






UNC Final Modification Report	At what stage is this document in the process?
<h1>UNC 0780:</h1> <h2>Amendment to Gas Quality NTS Entry Specification at the St Fergus SAGE System Entry Point</h2>	<div style="display: flex; flex-direction: column; gap: 5px;"> <div style="border: 1px solid #ccc; border-radius: 5px; padding: 5px; display: flex; align-items: center; gap: 5px;"> 01 Modification </div> <div style="border: 1px solid #ccc; border-radius: 5px; padding: 5px; display: flex; align-items: center; gap: 5px;"> 02 Workgroup Report </div> <div style="border: 1px solid #ccc; border-radius: 5px; padding: 5px; display: flex; align-items: center; gap: 5px;"> 03 Draft Modification Report </div> <div style="border: 1px solid #ccc; border-radius: 5px; padding: 5px; display: flex; align-items: center; gap: 5px;"> 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 Panel determined that this Modification should be sent for Authority Direction.</p>	
<p>Impacted Parties:</p> <p>Low: Transporters, Shippers and Consumers</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	20 January 2022		
Draft Modification Report issued for consultation	21 January 2022		
Consultation Close-out for representations	11 February 2022		
Final Modification Report available for Panel (at short notice)	14 February 2022		
Modification Panel decision	17 February 2022		

1 Summary

What

This proposed Modification seeks to enable a temporary increase in the carbon dioxide (CO₂) 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 CO₂ limit from 4.0 mol% to 6.0 mol% subject to a cap on total inerts (CO₂ and N₂) at 7.0 mol% until the end of Gas Year 2026/2027. To allow for future re-evaluation of the CO₂ blending at St Fergus, such as to extend a similar relaxation to another party should it be requested, it is proposed that this increase will be subject to a 2 year cancellation period that can be invoked as explained in the Solution section. This period will allow the SAGE facility to reinstate its CO₂ removal facilities if necessary.

In addition, the Modification will be subject to an annual confirmation of a continued requirement. This will take the form of a review, submitted by the SAGE terminal operator to National Grid NTS, showing the actual usage of the specification relaxation, and demonstrating a continued credible threat of high CO₂ pipeline upset situations.

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 4 mol% 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 treatment to remove the CO₂ before entry into the National Grid. This was achieved through the use of two amine absorption-based treatment trains operating in parallel.

Today, gas flow rates through the SAGE Terminal are below the original nameplate capacity. Production rates from Beryl, Brae and Tiffany have reduced whilst sources of sweeter gas from fields including Britannia as well as developments in the Norwegian sector such as Alvheim, Edvard Greig and Ivar Aasen have increased. Typically, 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. As a consequence, the SAGE Terminal no longer requires continual CO₂ removal for the remainder of the life of the facility. One treatment train has already been retired from service and the remaining treatment train remains on standby for intermittent use for unplanned platform shutdowns.

The SAGE Terminal operator now proposes to mothball the remaining treatment train as part of an overall terminal rationalisation project. In so doing, terminal unit costs and carbon emissions 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:

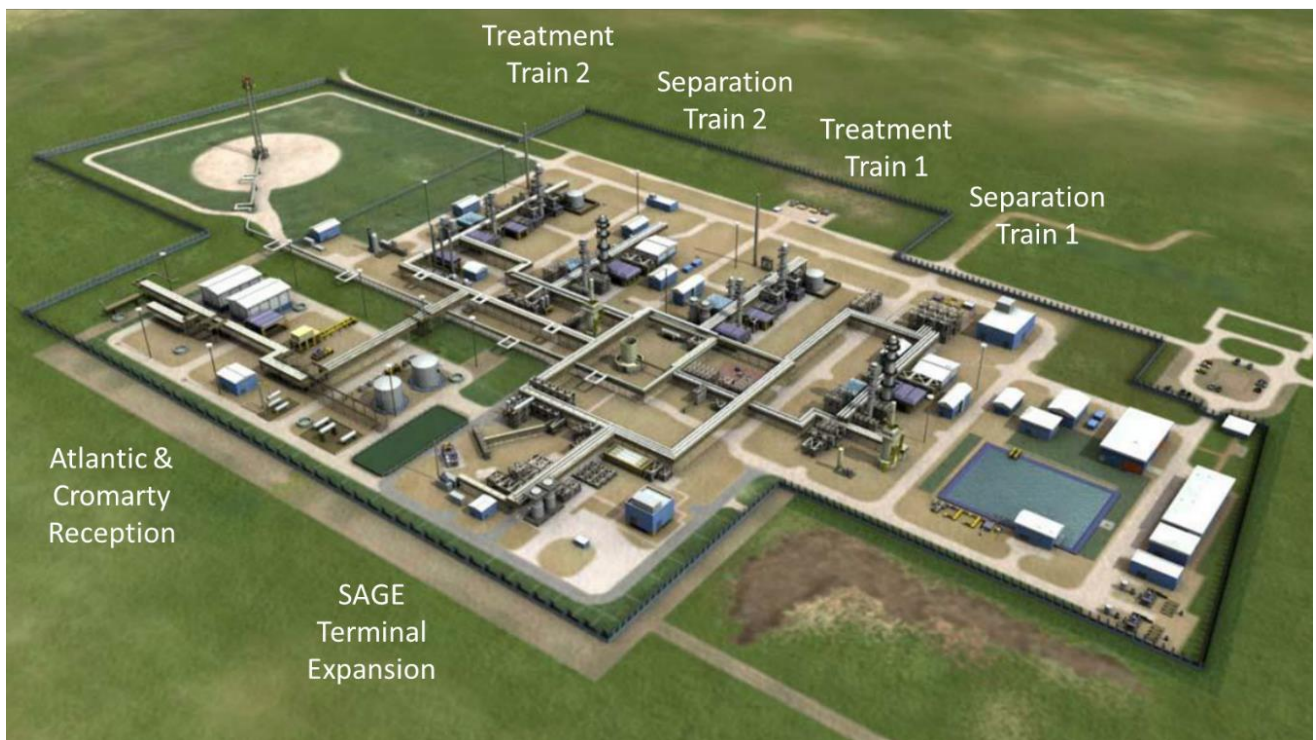
- (aa) Existing or future gas consumers.** The dilution from low CO₂ gas from the SEGAL sub-terminal and Norway through the Vesterled pipeline will result in gas being exported into the NTS which remains within the UNC limit of 4 mol%. It is noted that there is the possibility of CO₂ of up to 5.5 mol% 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% 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 6.0 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:

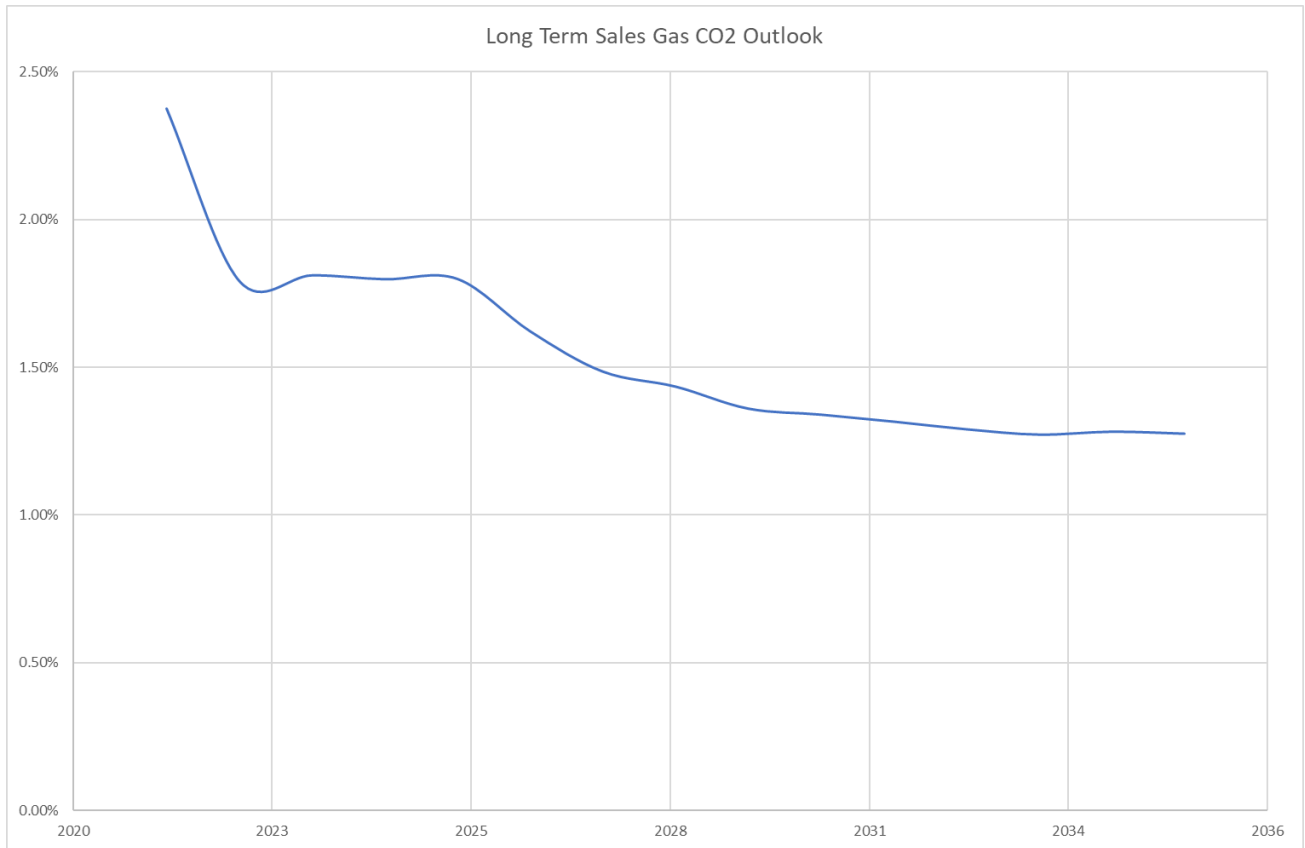
- be considered a non-material change and subject to Self-Governance.
- proceed to Consultation.
- The Modification Panel determined that this Modification should be sent for Authority Direction as the potential shifting of carbon emissions (and potential associated costs) between affected parties could be considered to be an impact on existing or future consumers.

3 Why Change?



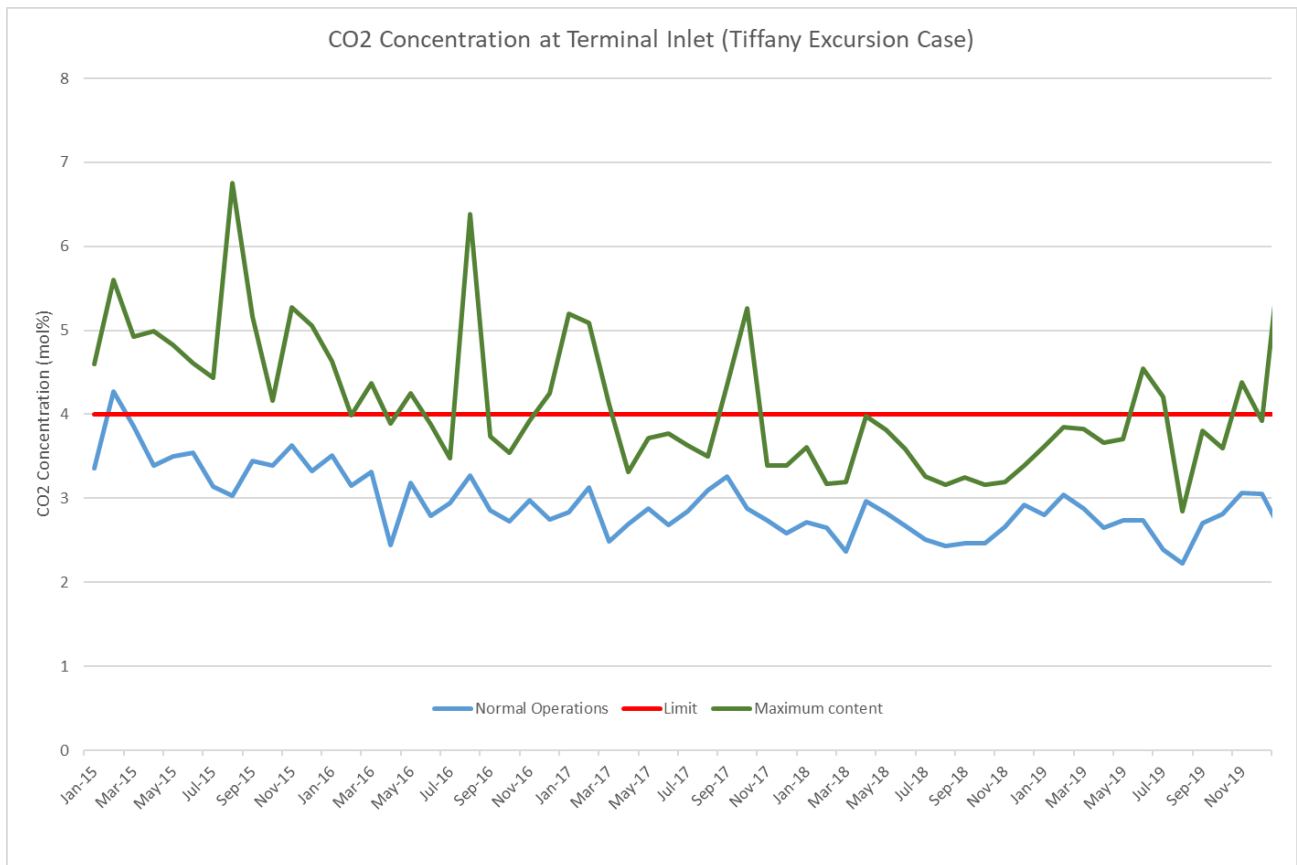
The original design of the SAGE facility included two identical amine absorption-based acid gas treatment trains each designed to remove around 1200 tonnes per day of CO₂. The acid gas stream was incinerated to oxidise H₂S and then vented to atmosphere. At design rates, each train consumes approximately 15 MW of fuel gas and 3 MW of electrical power.

At the present time, gas flow rates through the SAGE Terminal are below original nameplate capacity. Production from Beryl, Brae and Tiffany have reduced whilst rates from sweet gas fields including Britannia as well as developments in the Norwegian sector such as Alvheim, Edvard Greig and Ivar Aasen have increased. 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 was retired from service 6 years ago.



However unplanned platform outages can result in flow disturbances and short duration composition spikes on the pipeline. Some of these events can require short term CO₂ removal to maintain the sales gas within the 4% CO₂ specification. Typically, these excursions occur around five times per year, last less than 48 hours and would otherwise result in a sales gas CO₂ concentration of 6 mol% or less if not treated. The remaining treatment train has therefore been maintained for intermittent use to treat these spikes.

The blue line on the following chart shows the decreasing CO₂ content that has been experienced over the last five years. The green line shows the potential CO₂ levels that could be created should one of the potential upset scenarios occur – here a Brae outage where Tiffany gas fills the Brae pipeline and then enters the SAGE pipeline at Brae rates. In such a scenario, the blue line would spike up to the green line for a short period of time.



The annual combined CO₂ removed is usually around 1000 tonnes per year or less. This represents less than 0.25% of the design 400,000 tonnes per year removal capacity of each treatment train and less than 0.5% of the normal 200,000 tonnes per year of CO₂ exported within the current specification.

In addition to the ongoing operation and maintenance costs, this mode of operation is extremely inefficient from an energy and emission perspective.

Firstly, there is the inefficiency that results operating such large capacity equipment at low rates with limited turndown. Secondly there are inefficiencies that result from the intermittent operation – a significant proportion of the time the unit is in warm standby or in warm-up where the power usage is at normal levels whereas the CO₂ removal is nil. Thirdly it is often the case that the train is brought online as a precaution and not usefully used. The net effect of all these inefficiencies is that the CO₂ emitted directly as a result of fuel gas consumption or indirectly as a result of electricity consumption is far greater than the CO₂ that is removed. This is illustrated in the following chart.



For example, in 2020 more than 12000 tonnes of CO₂ were emitted to remove (and emit) 400 tonnes of CO₂. To date this year only 74 tonnes of CO₂ have been removed.

It is therefore proposed that SAGE be allowed to export this small quantity of CO₂ into the NTS by relaxing the specification to 6 mol%.

Terminal Efficiency and Longevity

The SAGE Terminal operator proposes to use this UNC modification to retire from service and mothball the second treatment train as part of an ongoing terminal rationalisation effort. Mothballing allows for a future revocation of this Modification and allows future reuse opportunities to be explored before decommissioning.

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. 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.

To allow SAGE to transition the treatment train and its associated utilities into a properly preserved and zero energy & emission mothballed state, it is necessary to obtain a specification relaxation with a validity period greater than the time it would be necessary to recommission the train. To avoid sterilising CO₂ capacity, this period should also be less than the typical development time necessary for which another party may need such a relaxation. SAGE believes that a period of 2 years would achieve both these goals.

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 footprint 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. The 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 6.0 mol% from the current limit of 4.0 mol%, subject to a cap on total inerts (CO₂ and N₂) at 7.0 mol% and through to the end of the Gas Year 2026/2027.

It is proposed that National Grid NTS shall be permitted to reduce the CO₂ limit at the St Fergus SAGE System Entry Point to a level between 4.0 mol% and 6.0 mol% with a 2 year notice period if:

- (a) another UNC Modification(s) is raised that seeks to increase the CO₂ limit at another NTS System Entry Point that National Grid NTS would be unable to accommodate without incurring material cost; and/or
- (b) if in the reasonable opinion of National Grid NTS, the 6.0mol% CO₂ limit has had a material adverse impact on the operation of any NTS compressor and/or the determination of emissions from an NTS compressor

In addition, the modification will be subject to an annual demonstration of a continued requirement. This will take the form of a review submitted to National Grid NTS by the St Fergus SAGE terminal operator for each year within the time period for which this Modification applies, showing the actual usage of the specification relaxation, and demonstrating the continued credible threat of high CO₂ pipeline upset situations. Further, the SAGE terminal operator shall use its reasonable endeavours to notify National Grid NTS if it expects an increase in CO₂ beyond 4 mol% to occur in the gas it delivers at St Fergus.

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?

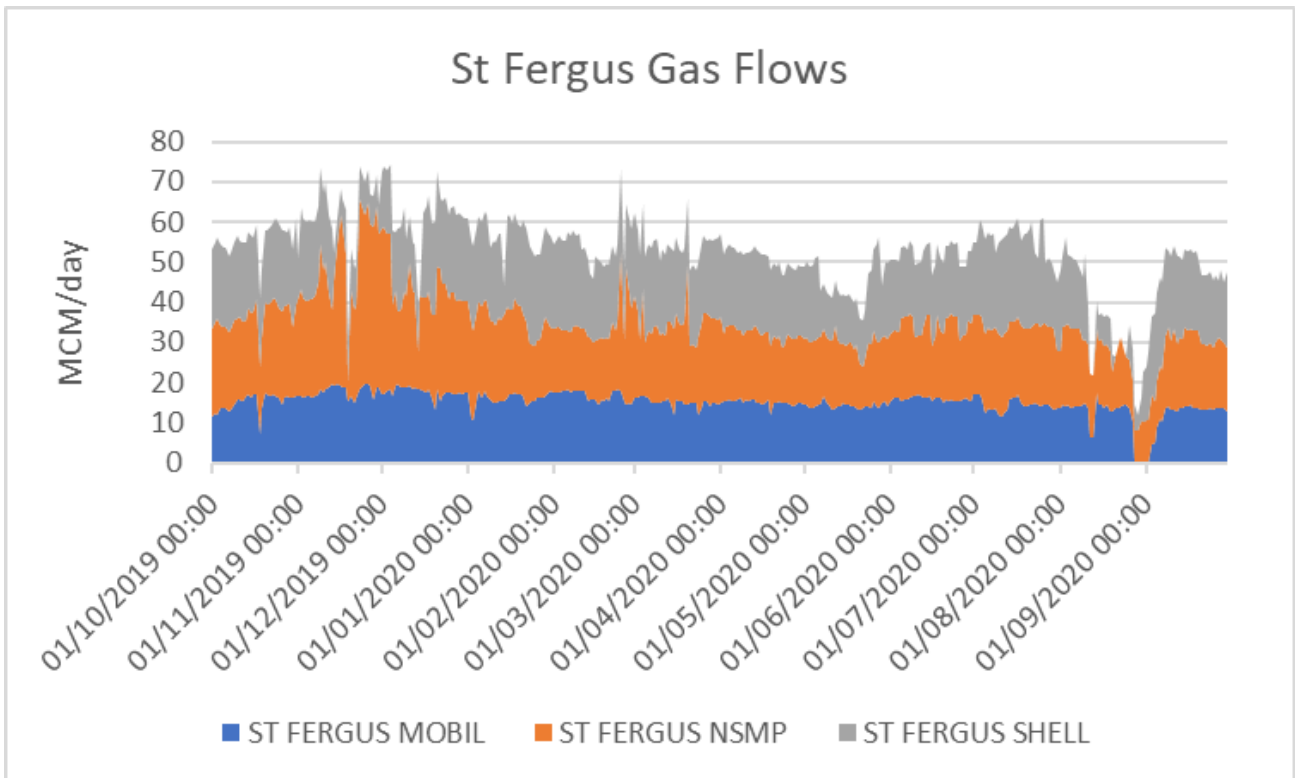
No

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.

National Grid NTS Assessment

Impact on NTS Compressor Operability

When a 'slug' of high CO₂ gas is received at St Fergus, that would result in a reduction in calorific value of the gas. If changes in the CV of the fuel gas for compressors are sufficiently material and occur over a short period then there is a risk to the operability of the units. National Grid NTS has worked with the proposer to establish the likely drop in CV in a high CO₂ event (elevating from 2.5mol% to 6mol%) and, given the reasonable expectation of comingling with other St Fergus supplies and a low likelihood of a coincident high CO₂ event from the NSMP terminal, National Grid NTS expects such an event to reduce the CV of gas leaving St Fergus by ~0.4 MJ/m³, if constant CVs are assumed from the Shell and NSMP terminals which would not be of a sufficient magnitude to impact the operability of NTS compressors further downstream. Without this comingling effect, if the flow from the SAGE terminal were to enter the NTS directly then the resulting CV reduction of ~1.5 MJ/m³ could be sufficiently material to impact NTS compressor operation. This calculation assumes that Ancala take no mitigating action to limit the CV reduction which would be possible by changing the operation of the natural gas liquids (NGLs) plant.

Impact on Compressor Emissions Models

National Grid NTS employs the use of predictive models in order to determine its emissions from compressors. These models are set up based on the gas quality at the time of the emissions test and therefore if gas quality on a day is materially different, such as may be the case in a temporary high CO₂ event, the accuracy of these models could be impacted. Since National Grid NTS cannot test this particular gas quality in isolation, the Proposer has agreed at National Grid NTS' request, should this Modification be implemented, to endeavour to notify National Grid NTS in advance that a high CO₂ event is expected in order that the impact on these emissions models can be monitored. It is noted that blending of such high CO₂ gas with other supplies within the National Grid St Fergus terminal should again help to mitigate any impact.

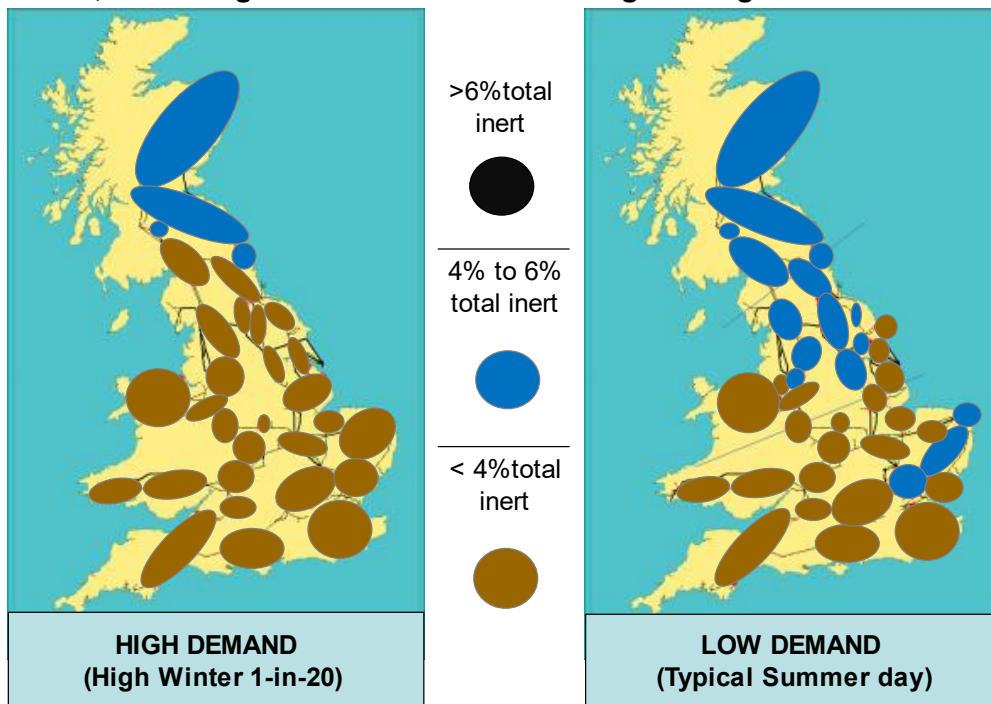
Impact on Total Inerts

National Grid NTS also conducted further analysis to assess the potential impact on total inerts within the network. The selected scenario was to assume gas flows on a summer day and winter day with all terminals flowing at their contractual CO₂ limits, (SAGE flowing at 6% CO₂) and at their historical 12 month average nitrogen content. This network analysis showed that 6% total inerts was not expected to be breached in any part of the network which further supports the view that compressor operation is not expected to be impacted, providing that there is adequate comingling within the National Grid terminal. (Heat maps attached for inclusion in WG report also).

Hydrogen Strategy

National Grid NTS had a further concern that an obligation to accept up to 6% CO₂ from the SAGE terminal may act as a barrier to the future potential injection of hydrogen at St Fergus if the combination of these gases meant that the lower limit for Wobbe Index could not be met. However, given that the proposal will result in a return to the current 4% limit by the end of Gas Year 2026/27 at the latest, National Grid NTS considers it unlikely that this concern will materialise.

Varying levels of total Inert content, assuming 6% CO₂ at ANCALA, 5.5% CO₂ at NSMP, and shipper CO₂ maximums currently at all other supply terminals, added together with 12 month average Nitrogen levels.



Impact on Greenhouse Gas Emissions

The remaining treatment train at the SAGE Terminal requires ongoing operation in order to 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 to 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>	Positive

Workgroup Assessment

The Workgroup of 22 November reviewed this table and made the following comments;

Lower bills than would otherwise be the case

A Workgroup Participant commented that there may be a positive benefit for consumers resulting in lower bills if the costs for processing of gas through the SAGE terminal is reduced. A Workgroup Participant acknowledged that this may be theoretically possible but that the materiality may be too small to be noticed.

Reduced environmental damage

A Workgroup Participant noted that although the emissions of CO₂ at the terminal could be reduced following implementation the modification, the CO₂ that is no longer extracted from the line-gas would pass to consumers and that their emissions of CO₂ would be consequentially higher. Workgroup Participants noted the analysis in the proposal (section 3 above) which illustrates that the avoided emissions at the terminal may greatly outweigh any increased emissions by consumers.

Workgroup Participants also noted that the potential excursions in gas quality are forecast to be low probability and for short durations; in general, the trend for gas quality is that the CO₂ content will be lower in coming years.

The Workgroup meeting on 6 January considered the additional revocation rights requested by National Grid under clause b) of the proposed solution that may be triggered in the event of *'material adverse impact on the operation of any NTS compressor and/or the determination of emissions from an NTS compressor'*.

Some Workgroup Participants expressed a concern that if there was a risk to the operation of NTS equipment then the same risks might be faced by other operations of similar equipment, e.g. CCGT generators or Users with compression. Workgroup Participants noted that the scenario presented in the analysis presented a 'worst case' and the likely ability for the relevant operators to predict a simultaneous occurrence of a high CO₂ 'slug' of gas and the SAGE terminal being the only or predominant feed into St Fergus terminal. Workgroup Participants suggested that should such events occur then there would be a reasonable expectation that the terminal operators would communicate with National Grid and that National Grid would, if the occurrence was likely to cause gas quality issues downstream, issue an alert to users, such as those provided for other operational matters via ANS.

Cross Code Impacts

None

EU Code Impacts

None

Central Systems Impacts

None.

Workgroup Participants did not disagree with these assessments.

7 Relevant Objectives

Impact of the Modification on the Transporters' Relevant Objectives:

Relevant Objective	Identified impact
a) Efficient and economic operation of the pipe-line system.	Positive
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 Relevant Objective (a) *Efficient and economic operation of the pipe-line system* and 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.

Workgroup comments

The Workgroup on 22 November identified that arguments for relevant objective a) should be related to any potential effect on the operation of the NTS. A Workgroup Participant argued that continued availability of gas through the SAGE terminal may have the consequential effect that the operational life of NTS assets is prolonged thereby yielding a benefit. Furthermore, that the continued availability of a diverse range of input sources may assist operation of the NTS.

In respect of relevant objective d) a Workgroup Participant argued that maximisation of the supply of gas through the SAGE terminal could make available more gas and that this could help facilitate competition between shippers.

A Workgroup Participant argued that a relaxation of the gas quality limits for SAGE alone may have the effect of diminishing competition between gas terminals. This may arise because other upstream operators may continue to have costs for treatment of gas to meet NTS entry specifications and thus may have a cost burden that make their supply less attractive thereby reducing competitive choice. It was noted that Network Entry Agreements are bilaterally agreed and that the precise limits are subject to bilateral discussions. Previous agreements for varying gas quality parameters have been assessed on the merits. Some Workgroup Participants felt that greater transparency of the agreed limits may be helpful.

The Workgroup noted the proposed solution includes the possibility that the relaxation may be reconsidered and may be withdrawn if another network code modification proposal seeks a gas quality relaxation that cannot be economically accommodated by National Grid whilst the facility granted by this proposal remains active.

8 Implementation

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 Consultation

Panel invited representations from interested parties on 20 January 2022.

All representations are encompassed within the Appended Representations section.

The following table provides a high-level summary of the representations. Of the 3 representations received 2 supported implementation and 1 provided comments.

Representations were received from the following parties:

Organisation	Response	Relevant Objectives
Ancala Midstream Acquisitions Limited	Support	a) positive d) positive
National Grid NTS	Support	a) neutral d) positive
SSE	Comments	Positive

Please note that late submitted representations will not be included or referred to in this Final Modification Report. However, all representations received in response to this consultation (including late submissions) are published in full alongside this Report and will be taken into account when the UNC Modification Panel makes its assessment and recommendation.

11 Panel Discussions

Discussion

The Independent UNC Panel Chair summarised that Modification 0780S would 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.

Panel Members considered the representations made noting that, of the 3 representations received 2 supported implementation and 1 provided comments.

Panel Members noted the points made by the respondents and the Proposer that this Modification would facilitate continued utilisation of the SAGE terminal and contribute to a net reduction in carbon dioxide emissions if viewing the total emissions from the terminal and by Users. It was noted that facilitating supplies through the SAGE terminal may contribute to maintaining diversity of gas supplies into the NTS.

Panel Members noted that National Grid reserves a right to revert to the current gas quality limits for the SAGE terminal in the event that there are operational problems on the NTS or if another terminal operator seeks a similar gas quality relaxation and furthermore, that in this respect the Modification was similar to the previous, similar accommodation granted under Modification 0607. The Proposer pointed out that the short-term operational risks have been assessed (see above under **National Grid NTS Assessment**) and concluded that the likelihood is very low and that mitigating actions would be available.

Panel Members noted the comments provided by SSE that an increase in the proportion of carbon dioxide in the NTS might lead to potential problems with gas storage assets but that the analysis undertaken indicates that there is unlikely to be any adverse consequence for the assets operated by SSE in respect of the specific relaxation in gas quality limits permitted by this Modification.

Panel members noted the request that implementation be made as soon as possible.

Some Panel members were concerned that carbon dioxide emissions would potentially increase for End Users if the higher levels of CO₂ are not removed at the SAGE terminal. Panel Members considered the counterpoint made in the Modification Impact Assessment (see above under **Impact on Greenhouse Gas Emissions**) that the reduction in CO₂ emissions at St Fergus would potentially be far greater than the increase in emission by End Users. Some Panel Members stated that the potential shifting of carbon emissions (and potential associated costs) between affected parties would lead to the Modification proposal falling into the criteria for Authority Direction as this could be considered to be an impact on existing or future consumers.

Consideration of the Relevant Objectives

Panel Members considered relevant objective a) Efficient and economic operation of the pipe-line system, agreeing that implementation would have a positive impact because continued availability of gas through the SAGE terminal may have the consequential effect that the operational life of NTS assets is prolonged thereby yielding a benefit. Furthermore, that the continued availability of a diverse range of input sources may assist operation of the NTS.

Panel Members considered relevant objective *d) Securing of effective competition between Shippers and/or Suppliers*, agreeing that implementation would have a positive impact because maximisation of the supply of gas through the SAGE terminal by extending the economic life of the operator's assets could make available more gas and that this could help facilitate competition between shippers.

Determinations

Panel Members voted unanimously that Modification 0780S does not have an SCR impact.

Panel Members voted with 11 votes (of a possible 14) that no new issues were identified as part of consultation.

Panel Members voted with 12 votes in favour (out of a possible 14), that Modification 0780 should follow Authority Direction procedures.

Panel Members voted with 6 votes in favour of implementation (out of a possible 14), and therefore the Panel did not recommend implementation of Modification 0780.

12 Recommendations

Panel Determination

Panel Members agreed that Modification 0780 should be submitted for Authority Direction

Panel Members did not recommend implementation.

13 Appended Representations

Representation - Ancala Midstream Acquisitions Limited

Representation - National Grid NTS

Representation - SSE

Representation - Draft Modification Report UNC 0780S

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

Responses invited by: 5pm on 11 February 2022

To: enquiries@gasgovernance.co.uk

Please note submission of your representation confirms your consent for publication/circulation.

Representative:	Angela Fletcher
Organisation:	Ancala Midstream Acquisitions Limited (Ancala Midstream)
Date of Representation:	11 February 2022
Support or oppose implementation?	Support
Relevant Objective:	<p>a) Positive</p> <p>d) Positive (i) between relevant shippers and (ii) between relevant suppliers and (iii) between DN operators (who have entered into transportation arrangements with other relevant gas transporters) and relevant shippers.</p>
Relevant Charging Methodology Objective:	Not Applicable

Reason for support/opposition: Please summarise (in one paragraph) the key reason(s)

The proposed modification will enable efficient and economic operation of the pipeline system (Relevant Objective (a)) by maximising the delivery of gas from the SAGE Terminal into the NTS and supporting reduction in the cost of and scope 1 emissions from oversized and redundant equipment. The modification supports both Central Obligations of the Oil & Gas Authority's Strategy; (i) to secure that the maximum value of economically recoverable petroleum from the United Kingdom continental shelf and reduce emissions from oil and gas assets. Analysis undertaken during the modification process has demonstrated that infrequent CO2 excursions can be accommodated with minimal impact on gas quality. National Grid has confirmed that it has risk assessed the impact of the rate of change of gas quality and found it acceptable even in the most pessimistic scenario provided by SAGE North Sea. SAGE North Sea has identified several options to reduce the rate of change of CO2 concentration and enable real time monitoring and automated response. The risk of disruption is negligible. This modification secures effective competition between suppliers and terminal operators and the reliable delivery of gas to UK consumers. UNC Modification 0607 was granted in relation to the NSMP terminal at St Fergus on a related basis. Granting of this modification ensures that there is no discrimination between terminal operators at St Fergus. Analysis confirms that there will be negligible emissions for domestic or industrial consumers as a result of this Modification. The modification will

support removal of scope one emissions consistent with UK Government objectives in the move to Net Zero.

Self-Governance Statement: *Please provide your views on the self-governance statement.*

Ancala Midstream agree that this modification should be subject to self-governance.

Implementation: *What lead-time do you wish to see prior to implementation and why?*

Ancala Midstream believe there is no reason to delay the implementation.

Impacts and Costs: *What analysis, development and ongoing costs would you face?*

None

Legal Text: *Are you satisfied that the legal text will deliver the intent of the Solution?*

Not applicable in this case.

Are there any errors or omissions in this Modification Report that you think should be taken into account? *Include details of any impacts/costs to your organisation that are directly related to this.*

No.

Please provide below any additional analysis or information to support your representation

Representation - Draft Modification Report UNC 0780S

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

Responses invited by: 5pm on 11 February 2022

To: enquiries@gasgovernance.co.uk

Please note submission of your representation confirms your consent for publication/circulation.

Representative:	Ashley Adams
Organisation:	National Grid NTS
Date of Representation:	25/01/2022
Support or oppose implementation?	Support
Relevant Objective:	a) Neutral d) Positive
Relevant Charging Methodology Objective:	Not Applicable

Reason for support/opposition: Please summarise (in one paragraph) the key reason(s)

National Grid NTS supports this Proposal. The implementation of this proposal, together with the subsequent amendment of the associated Network Entry Agreement (NEA) would enable the SAGE Terminal Operator to commence a terminal rationalisation programme which would reduce unit operating costs and extend the economic life of the SAGE terminal.

National Grid NTS agrees with the Proposer that this would further relevant objective d). We believe that this Proposal would maintain the economic viability of flows of gas through the SAGE terminal potentially prolonging the life of the terminal and its contribution towards a diverse portfolio of supply into the GB market compared with non-implementation, which should serve to enhance effective competition between shippers. We also note the environmental benefits and operational efficiencies within the SAGE terminal that are expected to result from implementation of this Modification.

Arguments in support of relevant objective a) the efficient and economic operation of the pipeline system, should only consider impacts in regard to the NTS and DN networks. Greater efficiency of the terminal's operations would be expected to be realised by the implementation of this Proposal, extending the life of the terminal, and therefore having a small positive impact on the efficient and economic operation of the NTS. However, as detailed in the Workgroup Report, National Grid have identified a small risk to

compressor operability arising from variations in the CV of the fuel gas. We therefore believe that, on balance, the Proposal will have a neutral impact on relevant objective a).

Additionally, allowing a greater latitude in gas quality limits can sometimes enable more gas to be delivered than would otherwise be the case, which makes use of existing infrastructure and in turn promotes the efficient and economic use of the system. However, we do not believe that, in this case, the implementation of the Proposal would necessarily result in more gas being delivered onto the NTS. If it was not to be implemented, we would expect that the CO₂ removal plant at the SAGE terminal would continue to operate intermittently when high CO₂ fields were the dominant supply source resulting in the similar quantities of gas being delivered.

Self-Governance Statement: *Please provide your views on the self-governance statement.*

National Grid NTS supports the application of Self Governance procedures as set out in the Draft Modification Report. We believe that the temporary amendment to the CO₂ limit at the St Fergus SAGE System Entry Point that this Proposal is seeking will not have a material impact on consumers, competition, operation of the pipeline systems, matters relating to sustainable development, safety or security of supply, the management of market or network emergencies, governance procedures, and will not unduly discriminate between different classes of parties to the UNC.

Whilst it will afford shippers delivering gas through the SAGE terminal greater latitude on CO₂ content than at other NTS entry points, we believe that individual requests for changes to gas quality limits at individual NTS entry points should be judged on their own merits. We are satisfied that the temporary nature of the Modification and the competition safeguards within the solution adequately mitigate any competition concerns.

Implementation: *What lead-time do you wish to see prior to implementation and why?*

National Grid NTS does not have any particular lead-time requirement for implementation. As Self-Governance procedures are proposed, following a Modification Panel decision to implement, and subject to no appeal being raised, we would expect to agree the necessary text within the Network Entry Agreement with SAGE North Sea Limited as soon as reasonably practicable thereafter and notify the industry once this had taken place in accordance with UNC TPD section I2.2.6.

Impacts and Costs: *What analysis, development and ongoing costs would you face?*

We do not expect any material additional costs for National Grid NTS associated with implementing this Proposal. However, in the unlikely event that the implementation of this Modification does result in material costs, we are satisfied that the points outlined within the solution allowing National Grid NTS to reduce the CO₂ limit back to a level between 4.0 mol% and 6.0 mol% provide a satisfactory remedy.

Legal Text: *Are you satisfied that the legal text will deliver the intent of the Solution?*

Since this UNC Modification seeks to enable a change to a Network Entry Agreement, we agree with the proposer that no UNC legal text is required in accordance with UNC TPD Section I 2.2.3 (a).

Are there any errors or omissions in this Modification Report that you think should be taken into account? *Include details of any impacts/costs to your organisation that are directly related to this.*

We have not identified any errors or omissions.

Please provide below any additional analysis or information to support your representation

Notification of high CO2 Events:

The SAGE terminal operator has agreed that they will notify National Grid NTS in advance of when a high CO2 event is expected so that we can monitor any impact on our compressor emissions models. We note the request from the Workgroup for such notification to be shared with the industry and are currently considering how this could best be facilitated.

UNC Modifications 0607

We would like to explain our position on this Proposal with reference to UNC Modification 0607 which introduced a 5.5 mol% CO2 limit at the St Fergus NSMP System Entry Point.

National Grid NTS treats each case to change gas quality limits on its own merits with respect to the relevant objectives. The differences between the arrangements outlined in UNC 0607 and UNC 0780S reflect the different requirements of the requesting parties, the reasoning demonstrated, and the impacts identified at the time the request was made.

We supported UNC 0607 in part due to the provision in the NSMP St Fergus NEA to allow National Grid NTS to reduce the CO2 limit at the NSMP St Fergus Entry Point to a level between 4.0mol% and 5.5mol% in the event that another UNC Modification to increase the CO2 limit is approved in respect of another System Entry Point and which National Grid NTS would otherwise be unable to accommodate without incurring material cost.

We believe that the proposed elevated limit at the SAGE subterminal can be facilitated in addition to elevated limit at the NSMP subterminal with minimal risk and without incurring material costs. The implementation of this Proposal is not therefore expected to have any effect on the limits revised through UNC Modification 0607. Although there is no agreed industry approach as to how National Grid NTS should facilitate any sharing of flexibility if it became necessary to do so, we have worked with the Proposer, as we did with the Proposer of UNC 0607, to ensure provision is included within the Proposal for any flexibility to be shared on a non-discriminatory basis if required, should future requests for gas quality limit changes materialise from other parties.

Representation - Draft Modification Report UNC 0780S

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

Responses invited by: **5pm on 11 February 2022**

To: enquiries@gasgovernance.co.uk

Please note submission of your representation confirms your consent for publication/circulation.

Representative:	Jeff Chandler
Organisation:	SSE
Date of Representation:	11/02/22
Support or oppose implementation?	Comments
Relevant Objective:	Positive
Relevant Charging Methodology Objective:	Not Applicable

Reason for support/opposition: Please summarise (in one paragraph) the key reason(s)

A number of modifications have been implemented to allow greater content of CO₂ onto the NTS. In most cases this CO₂ is passed through customer appliances and vented to atmosphere.

In the case of gas storage the CO₂ can react within caverns and create Carbonic formations that can cause rapid corrosion of assets.

It would appear from the modification report that in this case the CO₂ does not extend to the gas Storage assets operated by SSE. However, we continue to monitor the situation in case other terminals increase CO₂ content and directly affect asset condition and therefore lifetime.

Self-Governance Statement: *Please provide your views on the self-governance statement.*

N/A

Implementation: *What lead-time do you wish to see prior to implementation and why?*

N/A

Impacts and Costs: *What analysis, development and ongoing costs would you face?*

If corrosion of assets is accelerated then an economic assessment will need to be made assessing replacement or de-commissioning of those assets given they have been operated in one case since the 1970s.

Legal Text: *Are you satisfied that the legal text will deliver the intent of the Solution?*

N/A

Are there any errors or omissions in this Modification Report that you think should be taken into account? *Include details of any impacts/costs to your organisation that are directly related to this.*

Insert Text Here

Please provide below any additional analysis or information to support your representation

Insert Text Here