

UNC Modification	At what stage is this document in the process?
<h1 data-bbox="132 320 657 412">UNC 0780:</h1> <h2 data-bbox="132 450 1139 663">Amendment to Gas Quality NTS Entry Specification at the St Fergus SAGE System Entry Point</h2>	<div data-bbox="1209 309 1468 627"> <div>01 Modification</div> <div>02 Workgroup Report</div> <div>03 Draft Modification Report</div> <div>04 Final Modification Report</div> </div>
<p>Purpose of Modification:</p> <p>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.</p>	
<p>Next Steps:</p> <p>The Proposer recommends that this Modification should be:</p> <ul style="list-style-type: none"> subject to Self-Governance assessed by a Workgroup <p>This Modification will be presented by the Proposer to the Panel on 19 August 2021. The Panel will consider the Proposer's recommendation and determine the appropriate route.</p>	
<p>Impacted Parties:</p> <p>High:</p> <p>Low: Transporters, Shippers and Consumers</p> <p>None:</p>	
<p>Impacted Codes:</p> <p>None</p>	

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Timetable

Pre-Modification discussion	05 November 2020
Date Modification raised	11 August 2021
New Modification to be considered by Panel	19 August 2021
First Workgroup meeting	07 September 2021
Workgroup Report to be presented to Panel	18 November 2021
Draft Modification Report issued for consultation	19 November 2021
Consultation Close-out for representations	10 December 2021
Final Modification Report available for Panel (at short notice)	14 December 2021
Modification Panel decision	16 December 2021

 Any questions?

Contact:
**Joint Office of Gas
Transporters**



enquiries@gasgovvernance.co.uk

 0121 288 2107


Proposer:
Eric Marston
SAGE North Sea
Limited



eric.marston@ancalamidstream.co.uk

 07748 776602

Transporter:
Rachel Hinsley
National Grid

 rachel.hinsley1@nationalgrid.com

 07811 762440

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 6mol% subject to a cap on aggregate CO₂ and N₂ at 7mol% until the end of Gas Year 2026/2027 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 CO₂ 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 CO₂ 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 CO₂ removal using the two treatment trains. Today, the CO₂ 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 2026/2027 Gas Year. One treatment train has already been retired from service (some 5 years ago) and the remaining treatment train remains on standby for offshore unplanned shutdowns (estimated at 5 events per annum), which could generate short term excursions of up to between 5.5 and 6 mol% for a period of some 48 hours.

The SAGE Terminal operator now proposes to retire the second treatment train from service end 3Q 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:

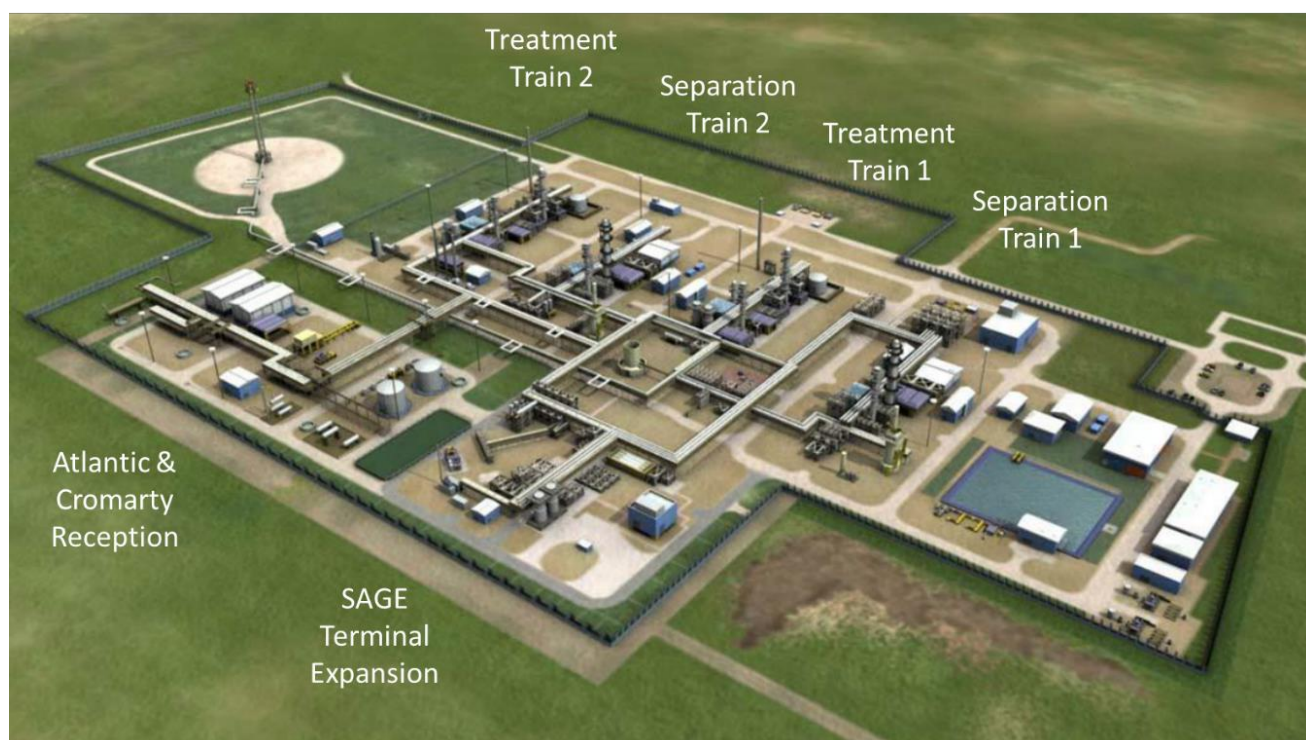
- (aa) **Existing or future gas consumers.** The dilution from low CO₂ gas from the SEGAL sub-terminal and Norway through the Vesterled pipeline will result in gas being exported into the NTS which remains within the UNC limit of 4 mol%. It is noted that there is the possibility of CO₂ of up to 5.5% from the NSMP terminal as a result of unplanned shutdowns associated with offshore shippers. However, the likelihood of this occurring coincident with an unplanned shutdown 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 6 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 CO₂ content of between 5.5 and 6 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 or below 7 mol%. 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 CO₂ 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 CO₂ fields.

Requested Next Steps

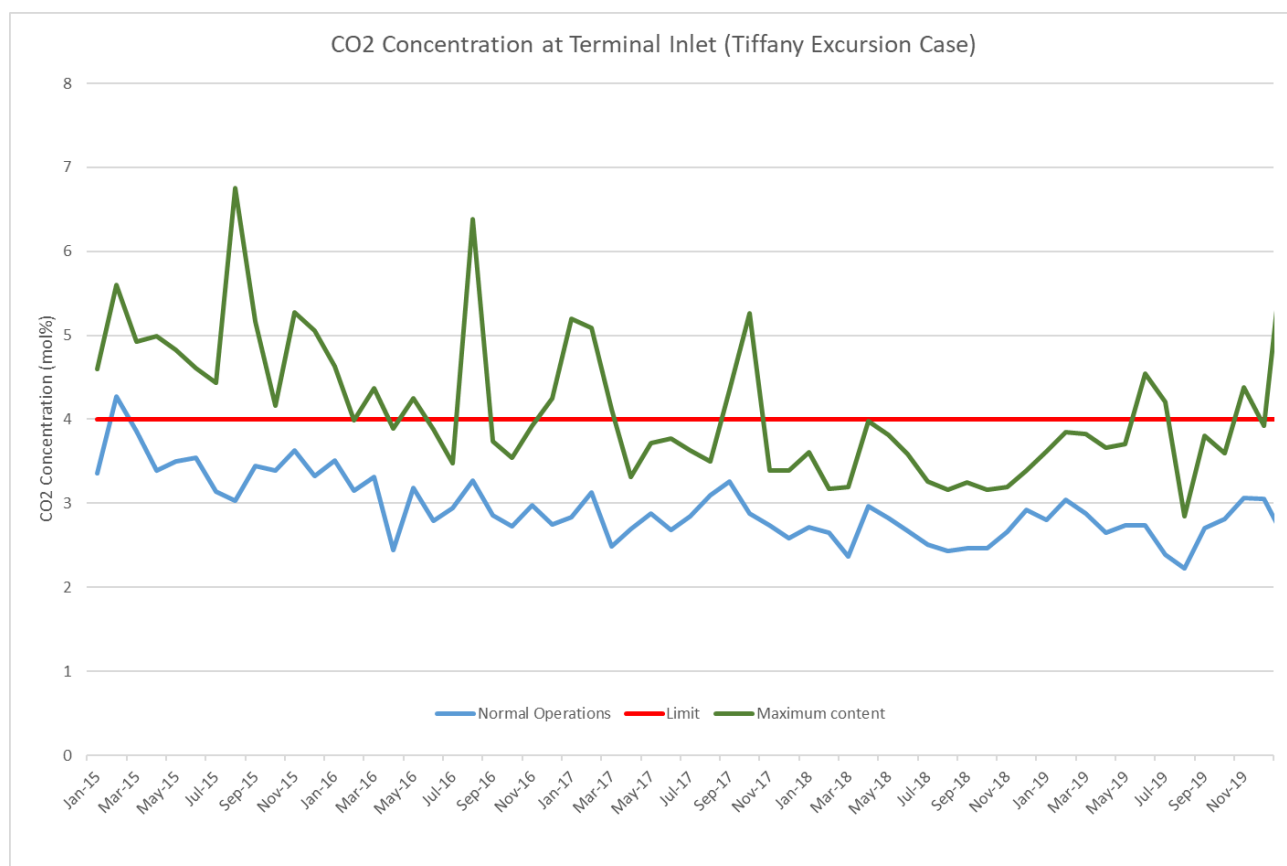
This Modification should:

- be considered a non-material change and subject to Self-Governance.
- be assessed by a Workgroup.

3 Why Change?



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 CO₂ removal using the two treatment trains. Today, the CO₂ 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 2026/2027 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 unplanned shutdowns which could generate short term excursions between 5.5 and 6 mol% for a period of some 48 hours. The following illustration shows the decreasing CO₂ content during normal operations over the last five years.



Terminal Efficiency and Longevity

The SAGE terminal operator now proposes to retire components of the second treatment train from service from 2022 onwards as part of an overall terminal rationalisation project. In doing so, terminal emissions will be reduced by up to 28%. Furthermore, terminal unit costs will also 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 CO₂ 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

Relevant Modification UNC 0607: Amendment to Gas Quality NTS Entry Specification at the St Fergus NSMP System Entry Point, Version 1, 19 October 2017. <https://www.gasgovernance.co.uk/0607>

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 CO₂ upper limit for gas delivered from the SAGE Sub-Terminal System Entry Point into the National Transmission System to 6 mol% from the current limit of 4 mol%, subject to a cap on total inert (CO₂ and N₂) at 7 mol%, through to the end of the Gas Year 2026/2027 and with any continued relaxation in specification beyond that date subject to an objective test for continued requirement.

No change to the text of the UNC is required since this is an enabling Modification in accordance with UNC Transportation Principal Document Section I 2.2.3 (a).

6 Impacts & Other Considerations

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

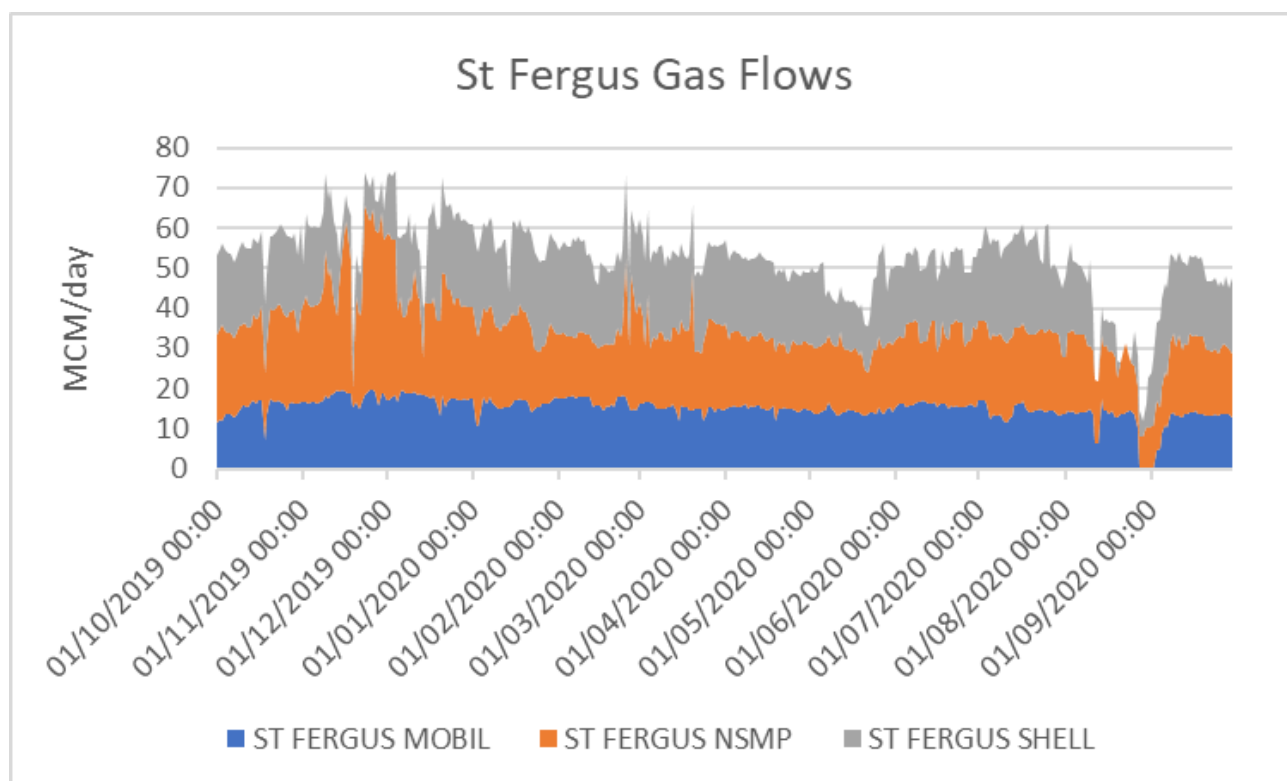
No

Impacts of Modification

Consumers currently receive gas with a CO₂ 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 and CO₂ content of gas entering the NTS at St Fergus has been undertaken by SNSL based on flowrates over the last 18 months. This is illustrated in the following graph and summarised in the following pages.

To complement this assessment, a penetration analysis has also been undertaken by National Grid which illustrates the impact of the proposed modification. A copy of the analysis is provided alongside this modification proposal. This suggests a degree of CO₂ penetration into the NTS of between 4.0 and 4.8 mol%, assuming that the SAGE Terminal is flowing at 6 mol% coincident with the NSMP Terminal flowing at 5.5 mol%.

The basis and likelihood of this scenario is considered further below.



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

A detailed analysis of the CO₂ and total inert content exported into the NTS from the SAGE Terminal, assuming retiral of the remaining treatment train, has 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 shipper unplanned shutdowns 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 CO₂ 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 CO₂ slug of gas. When East Brae starts-up again, this high CO₂ slug is further compressed before dilution with gas from other shippers. The consequence is a circa 48-hour excursion with a maximum of between 5.5 and 6 mol% CO₂ and an estimated frequency of five 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 CO₂ content from the three respective sub-terminals at St Fergus, assuming that this UNC modification is approved are summarised in the following table:

CO ₂ 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	6.0%	2.7%	2.0%
CO ₂ High SAGE	6.0%	4.0%	2.0%
CO ₂ High NSMP	4.0%	5.5%	2.0%
CO ₂ High NSMP and High SAGE	6.0%	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 CO₂ 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%	3.2%	3.9%	4.2%	4.6%
Average Flowrates	3.3%	3.4%	3.9%	3.9%	4.5%

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 CO₂ excursion from the NSMP terminal as well as a high CO₂ excursion from the SAGE Terminal. The overall CO₂ content entering the grid in this instance is predicted to reach between 4.5 and 4.6 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 CO₂ event, likely 48 hours ahead of the high CO₂ 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 CO₂ 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 CO₂ gas into the grid as appropriate.

Impact on Greenhouse Gas Emissions

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 94,000 tonnes per annum to 67,000 tonnes per annum. Based on the Shipper unplanned shutdown scenarios described above, the treatment train is only required to remove an estimated 3,000 tonnes of CO₂ per annum from the SAGE pipeline gas.

Consumer Impacts

Based on the analysis undertaken to date, including a penetration analysis undertaken by National Grid and complemented by an assessment of the likelihood of CO₂ penetration into the NTS of between 4.0 and 4.8 mol%, the proposed modification is considered no have no impact on consumers other than positive benefits as detailed below.

What is the current consumer experience and what would the new consumer experience be?

Positive benefits on both current consumers as well as any new consumers are detailed in the following table:

Impact of the change on Consumer Benefit Areas:	
Area	Identified impact
<p>Improved safety and reliability</p> <p>The SAGE Terminal is a top tier COMAH site. The modification will facilitate the rationalisation of under-utilised hydrocarbon plant and equipment at the SAGE Terminal which in turn will reduce the process safety risk associated with the operation.</p>	Positive
<p>Lower bills than would otherwise be the case</p> <p>No impact</p>	None
<p>Reduced environmental damage</p> <p>The modification will facilitate a reduction in total CO₂ emissions to atmosphere from the SAGE Terminal whilst continuing to process and transport gas into the UK grid as a transitional fuel and consistent with the UK's net zero agenda.</p>	Positive
<p>Improved quality of service</p> <p>The proposed modification will have no impact on the ability of the SAGE Terminal to continue processing and transporting as into the NTS.</p>	None

<p>Benefits for society as a whole</p> <p>The modification will support the continued economic life of the SAGE Terminal and as a consequence, continued security of supply of gas into the UK during a transitional period.</p>	<p>Positive</p>
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Cross Code Impacts

None

EU Code Impacts

None

Central Systems Impacts

None

7 Relevant Objectives

Impact of the Modification on the Transporters' 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 16 December 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. This would enable the SAGE Terminal Operator to commence the process of isolating and retiring component parts of the treatment train in early 2022 and reduce the environmental impact of the train as the first priority.

No implementation costs for other industry parties are anticipated.

9 Legal Text

No change to the text of the UNC is required since this is an enabling Modification in accordance with UNC Transportation Principal Document Section I 2.2.3 (a).

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.