UNC Modification	At what stage is this document in the process?

UNC 0XXX:

Amendment to Gas Quality NTS Entry Specification at the St Fergus SAGE System Entry Point

Purpose of Modification:

This enabling Modification will facilitate a change to the current contractual carbon dioxide limit at the St Fergus SAGE System Entry Point, through modification of a network entry provision contained within the Network Entry Agreement (NEA) between National Grid Gas plc and SAGE North Sea Limited (SNSL) in respect of the St Fergus SAGE Sub-Terminal.

	The Proposer recommends that this Modification should be: • subject to self-governance • assessed by a Workgroup. This Modification will be presented by the Proposer to the Panel on 19 November 2020). The Panel will consider the Proposer's recommendation and determine the appropriate route.
	High Impact: None
	Medium Impact: None
	Low Impact: Transporters, Shippers and Consumers

Contents

Timetable

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The Proposer recommends the following timetable:

Pre-Modification discussion	05 November 2020
Modification consideration by Panel	19 November 2020
Initial consideration by Workgroup	03 December 2020
Workgroup Report presented to Panel	15 April2021
Draft Modification Report issued for consultation	15 April 2021
Consultation Close-out for representations	10 May 2021
Final Modification Report available for Panel (at short notice)	13 May 2021
Modification Panel decision	20 May 2021

Any questions?

Contact:
Joint Office of Gas Transporters

enquiries@gasgovernance.co.uk

0121 288 2107

Proposer:
Eric Marston (SAGE North Sea Limited)

eric.marston@ancalamidstream.co.uk

07748 776602

Transporter:
Phil Hobbins

philip.hobbins@nationalgrid.com

07966 865623

Systems Provider:
Xoserve

UKLink@xoserve.com

1 Summary

What

This proposed Modification seeks to enable an increase in the carbon dioxide limit within the Network Entry Agreement (NEA) at the SAGE North Sea Limited (SNSL) sub-terminal at St. Fergus between National Grid Gas plc and SNSL.

It is proposed to increase the limit from 4mol% to 5.5mol% subject to a cap on aggregate CO_2 and N_2 at 7mol% until the end of Gas Year 2025/2026 with any continued relaxation in specification beyond that date subject to an objective test of continued requirement.

Why

The SAGE Terminal receives gas from some 40 different offshore Shippers. Of these Shippers, a number produce gas with a CO_2 content in excess of 4mol% including the Beryl, Brae and T Block fields. Historically, when production rates from these fields were at their peak, gas arriving at the terminal required continual processing to remove the CO_2 before entry to the National Grid. This was achieved through the use of two treatment trains operating in parallel using amine absorption technology.

Today, gas flow rates and composition through the SAGE Terminal are below original nameplate capacity. Production rates from Beryl, Brae and Tiffany have reduced and furthermore been balanced by sources of richer gas from fields including Britannia as well as developments in the Norwegian sector such as Alvheim, Edvard Greig and Ivar Aasen. As a consequence, the blended gas arriving at the SAGE Terminal no longer requires continual CO_2 removal using the two treatment trains. Today, the CO_2 content arriving at the SAGE Terminal is on average circa 3 mol% and this is predicted to continue declining towards 2 mol% by the end of the 2025/2026 Gas Year. One treatment train has already been retired from service (some 5 years ago) and the remaining treatment train remains on standby for infrequent offshore upset conditions (estimated at 6 events per annum), which could generate short term excursions of up to 5.5 mol% for a period of some 48 hours.

The SAGE Terminal operator now proposes to retire the second treatment train from service end 2Q 2021 as part of an overall terminal rationalisation project. In doing so, terminal unit costs will be reduced in line with industry benchmark data for the forecast throughput and scale of the operation. This essential change is required to maximise the economic life of the terminal and promote the development of remaining undeveloped discoveries and prospects in both the UKCS and the Norwegian Sector.

How

In accordance with the UNC Transportation Principal Document Section I 2.2.3 (a), the Proposer is seeking to amend the NEA described above via this enabling Modification. On satisfactory completion of the UNC process the parties to the NEA will be able to amend the agreement.

It should be noted that a similar enabling Modification (UNC Modification 0607 - Amendment to Gas Quality NTS Entry Specification at the St Fergus NSMP System Entry Point) was approved by Ofgem in February 2018.

2 Governance

Justification for Self-Governance

The Proposer considers that this proposed modification meets the self-governance criteria on the basis that the change is unlikely to have a material effect on:

(aa) **Existing or future gas consumers.** The dilution from low CO_2 gas from the SEGAL sub-terminal and Norway through the Vesterled pipeline will result in gas being exported into the NTS which remains within the UNC limit of 4 mol%. It is noted that there is the possibility of CO_2 of up to 5.5% from the NSMP terminal as a result of upset conditions associated with offshore shippers. However, the likelihood of this occurring coincident with upset conditions due to SAGE Terminal offshore Shippers is considered very low (1 event every 5 to 10 years) and therefore manageable.

(bb) **Competition in the shipping, transportation or supply of gas conveyed through pipes or any commercial activities connected with the shipping, transportation or supply of gas conveyed through pipes.** The proposed modification does not disadvantage the competitive position of the other terminal operators at St Fergus. Furthermore, increasing the UNC limit from 4 mol% through to 5.5 mol% for the SAGE Terminal will create a comparable entry specification with the NSMP Terminal in particular and therefore maintain the competitive environment amongst the St Fergus sub-terminals.

(dd) **Matters relating to sustainable development, safety or security of supply, or the management of market or network emergencies.** The export of gas with a CO_2 content of up to 5.5 mol% and for limited periods of time, (circa 48 hours) is unlikely to have a material impact on the management of the network nor safety and security of supply. The overall inert content will remain at 7 mol% per the current NEA. As previous, the likelihood of coincident excursions at both NSMP and SAGE is considered very low. Furthermore, given the notification period ahead of a high CO_2 event (also circa 48 hours), the St Fergus sub-terminal operators could take mitigating and co-ordinated steps, such as rate reduction in flow from high CO_2 fields.

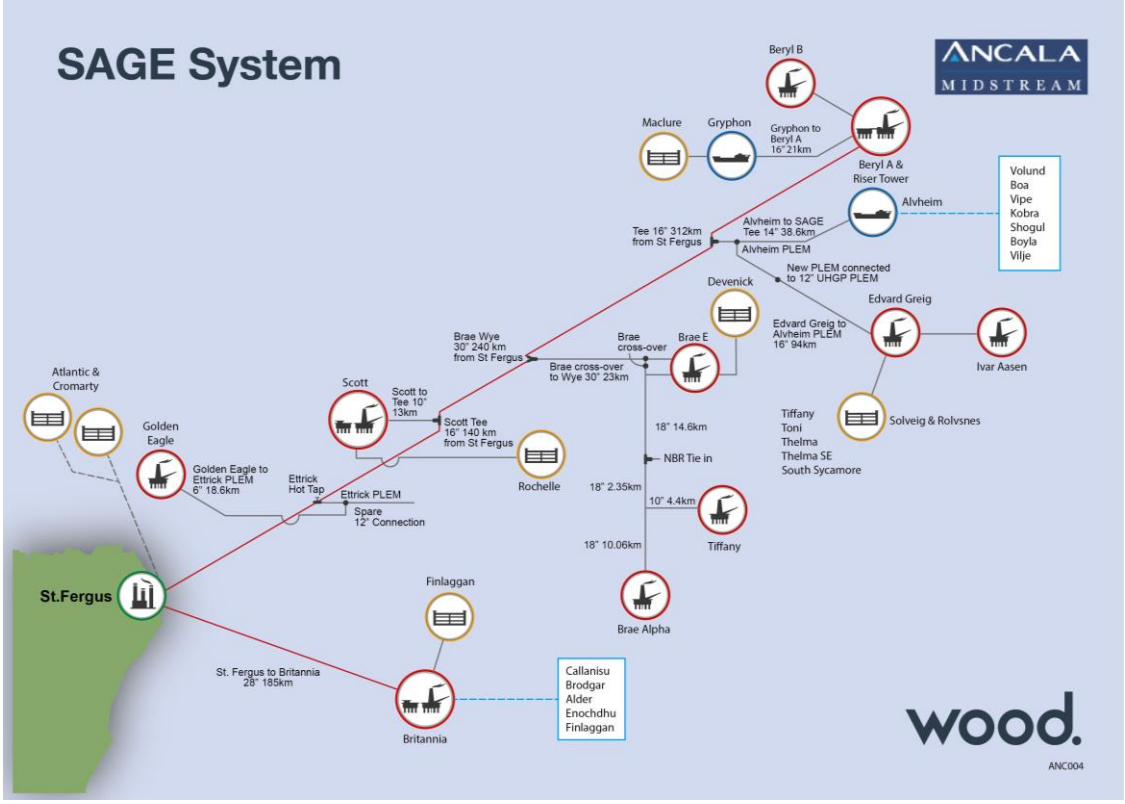
Requested Next Steps

This Modification should:

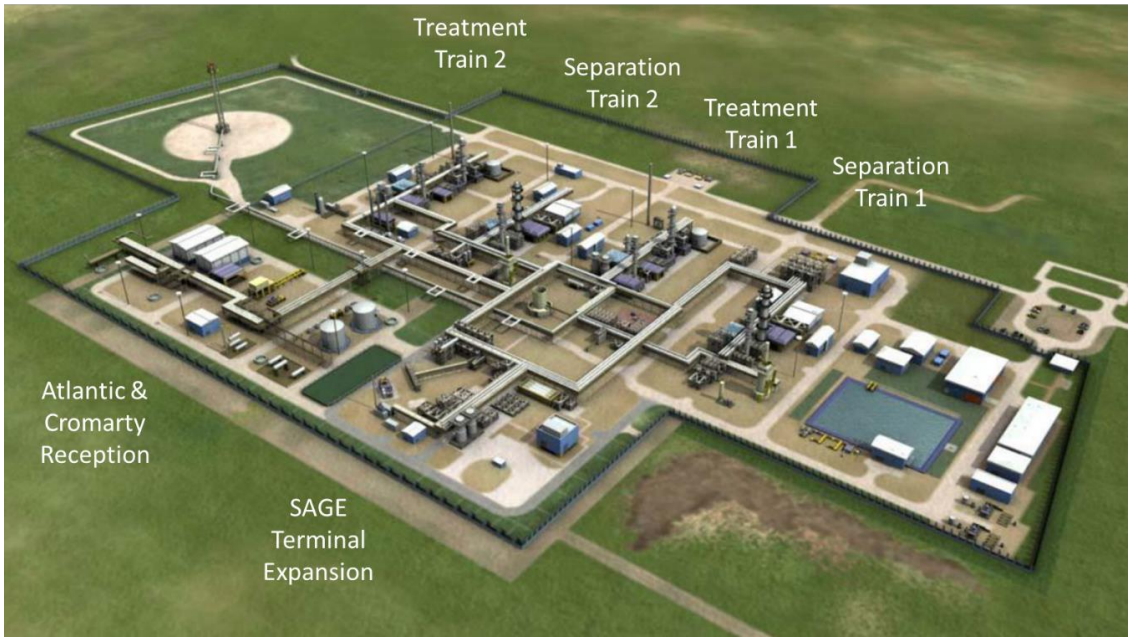
- be considered a non-material change and subject to self-governance
- be assessed by a Workgroup.

3 Why Change?

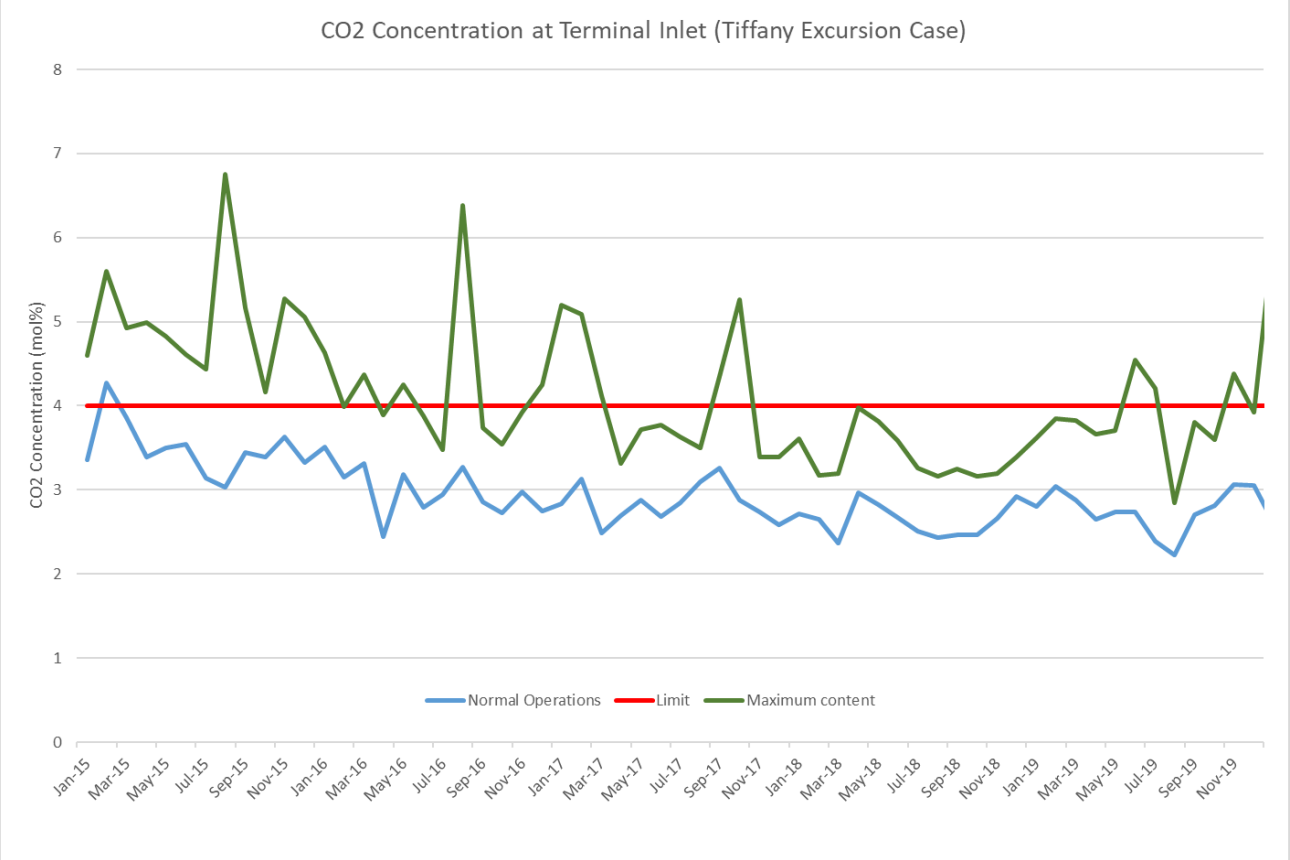
The SAGE Terminal receives gas from some 40 different offshore Shippers. Of these Shippers, a number produce gas with a CO_2 content in excess of 4mol% including the Beryl, Brae and T Block fields. These are shown in the following illustration, including Shippers from both the UKCS as well as the Norwegian sector.



Historically, when production rates from these fields were at their peak, gas arriving at the terminal required continual processing to remove the CO_2 before entry in the National Grid. This was achieved through the use of two treatment trains operating in parallel and using amine absorption technology. The two treatment trains are shown in the following illustration.



Today, gas flow rates and composition through the SAGE Terminal are below original nameplate capacity. Production rates from Beryl, Brae and Tiffany have reduced and furthermore have been balanced by sources of richer gas from fields including Britannia as well as developments in the Norwegian sector such as Alvheim, Edvard Greig and Ivar Aasen. As a consequence, the blended gas arriving at the SAGE Terminal no longer requires continuous CO_2 removal using the two treatment trains. Today, the CO_2 content arriving at the SAGE Terminal is on average circa 3 mol% and this is predicted to continue declining towards 2 mol% by the end of the 2025/2026 Gas Year. One treatment train has already been retired from service (some 5 years ago) and the remaining treatment train remains on standby for infrequent offshore upset conditions which could generate short term excursions of up to 5.5 mol% for a period of some 48 hours. The following illustration shows the decreasing CO_2 content during normal operations over the last five years.



Terminal Efficiency and Longevity

The SAGE terminal operator now proposes to retire the second treatment train from service end 2Q 2021 as part of an overall terminal rationalisation project. In doing so, terminal unit costs will be reduced in line with industry benchmark data for the forecast throughput and scale of the operation. The UNC modification facilitates the rationalisation project by enabling the retirement of the remaining under-utilised treatment train and associated utilities including the terminal steam system. This in turn means that terminal operating costs may be reduced, operational efficiency improved, and the economic life of the terminal extended. Offshore Shippers will benefit as the change delays the point in time when they cease paying a transportation and processing tariff and commence paying a share of the terminal operating costs. The effect is to extend the economic life of such offshore fields and furthermore promote the development of remaining undeveloped discoveries and prospects in both the UKCS and the Norwegian sector of the North Sea. In turn this continues to support the security of gas supplies into the UK.

What the effects are, should the change not be made

Without change, the SAGE Terminal will be required to continue operating and maintaining under-utilised facilities and equipment required to remove CO_2 from the SAGE pipeline gas stream on an infrequent basis. The SAGE Terminal carbon foot-print will remain comparatively high for the volume of gas transported through the system, using both electricity from the grid and steam generated on site to continue operation of the remaining treatment train. SAGE Terminal operating costs will remain comparatively high and will likely truncate the economic life of the terminal and the offshore Shippers who transport and process their gas through the SAGE Terminal.

4 Code Specific Matters

Reference Documents

UNC 0607: Amendment to Gas Quality NTS Entry Specification at the St Fergus NSMP System Entry Point, Version 1, 19 October 2017.

Knowledge/Skills

No additional skills or knowledge are required to assess this modification.

5 Solution

This Modification seeks to amend a Network Entry provision within the existing SAGE Terminal NEA. The amendment would increase the CO_2 upper limit for gas delivered from the SAGE Sub-Terminal System Entry Point into the National Transmission System to 5.5 mol% from the current limit of 4 mol%, subject to a cap on total inert (CO_2 and N_2) at 7 mol%, through to the end of the Gas Year 2025/2026 and with any continued relaxation in specification beyond that date subject to an objective test for continued requirement.

6 Impacts & Other Considerations

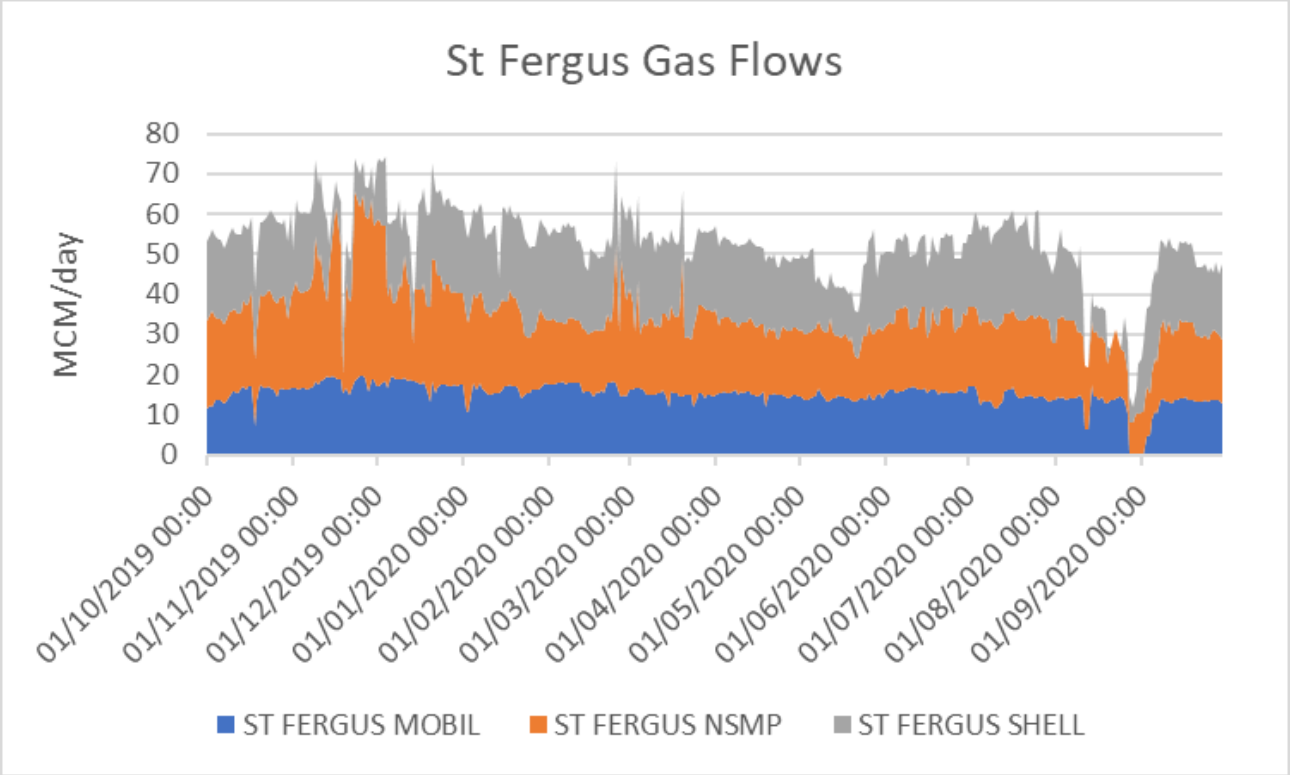
Does this Modification impact a Significant Code Review (SCR) or other significant industry change projects, if so, how?

UNC 0607 implemented in February 2018 refers to the inclusion of a qualification within the NSMP NEA amendment to enable the reduction of the CO_2 limit between 4 mol% and 5.5 mol% if another UNC Modification to increase the CO_2 limit from another System Entry Point were to be approved, and which National Grid would otherwise be unable to accommodate at no material cost.

It is suggested that such a change to the NSMP NEA would not be required and furthermore the National Grid will not be required to implement material modifications. As previously stated, the likelihood of coincident high CO_2 excursions from both NSMP and the SAGE Terminal is considered very low. Furthermore, in the unlikely event of coincident demand, the St Fergus sub-terminal operators could take appropriate steps to delay the arrival time of high CO_2 slugs and / or manage the gas production rate from certain shippers to reduce the CO_2 content through blend management.

Consumer Impacts

Consumers currently receive gas with a CO_2 content of 4 mol% from the SAGE Terminal, 2% from the SEGAL Terminal and between 4% and 5.5% from the NSMP Terminal, (ref: UNC 0607). An assessment of the flowrates entering the NTS at St Fergus has been undertaken based on flowrates over the last 18 months as illustrated in the attached graph and summarised in the following table:



Entry Point Flowrates	SAGE (mcm/day)	NSMP (mcm/day)	Shell (mcm/day)
Max Flowrates	19.70	47.46	26.44
Average Flowrates	15.35	19.86	18.14

Further to this, a detailed analysis of the CO_2 and total inert content exported into the NTS from the SAGE Terminal, assuming retiral of the remaining treatment train, has also been undertaken. This includes a probabilistic (Monte Carlo) simulation of the likelihood of excursions in excess of 4 mol%. Such excursions are a consequence of upset shipper conditions which result in a lack of blend gas within the SAGE Terminal.

Of the various scenarios considered, there is one outlier involving both the East Brae field and the Tiffany field. The Tiffany field exports gas with a relatively high CO_2 content but a relatively low flow rate such that blending from other shippers within the SAGE pipeline quickly dilutes this content to circa 3 mol% during normal operations. The exception to this is when the East Brae platform trips and allows Tiffany gas to flow directly into the Brae pipeline, gradually building a high CO_2 slug of gas. When East Brae starts-up again, this high CO_2 slug is further compressed before dilution with gas from other shippers. The consequence is a circa 48-hour excursion with a maximum of 5.5 mol% CO_2 and an estimated frequency of six times per annum (95% confidence). This estimate forms the basis and limiting case for this proposed UNC Modification.

The range of representative scenarios for the maximum CO_2 content from the three respective sub-terminals at St Fergus, assuming that this UNC modification is approved are summarised in the following table:

CO2 mol% at Entry Point	SAGE	NSMP	Shell
CO_2 Base Case	4.0%	4.0%	2.0%
CO_2 Steady State @ FUKA and High SAGE	5.5%	2.7%	2.0%
CO_2 High SAGE	5.5%	4.0%	2.0%
CO_2 High NSMP	4.0%	5.5%	2.0%
CO_2 High NSMP and High SAGE	5.5%	5.5%	2.0%

The above scenarios have been combined with the representative flowrates from the three sub-terminals at St Fergus to provide a likely range for CO_2 content entering the grid, as summarised in the following table:

Export into NTS	CO_2 Base Case	CO_2 Steady state @ FUKA and High SAGE	CO_2 High SAGE	CO_2 High NSMP	CO_2 High NSMP and High SAGE
Max Flowrates	3.4%	3.1%	3.8%	4.2%	4.5%
Average Flowrates	3.3%	3.3%	3.8%	3.9%	4.3%

It is evident from the analysis that gas entering the NTS as a consequence of a high CO2 excursion from the SAGE Terminal remains below 4 mol% due to blending with gas from the two neighbouring terminals.

There are two exceptions to this scenario:

(a) The first involves a coincident high CO_2 excursion from the NSMP terminal as well as a high CO_2 excursion from the SAGE Terminal. The overall CO_2 content entering the grid in this instance is predicted to reach between 4.3 and 4.5 mol%. The likelihood of such an event is considered very low and estimated at 1 event every 5 to 10 years. Due to the nature of the offshore events, both the SAGE Terminal and NSMP Terminal Operators will receive advance notice of a high CO_2 event, likely 48 hours ahead of the high CO_2 slug arriving at the terminal. Offshore Shippers may be co-ordinated and / or gas rates reduced in order to mitigate the impact on the NTS and maintain the overall content below 4 mol%.

(b) The second scenario involves the arrival of high CO_2 gas at the SAGE Terminal coincident with the inadvertent shut-in of one or both of the neighbouring terminals at St Fergus; ie: NSMP and / or Shell. All three terminals at St Fergus operate with high availability, estimated in excess of 99%. The likelihood of such a coincident event is considered negligible and greater than 1 in 1000 years. Furthermore, in the event of such an occurrence, it is expected that National Grid might take action to restrict the flow of high CO_2 gas into the grid as appropriate.

Impact (if any) on Greenhouse Gas Emissions

Particularly during the winter months, the remaining treatment train at the SAGE Terminal requires ongoing operation in order circulate and heat amine within the plant. Amine is the main chemical component within the treatment train which removes carbon dioxide from process gas. However, circulating and heating the amine is energy intensive in and of itself, using both electricity from the grid and steam generated at the terminal. Rationalisation of the treatment train has the potential to support a reduction in total emissions from the SAGE Terminal from circa 100,000 tonnes per annum to 50,000 tonnes per annum. Based on the upset Shipper scenarios described above, the treatment train is only required to remove an estimated 3,000 tonnes of CO_2 per annum from the SAGE pipeline gas.

Cross Code Impacts

None

EU Code Impacts

None

Central Systems Impacts

None

7 Relevant Objectives

Impact of the modification on the Relevant Objectives:	
Relevant Objective	Identified impact
a) Efficient and economic operation of the pipe-line system.	None
b) Coordinated, efficient and economic operation of (i) the combined pipe-line system, and/ or (ii) the pipe-line system of one or more other relevant gas transporters.	None
c) Efficient discharge of the licensee's obligations.	None
d) Securing of effective competition: (i) between relevant shippers; (ii) between relevant suppliers; and/or (iii) between DN operators (who have entered into transportation arrangements with other relevant gas transporters) and relevant shippers.	Positive
e) Provision of reasonable economic incentives for relevant suppliers to secure that the domestic customer supply security standards… are satisfied as respects the availability of gas to their domestic customers.	None
f) Promotion of efficiency in the implementation and administration of the Code.	None
g) Compliance with the Regulation and any relevant legally binding decisions of the European Commission and/or the Agency for the Co-operation of Energy Regulators.	None

Implementation of the proposed Modification has a positive impact on the Relevant Objective (d) securing of effective competition between relevant shippers.

The Modification enables the SAGE Terminal Operator to commence a terminal rationalisation programme and retire equipment which has limited utilisation based on forecast throughout and gas composition. As a consequence, unit operating costs will be reduced and the economic life of the SAGE Terminal extended. This in turn will continue to secure effective competition between shippers for access to SAGE as a cost efficient sub-terminal at St Fergus, and promote the development of remaining gas reserves and resources in both the UKCS and Norwegian sector of the North Sea.

8 Implementation

Implementation is required by 30 June 2021. As Self-Governance procedures are proposed, implementation could be sixteen business days after a Modification Panel decision to implement, subject to no Appeal being raised; ie: if a decision to implement is issued by 15 June 2021. This would enable the SAGE Terminal Operator to commence the process of isolation and retiring the Treatment Train, including the execution of the necessary engineering works, ahead of the winter months in 2021.

No implementation costs for other industry parties are anticipated.

9 Legal Text

Text Commentary

As this is an enabling Modification, no UNC legal text is required.

10 Recommendations

Proposer's Recommendation to Panel

Panel is asked to:

- Agree that self-governance procedures should apply
- Refer this proposal to a Workgroup for assessment.