Safety Monitor Requirements – Revised

February 2018

This report is an update of the Safety Monitor Report published in September 2017. We are updating the report due to changes with Rough Storage, and Non Storage Supply (NSS) flows observed so far this Winter. These changes have caused the NSS forecast to change from 354mcm to 382mcm, as of 8th February 2018. As a result of this change, the Safety Monitor Requirements for Space and Deliverability decreased from 647GWh and 512GWh/d respectively, to 56GWh and 56GWh/d. Further details can be found throughout this document.

Introduction

This document sets out 'Safety Monitor' for the 2017/18 Winter, pursuant to National Grid's obligations under the Uniform Network Code (UNC), Section Q.

Safety Monitor was introduced in 2004 to replace the so-called 'Top-up' monitors, which had existed (through the Network Code) since 1996. Safety Monitor defines levels of storage that must be maintained through the winter period. The focus of the Safety Monitor is public safety rather than security of supply. It provides a trigger mechanism for taking direct action to avoid a potential gas supply emergency (as defined in the Gas Safety (Management) Regulations).

Safety Monitor Methodology

It is our responsibility to keep the Safety Monitor under review (both ahead of and throughout the winter) and to make adjustments if it is appropriate to do so on the basis of the information available to us. In doing so, we must recognise that the purpose of the Safety Monitor is to ensure an adequate pressure can be maintained in the network at all times and thereby protect public safety. It is therefore appropriate that we adopt a prudent approach to setting the Safety Monitor levels.

The concept behind the Safety Monitor is to provide sufficient gas in storage to support those gas consumers whose premises cannot be physically and verifiably isolated from the gas network within a reasonable time period. To achieve this all gas consumers are categorised into one of two groups:

- Protected by Monitor - Gas is held in storage to facilitate continuity of supply to these consumers even in a 1 in 50 winter
- Protected by Isolation – Network safety would be maintained if necessary by physically isolating these customers from the network

The Safety Monitor has two components. These are the storage deliverability and storage space Safety Monitors. The storage deliverability Safety Monitor indicates the minimum level of deliverability required to both safely isolate loads that are "Protected by Isolation" and also support loads that are "Protected by Monitor". The deliverability Safety Monitor is therefore providing operational cover should an emergency be called on any particular day, whilst the space Safety Monitor provides sufficient gas in store to support "Protected by Monitor" loads for the remainder of the winter.

The level of the Safety Monitor is dependent on the level of non-storage supplies (NSS) and therefore if the level of NSS reduces, the Safety Monitor will increase. This

assessment is undertaken on a regular basis by National Grid throughout the winter period.

Operation of Safety Monitor

It is a requirement of National Grid's Safety Case that we operate this monitor system and that we take action to ensure that storage stocks (space) do not fall below the defined level. The level of storage established by the Safety Monitor is that required to underpin the safe operation of the gas transportation system. Its aim is to ensure the preservation of supplies to domestic customers, other non-daily metered (NDM) customers and certain other customers who could not safely be isolated from the gas system if necessary in order to achieve a supply-demand balance and thereby maintain sufficient pressures in the network.

The space Safety Monitor defines the minimum level of stored gas required in aggregate in all UK storage, on each day of the winter. We monitor the level of gas in all storage facility types throughout the winter to ensure that the actual aggregate stock level does not fall below the space Safety Monitor level. If this were to occur, there would be insufficient gas left in storage to underpin the safe operation of the system in a 1 in 50 cold winter. Under these conditions, we would therefore be obliged by our Safety Case to take action to remedy this situation. In the lead-up to such a situation, we would advise the market with the objective of encouraging mitigating action. If necessary, however, the Network Emergency Co-ordinator (NEC) may require the relevant storage operators to reduce or curtail flows of gas out of storage. In this situation, we would expect the market to rebalance in order to achieve a match between supply and demand.

We would continue to provide information to the market as the situation developed. For this winter we will continue to provide through our website a five day ahead view of the supply/demand balance, historic and forward projections of storage use and how these levels relate to the Safety Monitor requirements.

The combination of relevant information and clarity of the remaining storage position should assist market participants in ensuring security of supply. While National Grid would seek to minimise the extent of any intervention in the market, the balance between allowing the market to resolve the situation and taking action via the NEC will clearly depend on the severity of the situation and the associated timescales.

Approach to the Safety Monitor Levels

This note is published in conjunction with the 2017/18 Winter Outlook Report[1], which contains more detailed coverage of our preliminary view of supplies for the coming winter.

As with previous years we will continue to review the Safety Monitor levels throughout the winter and, if necessary, we will revise them to reflect material changes to the supply-demand balance.

[1] http://www2.nationalgrid.com/UK/Industry-information/Future-of-Energy/FES/Winter-Outlook/

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National Grid will continue to provide winter feedback to industry regarding supply assumptions and resulting changes to Safety Monitor by means of monthly updates via Operational forums and our reporting on our website.

Supply Assumptions

The process used to determine our supply assumptions is driven by changing supply patterns resulting from falling gas demand. This section summarises the process. Further detail is provided in the Winter Outlook Report[2] and the Safety Monitor Methodology Document.

Figure 1 shows the NSS versus demand relationship for this year's Safety Monitor. The data set to create this chart is from the past 5 winters with a weighting towards the most recent winters.

Figure 1 – Non storage supply (NSS) versus demand for the winters 2012/13 to 2016/17

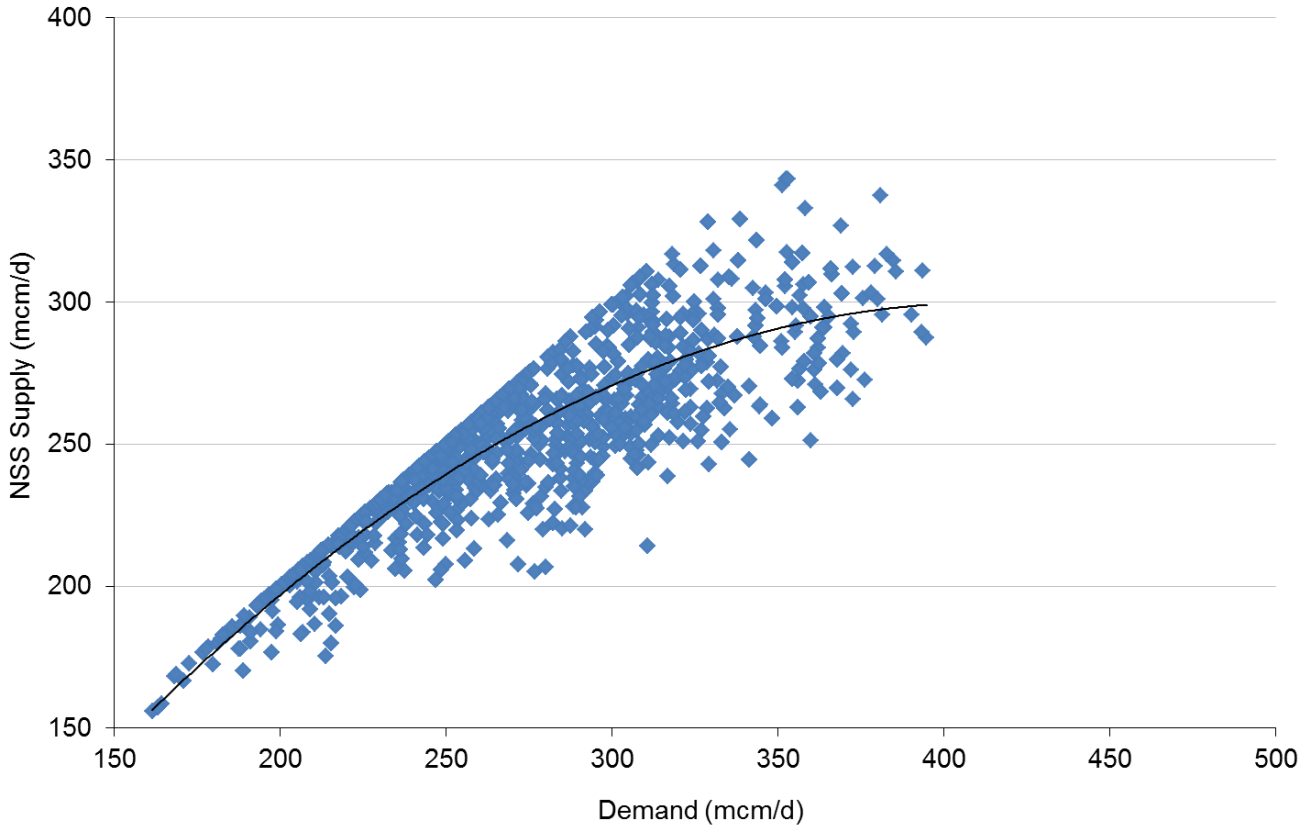


Figure 1 shows the NSS versus demand assumption for Winter 2017/18, based on an analysis of the last five winters. This is used to establish a curve of how NSS is expected to change with demand. This continues the approach of using a variable NSS assumption which is demand dependent. The curve is then adjusted to meet our

[2] http://www2.nationalgrid.com/UK/Industry-information/Future-of-Energy/FES/Winter-Outlook/

assumed NSS at a severe demand level, which is established for the upcoming winter. This is published and detailed in the Winter Outlook Report[2].

It is important that the assumed level of NSS used for calculating the Safety Monitor is available throughout the winter, notably at times of high demand. Hence in calculating the Safety Monitor, NSS at lower levels (98%) are used. There is also the further option to adjust the NSS assumption by a Winter Risk Factor – for any specific supply issues we feel may arise during the winter. This winter this factor is zero.

Within winter monitoring of actual NSS levels will enable us to determine whether the NSS versus demand relationship used within the Safety Monitor calculation methodology is fit for purpose: if it is found not to be, it can be revised based on the latest information.

In accordance with UNC Section V a revision has been made to the Non Storage Supply (NSS) forecast number to take into account the status change of Rough Storage to Rough Production, there has also been evidence over the winter period of flows consistently being higher than the forecast numbers published in Winter Outlook 17/18 for categories UKCS, Norway and IUK. The new forecast NSS from Gas Day 8th February 2018 will change from 354mcm to 382mcm.

The Safety Monitor numbers in accordance with UNC Section Q have been changed to reflect the above.

The tools and models will be updated accordingly.

Table 1 shows the anticipated availability of storage in winter 2017/18.

Table 1 – Storage Space and Deliverability Assumptions[3]

Storage type	Space (GWh)	Deliverability (GWh/d)
Medium (MRS)	**14,385**	**1,016**
Long (Rough)	**0**	**0**
Total	**14,385**	**1,016**

Demand Assumptions

The basis for the calculation of the Safety Monitor levels is our 2017 demand forecasts for 2017/18, using a severe (1 in 50 cold) load duration curve.

Safety Monitor Levels

Table 2 shows the initial Safety Monitor requirements for space and deliverability.

[3]. Assumptions are as of September 2017 and may be liable to change during the winter. Holehouse Farm is on outage for the majority of the winter period and has therefore been excluded from total storage space and deliverability assumptions.

Table 2 – Stored Safety Gas and Storage Safety Deliverability Requirement

Assumed total storage space (GWh)	Space Safety Monitor (GWh)	Space requirement (%)	Deliverability Safety Monitor (GWh/d)
14,385	56	0.39%	56

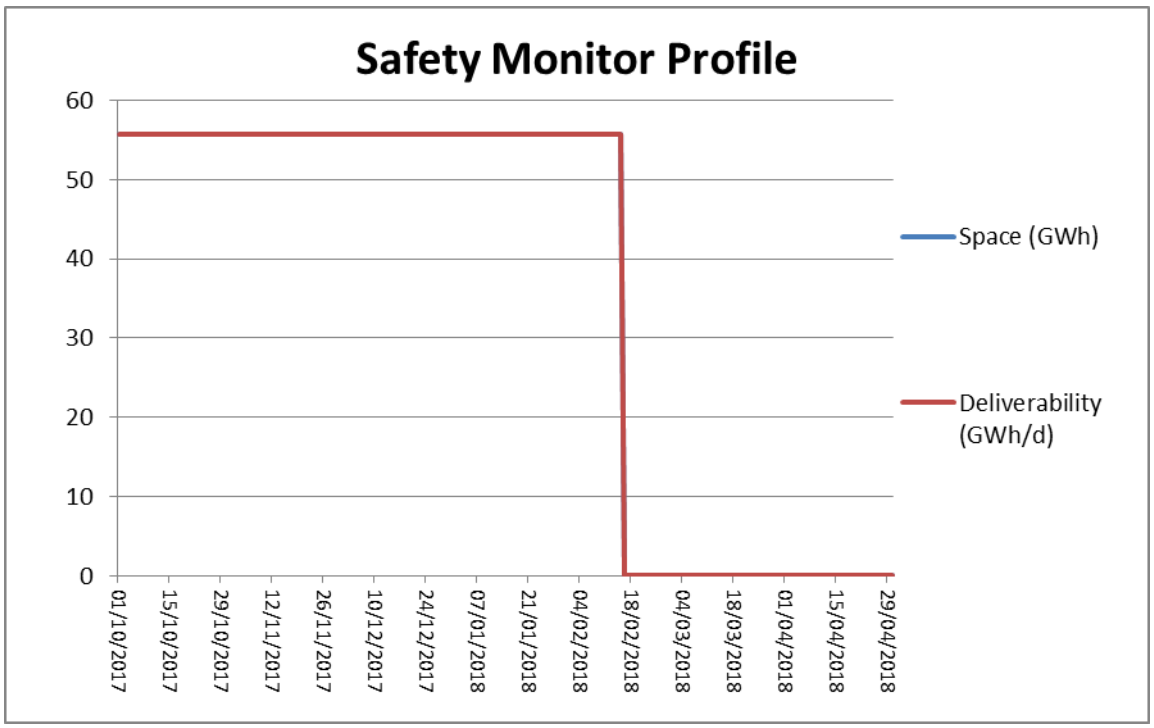
Rough has been excluded from storage assumptions and is therefore not part of the Safety Monitor calculation. This is due to the latest REMIT information stating that there is uncertainty of whether Rough will have stock for the full winter period that the Safety Monitor is applicable.

Monitor Profiles

Figure 2 shows the space profile and deliverability profile for the Safety Monitor.

The objective of the Safety Monitor profile is to identify at any point in time the requirement for gas in store to underpin the safe operation of the gas transportation system for what remains of the winter period. The Safety Monitor allows for the possibility of late winter cold weather patterns based on analysis of historical temperatures. However, in the event of cold weather earlier in the winter, the profiles may be reduced to reflect the occurrence of cold weather.

Figure 2: Safety Monitor Profile



Notes on Demand Assumptions

National Grid forecasts both diversified demand and undiversified demand. The diversified peak day is the peak day for the whole country, whilst the undiversified peak day is the peak day for each area of the country added together.

For planning and investing in the network, National Grid uses 1 in 20 peak day undiversified demand conditions (in addition to analysing other less severe weather conditions). This allows for the fact that there is no single profile of demand across the country associated with a 1 in 20 cold peak day, and therefore ensures sufficient transportation capacity is available to meet 1 in 20 demands under a range of conditions.

For security planning including Safety Monitors, National Grid uses diversified demand forecasts, which is the appropriate basis for assessing the balance between supply and demand on a national basis.