duties under the third package, we will continue to monitor the impact of our reforms, such as the impact on the market for interruptible contracts. We think it is important to provide an opportunity for the interruptible market to develop and our proposed emergency cash-out price of £20 per therm provides a strong incentive for this to occur. However we note that if these arrangements have been in place for some time and there is evidence that there are clear obstacles to a market for interruptible contracts developing which are outside of the control of industry, then we would consider carefully any proposal for the level of the emergency cash out price to be modified.

Quantitative Cost-Benefit Analysis

3.104 The quantitative Cost-Benefit Analysis (CBA) was conducted by Redpoint and is based on the modelling results that we have outlined above.

3.105 We have argued in our draft IA that the quantitative analysis has several limitations. In particular, the quantitative CBA does not include any economic knock-on effects, externalities and social costs caused by a GDE. The analysis focuses on the direct costs that gas consumers have to bear should a GDE occur. The quantitative CBA is based on the direct consumer price increases arising from investment and balancing costs.

3.106 Further, the quantitative CBA assumes risk neutrality and therefore weights all losses and gains equally. At an individual level and at a societal level, there is a measurable preference to avoid the largest risks, particularly where those risks might have a profound and lasting effect and potentially threaten the viability of an individual, enterprise or society. When weighted for risk aversion, the benefits could be significantly larger than our analysis implies.

3.107 We note that indirect costs, such as impact on competition (through credit requirements, liquidity, barriers to entry and financial distress) are not considered in the quantitative CBA.

Quantitative CBA results

3.108 Table 9 shows the results of the quantitative CBA analysis for uncapped and capped cash-out relative to current arrangements. Shipper welfare is assumed to be zero as it is assumed that shippers can pass on all costs to consumers through higher bills. The quantitative CBA shows that consumers are paid for the involuntary DSR services they provide as well as for the arrangement of interruptible contracts[19]. Further, cash-out is expected to reduce the total cost of gas due to increased DSR from customers with interruptible contracts.[20] For the purpose of the modelling, all these costs are assumed to be passed on to consumers through a retail price increase.

3.109 Firm consumers benefit from lower energy unserved and payments for involuntary DSR services. Interruptible consumers benefit from payments for commercial interruptions but are therefore more likely to be interrupted. Cash-out reform leads to more efficient interruptions and a general improvement in energy unserved for firm customers (with interruptible customers being interrupted before, for example, electricity customers). As cash-out would rise to a higher level under option 1, the additional costs for importing gas reduce the net benefit compared to option 2.

3.110 As was the case in the draft IA, the quantitative CBA shows that options 1 and 2 have a positive net benefit compared to the current arrangement over the modelled period (up to 2030). Xoserve's implementation costs of between £0.1 and £0.4 million have not been added to the quantitative CBA but would not make a material difference.

3.111 Compared to the draft IA, the net benefit of cash-out reform is lower. This is mainly due to the fact that under the revised modelling assumptions, the probability of interruptions is generally lower for current arrangements compared to the old modelling assumptions. On the other hand, the costs of reforming cash-out arrangements are also lower.

3.112 We note again that estimating the risks to security of supply as input assumptions to the modelling is difficult; the sensitivity analysis shown in table 5 indicates that cash-out reform is likely to have a greater impact when risks are greater. Overall, the modelling indicates that option 2 has the highest net benefit.

[19] It will depend on the contractual agreements between suppliers and customers as to what customers would be paid for commercial interruptions. For the calculation of this CBA, as a proxy this was assumed to be the VoLL of the relevant customer tranches. This could be on the basis of an exercise price payment only or permanent bill reduction only or a combination of the two.

[20] For modelling purposes, it was assumed that interruptible customers are interrupted before firm customers and that interruptible customers are interrupted when market prices rises above their VoLL. In reality, it will depend on the agreement between customers and suppliers when an interruptible customer can be interrupted. For example, this might be linked to a Gas Balancing Alert being declared.

Table 9: Cost-Benefit Analysis of the different reform options in £ million (real 2012 Pounds, Net Present Value) relative to current arrangements

	Cost Item	Cash-out rises to full VoLL	Cash-out rises to capped VoLL
Supplier Welfare	Cash-out liability (1)	-181	-27
	Payments to interruptible customers (2)	-51	-51
	Change in total cost of gas (3)	5	23
	Retail revenue (1+2+3)	227	55
	Net supplier welfare	0	0
Consumer Welfare	Retail Costs	-227	-55
	Payments for involuntary DSR service	181	27
	Payments to interruptible customers	51	51
	Load reduction to firm gas customers	33	39
	Load reduction to firm electricity customers	54	54
	Load reduction to interruptible customers	-51	-51
	Net consumer welfare (ie net benefit)	**41**	**65**

3.113 However, as noted earlier, results from modelling low probability, high impact events should be treated with caution. Further, we have noted that the quantitative CBA does not take into account economic effects which we have assessed qualitatively, such as the risk of any financial distress for shippers in the case of uncapped cash-out. Furthermore, the quantitative CBA does not capture externalities and social costs of a GDE and assumes that society is risk neutral. Finally, while we see benefit in paying interrupted firm consumers, these payments are assumed to be CBA neutral as they are assumed to be recovered from customers in the long-run.

3.114 Hence, it is important to note that, while providing useful insight into the effectiveness of the different reform options, the quantitative CBA is not a complete assessment of the impact of the reforms under consideration. The next section summarises the key quantitative and qualitative analysis.

4. Conclusion

Chapter Summary

This chapter summarises our views on the quantitative and qualitative costs and benefits and overall impacts arising from the implementation of the proposed reform options.

4.1 We have analysed the key impacts of the proposed reform options on consumers, competition, sustainable development, health and safety as well as the potential risks and unintended consequences. Table 10 shows our assessment of the impact of the options on some key criteria compared to current arrangements.

Table 10: Assessment of reform options compared to current arrangements

Key criteria	Option 1 Cash-out rises to full VoLL	Option 2 Cash-out rises to capped VoLL
Security of supply		
Payment for involuntary DSR services		
Consumer prices		
Competition and Market Efficiency		

 Positive impact Moderate impact  Negative impact

4.2 We confirm our assessment of the draft IA in that we believe that the current emergency arrangements, whereby cash-out prices are frozen and imbalances are managed by instructing domestic supplies to flow, are becoming increasingly less effective due to depleting domestic gas reserves. Furthermore, no involuntary demand side response (DSR) payment is made to firm consumers should they be interrupted. Therefore, the risks are largely with customers.

4.3 Our analysis suggests that cash-out reform is an effective instrument to enhance security of supply. In particular, it provides incentives for increasing the use of interruptible contracts. This should aid the discovery of the real VoLL of consumers and allow for a more economically efficient order of interruptions. This provides greater security to firm customers who are unable or unwilling to arrange interruptible contracts.

4.4 Cash-out reform also introduces payments for the provision of involuntary DSR services to firm customers that are disconnected. It improves market efficiency by transferring risks from consumers to those that are better able to manage those risks, ie the industry.

4.5 We believe that there may be an impact on competition as any potential risk of financial distress is transferred from consumers to shippers. We find that exposing shippers to the full cost of firm interruptions (option 1) could adversely affect competition (eg any risk of financial distress). When parts of the network have to be physically isolated, shippers have little influence over the restoration process which could take several weeks or months to complete. Therefore, we conclude that shippers' liability should be capped in case parts of the network have to be physically isolated (option 2).

4.6 Capping cash-out might reduce the effectiveness of the price signals provided through cash-out reform and could therefore leave a gap in the arrangements. Further, firm consumers are not being paid for the full costs of supply interruptions. Hence, consumers still face some risks. The potential for further measures to enhance security of supply is currently being assessed as part of the Gas Security of Supply Report. However, such measures are not a substitute to cash-out reform as the price signals need to be right and consumers should be paid for the involuntary DSR services they provide.

4.7 We believe that shippers are in a better position than customers to manage the risks of gas supply interruptions. Shippers have a variety of measures available to enhance security of supply. Therefore, we conclude that option 2 would be a significant improvement compared to current arrangements.

Appendices

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Appendix 1 - Stakeholder Feedback on Modelling

1.1 In this Appendix, we outline key stakeholder feedback on the modelling conducted by Redpoint Energy and our response to this feedback.[21] Details of how the modelling was revised can be found in Redpoint's report.

1.2 Some stakeholders argued that statistical modelling of low probability, high impact events is extremely challenging and might not be appropriate for the purposes of the exercise being undertaken. It was argued that government and/or Ofgem should take a more high-level view as to the level of security of supply it wants to achieve and the measures needed to achieve that.

- We agree that modelling such events is challenging and that the modelling should only be seen as one source of information. The qualitative assessment and economic rationale are pivotal: the Gas SCR seeks to correct a market imperfection whereby cash-out might be frozen at a low level, below the VoLL of gas customers. Further, shippers' imbalance position becomes longer (or less short) as soon as NDM customers are interrupted. This indicates that the risk of interrupting consumers lies mainly with consumers rather than the industry, even though the industry is arguably in a better position to manage such risks. This economic rationale as well as shippers' potential mitigation strategies and their impact are difficult to capture through modelling and we therefore consider, as outlined in the draft IA, the qualitative assessment to be key. However, we nevertheless think that the modelling can provide additional insights.

1.3 Some stakeholders argued that the modelling assumptions are too pessimistic, in particular around the probability, duration and magnitude of infrastructure outages as well as price and gas quality shocks. One criticism was that LNG terminals were modelled as a single block; hence, any interruption would have an unrealistically large impact. Stakeholders submitted data covering the last few years to show the reliability of LNG terminals and interconnectors.

- We are grateful for the provision of data on the reliability of gas import infrastructure. It is important to point out that the assumptions around infrastructure outages are meant to capture a range of risks. We did not intend to suggest that LNG terminals are prone to frequent sudden outages. A modelled "outage" at an LNG import terminal is also meant as a proxy for other risks, in particular geopolitical events that can affect gas supplies (eg a closure of the Strait of Hormuz). Such events are difficult to predict and an assessment

[21] This section does not include feedback on the storage obligation modelled for the draft IA as the Gas SCR now focuses on cash-out reform.

of their probability, duration and magnitude is to a large degree subjective. Following the publication of the draft IA and stakeholder responses, we have conducted extensive research in this area and we have revised the modelling assumptions. We have changed the probability of some of these risks occurring as well as revised the magnitude and duration. However, to reflect the complexities associated with estimation of these figures, we conducted sensitivity analysis assuming higher levels of outage risks and impacts to test the effect of these assumptions on our results.

- With regards to the specific concern that LNG import infrastructure is modelled as one block, we see this as defensible since the risk assumptions take this into account (ie we assumed a significantly lower outage size than we would have done if these were modelled as individual terminals).

1.4 Some stakeholders argued that interconnector price responsiveness was not modelled accurately and does not reflect historical flows. This affects in particular the price responsiveness of Interconnector UK (IUK) and the assumption around maximum flows at the Balgzand-Bacton Line (BBL) interconnector for 2012 which was criticised as being below historic maximum flows.

- Redpoint have adjusted interconnector price responsiveness based on observed flows against hub price differentials, and have removed the assumption that Public Service Obligations (PSOs) in Europe might require a greater price differential in an emergency. With regards to BBL Redpoint have lifted the assumed maximum flow limit of 8bcm/year in 2012.

1.5 One stakeholder pointed out that the model does not take into account gas stored at LNG terminals which currently serves as an important source of flexible capacity.

- Under the current approach to modelling LNG flows, the amount of LNG that is available to flow on a given day is determined on the basis of a reference price which is a two week moving average of the GB system price (with a one week delay for LNG cargoes to come to GB). The actual flow of gas out of LNG terminals to meet demand is determined by the GB system price on the day. Depending on prices, the flows out of LNG terminals can be less than the amount of LNG that is available to flow on that day. Whilst the modelling does not fully capture the optimisation of LNG send-out, Redpoint believes this is an appropriate simplification in a market model of this sort.

1.6 Some stakeholders have criticised how gas-fired power generation was modelled. It was argued that distillate back-up at some combined cycle gas turbines (CCGTs) should be accounted for in the model as it provides an additional buffer. Further, it was argued that all gas-fired power generators should come off in the model before the first tranche of firm DM customers is interrupted.

- We agree with both suggestions. Redpoint is now accounting for distillate backup in the model. CCGTs with distillate back-up are now assumed to switch

to distillate before any firm load shedding occurs. Further, the model now assumes that all gas-fired power generators will be off before the first tranche of firm DM demand is interrupted as this is more closely aligned with emergency procedures. We note that the only gas-fired power generators running at this point in the model are those needed as the marginal source of electricity production (ie their interruption would lead to electricity outages).

1.7 Several stakeholders have argued that cash-out reform would not incentivise the arrangement of interruptible contracts. This affects the assumption made in the model that the two tranches of DM customers with the lowest VoLL would provide demand side response by being interrupted before firm customers are interrupted and when market prices exceed their VoLL.

- We have assessed the incentives for arranging interruptible contracts further. We have indications that suggest that customers are willing to respond to price incentives provided, for example, through interruptible contracts (see chapter 3). In terms of the modelling, we have conducted a sensitivity analysis in the draft impact assessment (IA) already assuming that no additional demand side response would be available. We have run this sensitivity again for this IA.

1.8 One stakeholder argued that electricity market interactions should be included more specifically in the sense that the model should be used to create scenarios whereby peak electricity demand days coincide with a GDE. Another stakeholder argued that these interactions should be reviewed. It was argued, for example, that gas interruptions to CCGTs that lead to electricity outages would also lead to lower gas demand as domestic central heating would not operate.

- Redpoint's model already includes a simplified model of electricity supply and demand. Because it is a stochastic model, it already generates scenarios where electricity demand is high during times of high gas demand and low supplies. We have not included an assumption that gas demand would be lower following the interruption of electricity customers. Rota interruptions of electricity customers still allow the use of gas at times when electricity demand is available. During rota disconnections, it is possible that gas demand will be particularly high in periods when electricity is available.

1.9 One stakeholder commented on the modelling approach more specifically by arguing that a Gumbel-Jenkinson distribution should be used rather than a Poisson distribution for some of the stochastic assumptions and that 1500 simulations are not sufficient to reach convergence.

- We have discussed this further with Redpoint to ensure that the modelling approach is sound. Redpoint have advised that any differences between the Gumbel-Jenkinson distribution and the distributions used in the modelling (in particular lognormal for the duration and magnitude of outages) are likely to have an insignificant impact on the results. With regards to the number of simulations, Redpoint have advised that their approach is sound since the reform options are all assessed relative to current arrangements based on the

same set of exogenous random events. Hence, all options are compared on a like-for-like basis. The final Redpoint report contains more information on this. We have however noted in our draft policy decision already that where emergencies occur infrequently (such as for NDM interruptions), care needs to be taken in interpreting the quantitative results and these should be considered alongside the qualitative findings.

1.10 One stakeholder pointed out that assuming that LNG cargoes respond within 7 days and assuming that LNG was available at US Henry Hub prices for half the time is overly optimistic.

- First, we note that besides a reaction time of 7 days, it was also assumed that LNG cargoes would respond to a moving 14 day average price. Hence, high prices on one day would not necessarily lead to LNG cargoes responding. Further, it could equally be argued that a minimum 7 day delay is pessimistic with respect to future years since increasing LNG imports into Continental Europe are likely to mean that there are more LNG cargoes in the vicinity of GB on any given day. Finally, we would like to clarify that the model does not assume that gas is available at Henry Hub prices half of the time. As Redpoint's report for the draft IA pointed out LNG can be priced at either Henry Hub or oil-linked Japanese Crude Cocktail (JCC) prices or anything in between those prices with equal probability.

1.11 One stakeholder argued that oil-indexation as assumed for the modelled continental gas prices might not be the dominant price setter in the future, following the introduction of the Third Energy Package.

- At this point, we do not know what will set prices in the long run; therefore, we think it is justifiable to assume that changes in gas prices will mirror oil price changes in the long run. Redpoint have made some changes to price effects in periods of lower LNG prices based on historical observations which are outlined in the Redpoint report.

1.12 One stakeholder argued that the model might be based on an earlier model developed for one company where they had concerns around how gas storage responded to prices in the model. Further, this stakeholder had concerns about the price dynamics in the model.

- Redpoint have advised us that the model has undergone significant development since the version that was originally developed for industry. Several improvements have been made to the dynamics of storage and interconnectors in the model and model price dynamics have been calibrated to historic data. While any modelling of a complex system involves a significant degree of simplification, Redpoint believes that model dynamics adequately reflect actual market dynamics for the purposes of this exercise.

1.13 Some stakeholders have argued that more details on modelling assumptions and the workings of the model should have been made available.

- Throughout the consultation period, we have kept an open door policy and met with stakeholders to discuss the modelling and we have made additional information available. In the written stakeholder responses, more information was requested, for example, around price dynamics in the model. We have asked Redpoint to ensure that all relevant information is outlined clearly and transparently in their final modelling report that is published alongside this IA, in particular in areas where stakeholders requested more information.

1.14 We believe that the issues set out above summarise the main arguments made by stakeholders concerning the modelling. All non-confidential responses are available on our website.[22]

[22] All non-confidential responses can be accessed at http://www.ofgem.gov.uk/Pages/MoreInformation.aspx?docid=46&refer=Markets/WhlMkts/CompandEff/GasSCR

Appendix 2 – Consultation Response

2.1 Further work on the Gas SCR will now focus on the business rules (which set out the framework for the proposed changes), code and licence changes required to implement this proposed final decision. Our proposals can only come into effect following consultation on the detailed implementation. Whilst we remain open to representations on our proposed final decision more generally, we would not expect to change our high level policy decisions unless material new information comes to light.

2.2 Ofgem would like to hear the views of interested parties in relation to the issues set out in this IA.

2.3 Responses should be received by 24 October 2012 and should be sent to: gb.markets@ofgem.gov.uk

2.4 Unless marked confidential, all responses will be published by placing them in Ofgem's library and on its website, www.ofgem.gov.uk. Respondents may request that their response is kept confidential. Ofgem shall respect this request, subject to any obligations to disclose information, for example, under the Freedom of Information Act 2000 or the Environmental Information Regulations 2004.

2.5 Respondents who wish to have their responses remain confidential should clearly mark the document/s to that effect and include the reasons for confidentiality. It would be helpful if responses could be submitted both electronically and in writing. Respondents are asked to put any confidential material in the appendices to their responses.

2.6 We will also be looking to run a number of stakeholder workshops and seminars during the consultation process. Although these are intended to inform our thinking on the Gas SCR process these workshops should not be seen as a substitute for providing a full written response. Having considered the responses to this consultation, Ofgem intends to undertake a statutory consultation on the licence changes.

2.7 Any questions on this document should, in the first instance, be directed to:

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Appendix 3 - Glossary

A

Agency for the Cooperation of Energy Regulators (ACER)

The Agency for the Cooperation of Energy Regulators is a body of the European Union designed to help co-ordinate and support the actions of national regulatory authorities. Its over-arching objective is to help achieve a single energy market in Europe.

Authority (The)

The Authority is the Gas and Electricity Markets Authority (GEMA). GEMA is the governing body of Ofgem and consists of non-executive and executive members and a non-executive chair.

C

Cash-out

National Grid Gas is responsible for taking out balancing actions on behalf of the market. The prices paid for these balancing actions are then passed onto long and short shippers. That is, long shippers are paid at one rate for their positive imbalance and short shippers have to pay at a different rate for their negative imbalance. These charges are known as cash-out prices.

Cash-out (dynamic)

Dynamic cash-out means that the level of the cash-out continues to change in response to circumstances upon declaration of stage 2 of an emergency (pre exit reform). This approach was proposed in the initial consultation.

Cash-out (frozen)

Under current gas emergency arrangements the cash-out price is frozen when stage 2 of an emergency is declared. That is, the cash-out price remains at the level it was at this time for the duration of the emergency.

D

Daily-metered (DM) customer

This is a gas customer with a meter which allows their consumption to be measured on a daily basis.

Demand Side Response (DSR)

A demand side response is a short-term change in the use of, in this case, gas by consumers following a change in the balance between supply and demand.

E

Emergency curtailment arrangements

The emergency curtailment arrangements provide for compensation to be provided to shippers in the event that transporters instruct, under the direction of the Network Emergency Coordinator, the curtailment of gas off-takes at any relevant supply point. Shippers are still required to pay cash-out on their imbalances but curtailed quantities are subject to a trade between the shipper and the residual balancer at the Emergency Curtailment Trade Price. As such, shippers will not be 'cashed out' on these curtailed quantities.

Emergency curtailment trade price

This is the price at which a shipper's emergency curtailment quantity is compensated. This is determined as the 30 day average System Average Price prevailing at the commencement of a gas deficit emergency.

Exit Reform

The Reform of the NTS Exit Capacity arrangements also known as Exit Reform began in 2005 following the Authority's decision to approve National Grid Gas's sale of four of its distribution network businesses. The process concluded in January 2009 with the implementation of code modification UNC195AV known as the Introduction of Enduring NTS Exit Capacity Arrangements.

The reform was necessary to ensure NGG received efficient investment signals in respect of NTS users' capacity needs under the new arrangements. This reforms process has also resulted in changes being made to the stages of a national gas deficit emergency.

F

Firm customer

This is a customer with a non-interruptible gas supply contract. These customers cannot be instructed to reduce their demand or have their demand curtailed except for following the announcement of stage 2 or greater of an emergency.

Firm load shedding

Upon declaration of stage 2 of an emergency, the Network Emergency Coordinator may instruct transporters of gas to instruct that consumers stop using gas. This is known as firm load shedding.

Force majeure

Force majeure is a way in which parties to a contract can agree on specific circumstances when a failure to perform an obligation will be excused (ie when the breaching party will not face liability for its breach).

Clause 3 of Section 3 of the Uniform Network Code General Terms defines force majeure as: "Any event or circumstance, or any combination of events and/or circumstances the occurrence of which is beyond the reasonable control of, and could not have been avoided by steps which might reasonably be expected to have been taken by, a Party (the Affected Party) and which causes or results in the failure of the Affected Party to perform or its delay in performing any of its obligations owed to any other Party or Parties under the code."

G

The Gas Act (1986)

The Gas Act is a piece of primary legislation that prohibits persons from engaging in specified activities unless authorised to do so by a licence granted by the Authority. The Gas Act also sets out the powers of the Authority in carrying out its functions under Part I of the Gas Act.

Gas Deficit Emergency (GDE)

A Gas Deficit Emergency is a type of Gas Supply Emergency arising as a result of insufficient deliveries of gas being available to meet required demand on the gas system or as a result of a potential or actual breach of a safety monitor.

The Gas Safety (Management) Regulations 1996 (GS(M)R)

The GS(M)R set out the requirement for a Network Emergency Coordinator (NEC) for any network which includes more than one gas transporter. They also require each gas transporter, as well as the NEC, to prepare a safety case which must be approved by the Health and Safety Executive.

Gas Supply Emergency

A Gas Supply Emergency is defined in the Uniform Network Code as the occurrence of an event or series of events that results in, or gives rise to a significant risk of, a loss of pressure in the gas system which may lead to a supply emergency.

H

Health and Safety Executive (HSE)

The Health and Safety Executive (HSE) is the national independent watchdog for work-related health, safety and illness. The safety case produced by the Network Emergency Coordinator must be submitted to the HSE for their approval.

I

Interconnector (Gas)

The gas pipelines and associated terminals which connect the European and UK gas transmission networks.

Interruptible contract

An interruptible contract may be signed by gas consumers where the relevant transporter and/or supplier have the ability to ask a consumer to reduce its off-takes (generally daily metered customers). These contracts allow the transporter and/or supplier to disconnect the consumer (in or out of an emergency) in order to manage demand on the system. Consumers may sign these contracts in return for reduced rates on their gas supply.

L

Licensee (Gas)

The Gas Act requires parties involved in the gas industry to be licensed by the Authority. As license holders, these parties are required to comply with a number of licence conditions.

Licence condition

All parties licensed by the Authority to partake in gas industry activities are required to meet certain licence conditions. The licence conditions for the gas industry are categorised into transporter, shipper, supplier and interconnector licence conditions. The licence conditions are separated into standard licence conditions which apply to all licensees of one type (eg transporters) and special licence conditions which apply only to a specific party (eg National Grid Gas).

Liquefied Natural Gas (LNG)

Liquefied Natural Gas is natural gas (predominantly methane, CH_4) that has been converted temporarily to liquid form for ease of storage or transport.

Liquidity

Liquidity is a measure of the number of times a given commodity is traded. A low liquidity can mean that it is difficult for new entrants to enter into and grow in a market.

Local Distribution Zone (LDZ)

Local Distribution Zones (LDZs) are low pressure pipeline systems which deliver gas to final users and Independent Gas Transporters. There are twelve LDZs which take gas from the high pressure transmission system for onward distribution at lower pressures.

M

Market Balancing Action (MBA)

An action taken by National Grid Gas to balance the system in which it enters into a transaction with a party so that that party will agree to make an acquiring or disposing trade nomination. The prices at which these trades are made set cash-out prices.

Modification (Code)

The Uniform Network Code (UNC) is the framework which sets out the gas transportation arrangements for those parties licensed under the Gas Act 1986. This code has developed through modifications raised by signatories to the UNC. It is still possible for modifications to be made through this industry led process. However, the introduction of the Significant Code Review process now allows for Ofgem to lead on the development of modifications before directing them to be raised.

N

National Grid Gas (NGG)

National Grid Gas (NGG) is the Gas Transportation licence holder for the North West, West Midlands, East England and London Gas Distribution Networks. NGG also hold the Gas Transportation licence for the gas National Transmission System (NTS). Prior to 10 October 2005, NGG was known as Transco.

National Transmission System

This is National Grid Gas's high pressure gas transmission system. It consists of more than 6,400 km of pipe carrying gas at pressures of up to 85 bar (85 times normal atmospheric pressure).

Network Emergency Coordinator (NEC)

The Network Emergency Coordinator is responsible under safety legislation for the coordination of a gas supply emergency.

Non-daily metered gas customer (NDM)

This is a gas customer who does not have a meter which can be read on a daily basis.

Neutrality

This refers to the system of Balancing Neutrality Charges which are used under the Uniform Network Code (UNC) to ensure that National Grid neither benefits nor loses financially from the balancing actions it is required to undertake. The charges reflect the difference between all amounts received and paid by National Grid for gas used to balance the system and are spread across all signatories of the UNC on the basis of their usage of the transportation system.

O

On-the-day Commodity Market (OCM)

This is the market on which trading takes place to allow NGG to balance the system. Shippers may also trade with each other on the OCM.

P

Post Emergency Claim (PEC)

The post emergency claims arrangements are used to compensate parties for flowing additional gas onto the system in an emergency if opportunity costs for shippers to do so exceed the cash-out price they received for being long.

Project Discovery

Project Discovery is Ofgem's investigation published in 2010 into whether or not future security of supply could be delivered by the existing market arrangements over the coming decade. A copy of the report and associated documents can be accessed on our website.

Public Appeal

An appeal made by National Grid Gas to consumers in the event of a Gas Supply Emergency to reduce gas use.

Public Service Obligations

A public service obligation is an obligation on suppliers to meet the needs of certain categories of customers. The details of the obligation placed on each supplier will differ.

S

Safety case

The Gas Safety (Management) Regulations 1996 set out the requirement for each transporter of gas to publish a safety case which must be approved by the Health and Safety Executive. These safety cases must demonstrate the method by which the holder will ensure the safe operation of its network. In the case of the Network Emergency Coordinator (NEC), the safety case includes details of the procedures that the NEC has established to monitor the situation throughout a supply emergency and for co-coordinating actions across affected parts of the gas network.

Safety and Firm Gas Monitor Methodology (Safety Monitor)

The Safety Monitor provides a requirement for sufficient gas to be held in storage to meet a number of criteria. This requirement remains valid in the event of a GDE.

Significant Code Review (SCR)

The SCR is a new modifications process introduced through the Code Governance Review. This process allows Ofgem to develop modifications proposals before directing them to be raised.

Shippers

Gas shippers buy gas from producers and sell the gas onto suppliers, and are defined as any body which introduces, conveys and takes out gas from the gas pipeline.

Smeared/shared cost

This is a cost that is spread across all relevant parties. For example, the costs to National Grid of a certain activity may be spread across all shippers involved in the Great Britain gas market.

Stage 2 Emergency

Upon entrance into a Gas Supply Emergency, a number of stages may be declared. Under the current arrangements the cash-out price is frozen upon declaration of stage 2 of an emergency.

System Average Price

This is the average price of all trades on a given day.

System Marginal Buy Price

The System Marginal Buy Price is the greater of the system average price plus the default system marginal price, and; the price of the highest balancing action offer price in relation to a Market Balancing Action taken by National Grid Gas for that day.

System Marginal Sell Price

The System Marginal Sell Price is the lesser of the system average price minus the default system marginal price, and the price of the lowest balancing action offer price in relation to a Market Balancing Action taken by National Grid Gas for that day.

System Operator

This is the entity responsible for operating the Great Britain transmission system and for entering into contracts with those who want to connect to and/or use the transmission system. National Grid is the GB system operator.

T

Therm

A unit of heating value equivalent to 100,000 British thermal units (Btu).

The Third Package

The Third Package is a key step in implementation of the internal European energy market. It recognises the need for better co-ordination between European network operators and continuing co-ordination between regulators at that level.

When discussing the 'Third Package' in this document we are referring to Directive 2009/73/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in natural gas and to Regulation (EC) No 713/2009 of the European Parliament and of the Council of 13 July 2009 establishing an Agency for the Cooperation of Energy Regulators.

Transporter (Gas)

The holder of a Gas Transporter's licence in accordance with the provisions of the Gas Act 1986.

U

Uniform Network Code (UNC)

The UNC defines the rights and responsibilities for all users of gas transportation systems in Great Britain. The UNC is, in effect, a contract between the gas transporter and the users of its pipeline system.

Uniform Network Code (UNC) – Section Q

Section Q of the UNC is the main framework which sets out the arrangements that will be in place in the event of declaration of a gas emergency.

V

Value of Lost Load (VoLL)

This is the theoretical price at which a consumer would rather have their gas supply disconnected than continue to pay for a firm supply.

List of Acronyms

ACER	Agency for Cooperation of National Energy Regulators
ASSAP	Average Summer System Average Price
CM	Choice Modelling
BCM	Billion Cubic Meters
CV	Contingent Valuation
DECC	Department of Energy and Climate Change
DM	Daily Metered (gas customer)
DN	Distribution Networks
DSR	Demand Side Response

ECQ	Emergency Curtailment Quantity
EMR	Electricity Market Review
GBA	Gas Balancing Alert
GDE	Gas Deficit Emergency
GS(M)R	Gas Safety (Management) Regulations 1996
HSE	Health and Safety Executive
I&C	Industrial and Commercial
LDZ	Local Distribution Zone
LNG	Liquefied Natural Gas
MBA	Market Balancing Action
NDM	Non-Daily Metered (gas customer)
NEC	Network Emergency Coordinator
NGG	National Grid Gas
NGSE	Network Gas Supply Emergency
NTS	National Transmission System
OCM	On-the-day Commodity Market
OTC	Over The Counter
PEC	Post Emergency Claims
PSOs	Public Service Obligations
SAP	System Average Price
SCR	Significant Code Review
SO	System Operator
SWCQ	Storage Withdrawal Curtailment Quantity Arrangements
UKCS	UK Continental Shelf
UNC	Uniform Network Code
VoLL	Value of Lost Load

Appendix 4 - Feedback Questionnaire

Ofgem considers that consultation is at the heart of good policy development. We are keen to consider any comments or complaints about the manner in which this consultation has been conducted. In any case we would be keen to get your answers to the following questions:

1. Do you have any comments about the overall process, which was adopted for this consultation?
2. Do you have any comments about the overall tone and content of the report?
3. Was the report easy to read and understand, could it have been better written?
4. To what extent did the report's conclusions provide a balanced view?
5. To what extent did the report make reasoned recommendations for improvement?
6. Please add any further comments?

Please send your comments to:

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