Operating Margins

2013/14

nationalgrid

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1 About this Document

This document is published pursuant to National Grid's obligations under the Uniform Network Code Section K Part 2.2.3, which places a requirement on National Grid to publish the following information:

- The assumptions used in the determination of Operating Margins
- The aggregate amount of Operating Margins
- The maximum rate of deliverability required for Operating Margins
- The amounts of deliverability and space in each storage location
- The Operating Margins profile

The terms and conditions of the Uniform Network Code apply to the contents of the document.

The resultant Operating Margins booking also meets National Grid Gas requirements to conform to its current Safety Case.

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2 Background Information

2.1 Use of Operating Margins

The criteria for the use of Operating Margins are set out in the System Management Principles Statement.

2.1.1 The triggers for use of Operating Margins are: -

1. Primarily, Operating Margins will be used in the immediate period following operational stresses such as beach supply failure as a result of a failure offshore, unanticipated demand changes or unexpected pipeline and/or plant unavailability to maintain system pressures in the period before other balancing measures become effective.

2. Orderly Rundown requires a quantity of Operating Margins stock to ensure safe rundown of the system in the event of a Network Gas Supply Emergency while firm load shedding takes place as required in our Safety Case.

3. Operating Margins will also be used to support system pressures on the gas day in the event of a compressor trip, pipe break, or other failure or damage to transmission plant. Following the day of the event, any reduction in capacity resulting from the event becomes equivalent to a planned maintenance activity, and therefore is unlikely to be supported by the use of Operating Margins.

2.1.2 Refilling of Operating Margins

If the volume of Operating Margins, at any point in the winter, falls below the monitor level calculated by National Grid at individual sites, National Grid may seek to refill Operating Margins to the extent of the published monitor where it is practical to do so.

2.2 Safety Case Operating Margins Requirements

Besides meeting our Uniform Network Code requirements for Operating Margins, the Operating Margins booking must also satisfy our current Safety Case requirements for Operating Margins. These are broadly similar and for reporting purposes we now use terminology that is consistent with our Safety Case definitions for Operating Margins.

3 Overview of the Operating Margins methodology

National Grid has determined its Operating Margins requirement by consideration of all available storage facilities, LNG importation facilities, direct connected loads and supplies on the NTS.

National Grid Gas procures Operating Margins services from storage and importation facilities and their capacity holders as well as offtake reduction and supply increase services rather than from specific storage facilities. To that end, National Grid Gas has recently completed a tender to procure storage capacity and gas delivery offers.

The philosophy behind this year's methodology is consistent with that used last year, with the total booking being split between Group 1, Group 2 and Group 3 as broadly defined in our Safety Case.

GROUP 1 - includes those events that, although unlikely to occur co-incident with a 1 in 50 winter, would have a major impact on the safe operation of the NTS. This group includes a major loss of supply, e.g. sub-terminal, or loss of infrastructure.

GROUP 2 - includes those events that could reasonably be expected to happen during any winter, but potentially more so in a severe winter as alternative supplies are expected to be less available and occurrences of such events could escalate due to higher demands. Inclusion of this Operating Margins is required in order that Operating Margins is kept available for a series of such events. This events group includes analysis for compressor failure; routine forecast errors and significant supply losses as required in our Safety Case.

GROUP 3 - Orderly Rundown is Operating Margins stock to ensure safe rundown of the system in the event of a Network Gas Supply Emergency while firm load shedding takes place as required in our Safety Case.

Operating Margins is primarily calculated by network analysis of the system and to a lesser extent by using various analytical models. Section 4 provides a more detailed explanation of the calculation of the individual elements.

4 Assumptions used in the determination of Operating Margins

4.1 Assumptions used in the Operating Margins calculations

1. Supply is utilised in the following order: UKCS supplies and imports, Long duration storage (Rough), Medium duration storage (MRS) and Short duration storage (LNG).

2. Other storage, NTS compressors and pipelines have 100% availability (apart from the specific failure condition being considered).

3. Relevant storage facilities are on short standby at high demands.

4. If operating conditions require Operating Margins stocks to be depleted they may be refilled[1] to the stock profile shown in Section 7.

4.1.1 Operating Margins requirements for Group 1

The determination of the requirements for Group 1, include assessment of the following scenarios:

- Loss of key infrastructure, notably loss of Forties liquids pipeline, an electrical supply failure at St Fergus.
- Loss of the largest sub-terminal at each terminal.

Group 1 Operating Margins requirement is calculated by network analysis of the system.

4.1.2 Operating Margins requirements for Group 2

The requirements for Group 2 include compressor failures and other operational factors such as forecast changes and significant supply losses. These requirements are added together reflecting that all of these events could reasonably be expected to occur, in some cases more than once during a severe winter.

Group 2 Operating Margins requirement is calculated by network analysis of the system (for significant supply losses) and by using a range of analytical models using historic and forecast data (for compressor failure and routine forecast errors).

[1] This may need to be effected by transfer of gas in store if there is limited injection capacity.

4.1.2.1 NTS Compressor failure assumptions

1. Our compressor model takes into account our most recent compressor performance data, including:
   - Planned running hours (for a severe winter)
   - Mean time between failure (MTBF)
   - Start probabilities
   - Average repair times
   - Complete station trip data (reliability)
   - Planned and unplanned unit availability

2. The compressor model determines 3 key components namely:
   - Station trips
   - Station emergency shut downs (SESDs)
   - Unavailability

   From these a compressor power loss is determined.

3. Network analysis is then used to determine the volume loss due to compressor power loss and this is then assigned to appropriate storage sites.

4.1.2.2 Forecast Changes

1. This component has been included to reflect the operational fact that during any winter a level of under forecasts can be expected, and in the extreme this may require Operating Margins support.

2. The Operating Margins requirement has been calculated based upon historic trends in 16:00 hours forecasting performance, assuming 10 mcm of linepack is available.

3. It is assumed that in a cold winter the requirement would not increase: though demand would be higher it may not necessarily be more volatile.

4.1.3 Operating Margins requirement for Group 3 - Orderly Rundown

4.1.3.1 Orderly rundown assumptions

1. Severe winter has been experienced, no shipper storage available from 06:00 hours and no shipper firm load reduction.

2. A Network Gas Supply Emergency is declared effective from 06:00 hours and firm load shedding of VLDMCs and LDZ DM loads is required to balance supply and demand.

3. NTS linepack is used to smooth out the mis-match between supply and demand within day, but is limited to +/- 10mcm.

4. With no shipper storage available, the within day supply shortfall is assumed met by a combination of Operating Margins booked storage in Rough, MRS and LNG Importation facilities with storage.

5. As detailed in Section 3, this assessment may change or be expanded following engagement with the Distribution Networks about their role in assisting the orderly rundown.

5 Isle of Grain Operating Margins Requirements

National Grid continues to book some Operating Margins at Grain LNG.

6 Aggregate Operating Margins booking 2012/13

Table 1 below summarises the expected bookings required from the regulated LNG Storage facilities and all other service providers as a result of the competitive tender process. This was completed in early 2013 and forms part of National Grid's overall procurement process.

The aggregated Operating Margins booking for 2013/14 is 1,090 GWh.

Table 1: 2013/14 Operating Margins Booking

	2012/13 Space Booking (GWh)	**2013/14 Space Booking (GWh)**	2013/14 Max Deliverability (GWh/d)
Avonmouth	152	**115**	143
All other providers	938	**975**	
Total[2]	1,090	**1,090**	

This booking explicitly meets our UNC and Safety Case obligations.

Tender information will be published later this year that will provide further detail on the 2013/14 Operating Margins tender.

6.1 The maximum rate of deliverability required for Operating Margins

The combination of the aggregated LNG deliverability in Table 1, combined with that from other providers, meets the calculated maximum Operating Margins deliverability requirement. To reduce costs and to reflect at high demand that many of these sites are expected to be flowing gas, we will not be booking any site deliverability. Hence we will use interruptible deliverability or over-run deliverability on the day of use.

7 The Operating Margins profile

Table 2 below shows the Operating Margins profile, the quantity of gas required in store for each month of the year. Though not shown the storage profiles can be site specific reflecting their individual Operating Margins needs.

Table 2: 2013/14 Operating Margin Profile

	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Monitor (GWh)	517	517	517	517	517	1090	1090	1090	1081	981	916	517
Monitor (%)	47%	47%	47%	47%	47%	100%	100%	100%	99%	90%	84%	47%

8 Operating Margins WACOG Calculation Principles

Per Section K4.2.6(b) of the UNC, National Grid Gas must publish the principles by which the Net Margins WACOG will be calculated in relation to facilities where National Grid Gas has entered into a number of Operating Margins Gas Delivery Arrangements.

Deliverability Contract 2013-1 and 2013-4:

The Net Margins WACOG in respect of Deliverability Contracts 2013-1 and 2013-4 is as follows:

DC = max (SMPB, Summer 2014 * 1.1)

Where:

SMPB represents the System Marginal Sell Price (in p/kWh) for gas for the Gas Day in which the service has been delivered

Deliverability Contract 2013-2:

The Net Margins WACOG in respect of Deliverability Contract 2013-2 is as follows:

DC = SMPB * 1.33

Where:

SMPB represents the System Marginal Sell Price (in p/kWh) for gas for the Gas Day in which the service has been delivered

Deliverability Contract 2013-3:

Net Margins WACOG = $\sum$ Max [(SBPi x 0.56 – SMSPi, 0)] + SAP) x Q_i

Where:

$\sum$ represents the sum over all Hours within the Gas Day in which the service has been delivered

SBP_i is the average System Buy Price (in £/kWh) for electricity determined by the two relevant settlement periods within the Hour i as published in the final settlement report

$SMSP_i$ is the System Marginal Sell Price (in £/kWh) for gas for the Gas Day in which the Hour occurs

Q_i is the Actual Utilisation Quantity (kWh) delivered in the Hour i

Deliverability Contract 2013-5:

Net Margins WACOG = $\sum$ Max [(SBPi x 0.64 – SMSPi, 0)] + SAP) x Q_i

Where:

$\sum$ represents the sum over all Hours within the Gas Day in which the service has been delivered

SBP_i is the average System Buy Price (in £/kWh) for electricity determined by the two relevant settlement periods within the Hour i as published in the final settlement report

$SMSP_i$ is the System Marginal Sell Price (in £/kWh) for gas for the Gas Day in which the Hour occurs

Q_i is the Actual Utilisation Quantity (kWh) delivered in the Hour i

Deliverability Contract 2013-6:

Net Margins WACOG = $\sum$ Max [(SBPi x 0.5 – SMSPi), 0)]+ SAP x Qi

Where:

$\sum$ represents the sum over all Hours within the Gas Day in which the service has been delivered

SBP_i is the average System Buy Price (in £/kWh) for electricity determined by the two relevant settlement periods within the Hour i as published in the final settlement report

$SMSP_i$ is the System Marginal Sell Price (in £/kWh) for gas for the Gas Day in which the Hour occurs

Q_i is the Actual Utilisation Quantity (kWh) delivered in the Hour i

Deliverability Contracts 2013-7, 2013-8 and 2013-9:

The Net Margins WACOG in respect of Deliverability Contracts 2013-7, 2013-8 and 2013-9 is as follows:

Net Margins WACOG = max (SMPB + 0.1706, 2.559)

Where:

SMPB represents the System Marginal Sell Price (in p/kWh) for gas for the Gas Day in which the service has been delivered