

# **CD291 - Amendments to the Gas Safety (Management) Regulations 1996 consultation response**

## Contents

<b>Executive Summary</b> .....	<b>1</b>
<b>1. Introduction</b> .....	<b>5</b>
Previous communications with stakeholders .....	6
Public consultation.....	6
<b>2. Respondent demographics</b> .....	<b>7</b>
i. Who responded to the consultation? .....	7
ii. Business response: Business size by number of employees .....	8
iii. Business response: Location of business operations.....	9
<b>3. A new lower Wobbe number (WN) limit:</b> .....	<b>9</b>
iv. To decrease the lower WN limit for normal supply from $\geq 47.2$ MJ/m <sup>3</sup> to $\geq 46.5$ MJ/m <sup>3</sup> (this is the current lower emergency limit) .....	9
v. Gas production and gas processing/blending .....	16
vi. Emissions .....	21
vii. Conclusion .....	22
<b>4. To remove the Incomplete Combustion Factor (ICF) and the Soot Index (SI) limits in schedule 3 and introduce a relative density of <math>\leq 0.700</math>.</b> .....	<b>22</b>
viii. Incomplete Combustion Factor .....	25
ix. Sooting Index.....	25
x. Relative Density .....	26
<b>5. To incorporate the HSE class exemption limit of <math>\leq 1\%</math> (molar) for oxygen in gases conveyed at pressures up to 38 barg</b> .....	<b>27</b>
<b>6. Clarity that biomethane pipelines are to be considered part of the gas network</b> .....	<b>30</b>
xi. How this policy intention may be achieved .....	34
<b>7. Clarity that co-operation duties apply to operators of liquefied natural gas (LNG) import facilities</b> .....	<b>40</b>
<b>8. A general duty on the industry to provide a continuously manned telephone service</b> .....	<b>43</b>
xii. A continuously manned telephone service now and in the future.....	43
xii. A safety case and new schedule .....	46
<b>9. Costs</b> .....	<b>51</b>
xiv. A new lower WN limit of $\geq 46.5$ MJ/m <sup>3</sup> .....	51
xv. To remove the Incomplete Combustion Factor (ICF) and the Soot Index (SI) limits in schedule 3 and introduce a relative density of $\leq 0.700$ .....	59
xvi. To incorporate the HSE class exemption limit of $\leq 1\%$ (molar) for oxygen in gases conveyed at pressures up to 38 barg.....	60
xvii. Clarity that biomethane pipelines are to be considered part of the gas network.....	60
xviii. Clarity that co-operation duties apply to operators of LNG import facilities.....	62
xix. A general duty on the industry to provide a continuously manned telephone service .....	62

xx. Familiarisation.....	64
<b>10. Benefits.....</b>	<b>65</b>
xxi. Safety.....	65
xxii. Gas production .....	65
xxiii. Gas processing.....	67
xxiv. Emissions.....	67
xxv. Gas prices.....	68
<b>11. Other costs and benefits .....</b>	<b>68</b>
<b>12. Transition arrangements .....</b>	<b>69</b>
<b>13. Wider concerns/issues raised during consultation.....</b>	<b>71</b>
<b>14. Conclusion and next steps.....</b>	<b>78</b>

## Executive Summary

This consultation response relates to the proposed amendments to the Gas Safety (Management) Regulations 1996 (GSMR)<sup>1</sup> by the Health and Safety Executive (HSE) and was open for responses for an eight-week period from Friday 28 January 2022 to Monday 21 March 2022.

GSMR was made using powers afforded to the Secretary of State by the Health and Safety at Work etc. Act 1974 (HSWA)<sup>2</sup> and so is one set of provisions designed to secure the health, safety and welfare of persons at work, protect others against risks to health or safety as a result of workplace activities and to control the possession, use and acquisition of dangerous substances.

GSMR applies to the conveyance of natural gas through pipes to domestic premises and other consumers and places duties on those conveying gas via a safety case regime. Those wishing to convey gas within Great Britain (England, Scotland and Wales) (GB) must prepare a safety case which outlines how they will manage the risks arising from the activity of gas conveyance. The safety case must be submitted to HSE and HSE must accept the safety case before conveyance can begin. The regulations also outline the actions to be taken in gas supply emergencies and during gas escapes and they set specified values for the gas composition permitted to be conveyed.

The existing regulations constrain the supply of gas for conveyance within GB from alternative sources and result in significant gas processing costs in order to comply with the gas composition values. The proposals for amendments to gas composition therefore seek to adapt the prescriptive regulation of gas composition contained in schedule 3<sup>3</sup> of GSMR and diversify gas resources accessible from the UK Continental Shelf (UKCS), to boost indigenous production and contribute to greater security of supply. This is the key objective of this review of regulation. The proposals also intended to reduce gas processing costs and update the regulations to reflect modern practices, thereby providing better regulation of gas conveyance.

The Gas Quality Working Group (GQWG)<sup>4</sup>, formed by the gas industry, presented several proposals to HSE to adapt the values for gas composition set out in schedule 3 of GSMR. The evidence submissions supporting these proposals were analysed by HSE and a cost benefit analysis undertaken to assess the economic impacts. This resulted in the following proposals related to gas composition being taken to consultation:

1. a new lower Wobbe Number (WN) limit of  $\geq 46.5$  MJ/m<sup>3</sup>;
2. to remove the Incomplete Combustion Factor (ICF) and the Soot Index (SI) limits in schedule 3 and introduce a relative density of  $\leq 0.700$ ; and

---

<sup>1</sup> Gas Safety (Management) Regulations 1996, legislation.gov.uk, 1996 [Gas Safety \(Management\) Regulations 1996 \(legislation.gov.uk\)](https://www.legislation.gov.uk/ukpga/1996/37/contents)

<sup>2</sup> Health and Safety at Work etc. Act 1974, legislation.gov.uk, 1974 <https://www.legislation.gov.uk/ukpga/1974/37/contents>

<sup>3</sup> Gas Safety (Management) Regulations 1996, Schedule 3 Content and other characteristics of gas, legislation.gov.uk, 1996, [Gas Safety \(Management\) Regulations 1996 \(legislation.gov.uk\)](https://www.legislation.gov.uk/ukpga/1996/37/contents)

<sup>4</sup> Gas Quality Working Group, igem.org.uk, 2022 [Gas Quality Working Group - IGEN](https://www.igem.org.uk/gas-quality-working-group)

3. to incorporate the HSE class exemption limit of  $\leq 1\%$  (molar) for oxygen in gases conveyed at pressures up to 38 barg.

Explanation of these technical amendments can be found in Sections 3, 4 and 5 respectively. HSE also consulted upon its own proposals for updating and modernising GSMR resulting in three additional proposals:

4. clarity that biomethane pipelines are to be considered part of the gas network;
5. clarity that co-operation duties apply to operators of liquefied natural gas (LNG) import facilities; and
6. a general duty on the industry to provide a continuously manned gas emergency telephone service.

These proposals are intended to improve the regulations and safety standards achieved to date, with standards of health, safety and welfare a key strategic goal of changing the legislation.

The proposed amendments to GSMR will potentially affect all dutyholders, sectors and end-users involved in the life cycle of gas and the aim of the consultation was to:

- raise awareness and understanding of the proposed amendments;
- assess the support for the proposed amendments, and seek the views of stakeholders;
- assess the likely costs, benefits and wider impacts of the proposals; and
- use the expertise, experiences and views of respondents to develop an effective and efficient policy towards gas conveyance regulation.

Responses have also been analysed to inform a final stage impact assessment, to be published in due course on [legislation.gov.uk](https://www.legislation.gov.uk), and to verify data and evidence gathered by both an initial stakeholder survey and further social research undertaken by HSE.

Consultation responses were analysed by HSE over a series of workshops attended by subject matter experts. These workshops were comprised of representatives from:

- HSE Science Division;
- HSE Energy Division;
- Department for Business, Energy and Industrial Strategy (BEIS);
- Office of Gas and Electricity Markets (Ofgem); and
- North Sea Transition Authority (NSTA).

These workshops served to aid HSE in the interpretation of responses and submitted evidence, helped HSE to reach final assessments of impacts resulting from the proposed changes and to identify where additional evidence may be required.

The overall response to the consultation was positive, with the majority of respondents in support of each of the proposed six amendments and good evidence was obtained on the costs and benefits associated with the changes. Each amendment received a small number of concerns which have been used to inform

and develop the resultant policy. These concerns are summarised and addressed in the appropriate sections of this response which relate to individual proposals.

The proposal for a new lower WN limit of  $\geq 46.5$  MJ/m<sup>3</sup> was the proposal which elicited most concerns as well as being associated with the most significant impacts, costs, and benefits. Concerns from respondents included but were not limited to:

- the effect of new lower WN gas on appliances and how gas engineers are appraised of these effects;
- the impact upon gas turbines and subsequent impact upon power-generation; and
- the level of testing that appliances have been subjected to on lower WN gas.

Supplementary consultation activity also identified that the implementation of this proposal would not be straightforward and presented risks to its ability to provide additional gas for conveyance in GB. The principal risk was the renegotiation of network entry agreements (NEAs), their interdependency with interconnector agreements and whether these could be agreed at all entry points to enable lower WN gas to be injected into the grid. The evidence and information obtained through consultation has also shown that the volumes of gas that may be enabled by this change are subject to many uncertainties which have the potential to reduce the impact of the change on security of supply.

The consultation has shown that the impacts of this proposal are greatest on the power generation sector. Power generators will incur large costs as a result of this change and outages in generation are predicted for power generators burning gas to generate electricity. Research on the magnitude of this issue has been undertaken by HSE Science Division, BEIS and Ofgem and whilst it has not been possible to assess or quantify the impact on electricity security of supply or electricity prices, the consensus is that the change will not lead to significant wholesale power outages, or prolonged or frequent wholesale power outages. Mitigations to limit these impacts have been considered as part of the policy development and will be implemented through the amended legislation. With gas prices, the analysis of responses and evidence obtained is that this proposal will not alter the price of gas, so no benefit is obtained in terms of cost of living.

Concerns and risks raised through this consultation are addressed in Sections 3 and 9 of this response.

The benefits of making this change are substantial. In economic terms the value of the additional gas that may be supplied as a consequence of this change results in a net present value for the proposed legislative changes, and in terms of contributing to important strategic goals for the government it helps to improve energy resilience and increase United Kingdom supply of gas. HSE has worked closely with BEIS to assess the impact of the change on our energy system, who have recommended that the additional gas and increased production confidence that changing the lower WN limit would bring is beneficial to our energy independence and in delivering the original policy objective of this review.

Having considered the evidence HSE has concluded that the proposal for a new lower WN number limit of  $\geq 46.5$  MJ/m<sup>3</sup> does help to deliver the intended policy objective and will be taken forward. However, due to the impacts and costs associated to making this change, particularly the potential effect on businesses, HSE has also agreed with BEIS that this amendment should be subject to a two-year transition period before it comes into force, and will apply from April 2025. This will allow time for power generators and other sectors to adapt to the change and to mitigate against the risks identified to power generation.

The five other proposed amendments will also be pursued by amending GSMR accordingly and these amendments will come into force at the first common commencement date following publication of this response. Where material concerns, impacts and costs related to these six proposals have been identified, HSE have evolved the policies accordingly to reduce these impacts. Further detail of the evolution of these proposals can be found throughout this consultation response.

## 1. Introduction

1. This consultation response is designed to be read in conjunction with the consultation and related information at: [CD291 - Amendments to the Gas Safety \(Management\) Regulations 1996 consultation - HSE Consultation Hub](#)

2. This report presents a summary of the outcome of the public consultation on the proposals to amend the Gas Safety (Management) Regulations 1996 (GSMR). During an eight-week consultation a number of questions were asked to different stakeholder groups, which were designed to inform policy of gas conveyance regulation. They were also to inform and validate cost assumptions made in an initial consultation stage impact assessment<sup>5</sup> which was published alongside the consultation. A final stage impact assessment estimates likely costs, benefits and wider impacts of the proposed amendments to GSMR and will be published alongside the amending regulations on [legislation.gov.uk](#)<sup>6</sup>.

3. The consultation sought views on the following proposals:

1. a new lower Wobbe number (WN) limit of  $\geq 46.5$  MJ/m<sup>3</sup>;
2. to remove the Incomplete Combustion Factor (ICF) and the Soot Index (SI) limits in schedule 3 and introduce a relative density of  $\leq 0.700$ ;
3. to incorporate the HSE class exemption limit of  $\leq 1\%$  (molar) for oxygen in gases conveyed at pressures up to 38 barg;
4. clarity that biomethane pipelines are to be considered part of the gas network;
5. clarity that co-operation duties apply to operators of liquefied natural gas (LNG) import facilities; and
6. a general duty on the industry to provide a continuously manned gas emergency telephone service.

4. The policy objectives of making amendments to GSMR as set down at consultation were:

- the adaptation of prescriptive GB regulation for gas composition contained in GSMR schedule 3, which currently restricts the sources of gas sitting outside current specifications from being conveyed in the transmission and distribution network;
- diversifying gas resources accessible from across the North Sea including both the UKCS and the Norwegian sector, contributing to greater security of GB's energy supply;
- reduced gas processing, potentially making gas supplies easier to secure, and the potential for fewer greenhouse gas emissions being produced by the processing of gas; and
- maintaining and improving the safety standards that have been achieved to date by GSMR.

---

<sup>5</sup> Impact Assessment, HSE, 2021 <https://consultations.hse.gov.uk/hse/cd291-revision-gas-safety-management-regulations/>

<sup>6</sup> Legislation.gov.uk, 2022 [Legislation.gov.uk](#)



## Previous communications with stakeholders

5. The gas industry played a pivotal role in bringing these proposals to consultation. Starting with Scotland Gas Networks Plc, Southern Gas Networks Plc and SGN Natural (SGNs) 'Opening up the Gas Market' report (OGM)<sup>7</sup> and finishing with the Gas Quality Working Group's (GQWG) safety evidence submissions, there have been many representatives from across the spectrum of the industry that have shared their time, expertise, and views to get these proposals submitted.

6. HSE has also undertaken a considerable amount of research and consultation to inform the development of policy options and assess the potential impacts. Activity has included:

- qualitative interviews with trade associations, professional bodies and businesses representing affected groups;
- a gas industry stakeholder survey conducted in January 2021, which obtained both qualitative and quantitative data; and
- research interviews with appliance and equipment manufacturers, gas producers, gas distributors, interconnector operators and gas engineer training advocates, throughout 2022.

7. Ongoing stakeholder engagement has been an integral part of understanding the implications of the proposed amendments. It has provided HSE with valuable insight on primary issues, detailed wider impacts, and provided evidence of potential implementation costs that HSE explored during public consultation.

## Public consultation

8. The formal public consultation ran from 28 January until 21 March 2022. Prior to the consultation being launched, HSE policy leads identified stakeholders and informed them of the proposed amendments and the aim of the consultation via email. An HSE e-bulletin was also sent to stakeholders who had signed up to receive updates in relevant areas. This e-bulletin was opened by 42,598 stakeholders and was sent twice during the consultation.

9. The consultation was held on the HSE Consultation Hub online platform<sup>8</sup> and questions were routed based on which stakeholder group the respondent identified as. This meant that respondents saw only those questions that were relevant to their stakeholder grouping.

10. All respondents were asked the same primary questions within each section outlining the six proposed amendments.

11. Table counts presented in this response do not always add up to the total number of consultation responses. This is due to routing through the questions and a number of 'Don't know' responses. In addition to the typical reasons for selecting 'Don't know' responses in surveys, the technical nature of some of proposals provide

---

<sup>7</sup> Opening up the Gas Market, SGN, 2016 <https://www.sgn.co.uk/sites/default/files/media-entities/documents/2019-07/SGN-Oban-Gas-Market-Report-Full-Report-2016.pdf>

<sup>8</sup> HSE consultations hub, 2022, [Health and Safety Executive - Citizen Space \(hse.gov.uk\)](https://www.hse.gov.uk/citizen-space/)

an additional reason for respondents not giving a substantive answer. The published tables include counts of those who gave substantive answers for each question. Additionally, to protect the identification of consultation respondents, values of less than five have been suppressed in tables in Section 2 of this response.

12. HSE received 55 responses to the online consultation and 20 written submissions.

13. Responses were analysed by HSE over a series of workshops attended by subject matter experts. These workshops comprised of representatives from:

- HSE Science Division;
- HSE Energy Division;
- Department for Business, Energy and Industrial Strategy (BEIS);
- Office of Gas and Electricity Markets (Ofgem); and
- North Sea Transition Authority (NSTA).

14. These workshops served to aid HSE in the interpretation of responses and submitted evidence, helped HSE to reach final assessments of impacts resulting from the proposed changes and to identify where additional evidence may be required.

### **Post consultation communication with stakeholders**

15. From April 2022 to October 2022, HSE conducted further research and evidence-gathering on the proposals; some topics or individual consultation responses required additional information or clarification to ensure that the most accurate evidence was used to assess potential costs and benefits and weight the proposals against their ability to deliver the policy aims and objectives.

16. This included three research interviews with the National Transmission System (NTS) operator, four research interviews with a gas producer, one research interview with a power generator, six cross-government evidence review sessions and liaison with the Regulatory Policy Committee<sup>9</sup>. HSE also communicated with government officials from BEIS, the NSTA and Ofgem who lent their expertise and provided input into policy decision-making.

17. This has all resulted in the following presentation of the evidence obtained alongside the cost benefit analysis and assessment of impacts given in the final stage impact assessment.

## **2. Respondent demographics**

### **i. Who responded to the consultation?**

---

<sup>9</sup> Regulatory Policy Committee, gov.uk, 2022 [Regulatory Policy Committee - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/organisations/regulatory-policy-committee)

18. An opening mandatory question asked what capacity the respondent was responding in, allowing stakeholders to be asked a series of questions based on which group they identified as.

**Table 1\*** Respondent categorisation

<b>Respondent category</b>	<b>No. of responses</b>
A gas producer	5
A gas distributor	7
Power generation	5
A gas engineer	7
Manufacturing/engineering of gas equipment/appliances	7
Other	6
<b>Total</b>	<b>37</b>

\* values of less than five responses have been suppressed in tables 1-3

19. The responses were fairly representative of all stakeholder groups in the gas industry, enabling a breadth of views from across the industry. Every respondent category with the exception of industrial users of gas, had at least one response. Of the 55 online responses, six responded 'Other'. Examples of respondents categorising themselves as 'Other' included a housing association and a charity.

## ii. Business response: Business size by number of employees

20. Respondents were also asked about the size of their organisations. The category with the most employees was 15 responses for 1,000 or more and nine responses between 10-49. A proportionate spread across all categories was evident and this was useful in considering the impact of the proposed changes as this reflects the large size of businesses that that HSE expects to receive the greatest benefits and costs of these proposals.

**Table 2\*** Respondent business size

<b>Business size (no. of employees)</b>	<b>No. of business responses</b>
2-9	8
10-49	9
50-249	7
250-499	7
500 - 999	5
1,000 or more	15
<b>Total</b>	<b>51</b>

### iii. Business response: Location of business operations

21. Respondents were then asked which country they operate in with the options reflecting the territorial jurisdiction of GSMR. Forty-eight of the 55 respondents were based in England although many of their businesses also extend to the rest of the UK and beyond.

**Table 3\*** Respondent business location

Country	No. of responses
England	48
<b>Total</b>	<b>48</b>

### 3. A new lower Wobbe number (WN) limit:

- iv. **To decrease the lower WN limit for normal supply from  $\geq 47.2 \text{ MJ/m}^3$  to  $\geq 46.5 \text{ MJ/m}^3$  (this is the current lower emergency limit)**

22. The Wobbe Index (WI) is the main parameter for the content and characteristics of gas that may be conveyed in GB networks and measures the interchangeability of gas. Currently, only gas with WN's between  $47.2 \text{ MJ/m}^3$  and  $51.41 \text{ MJ/m}^3$  is permitted for transmission and distribution to consumers in GB. The WN is calculated by the ratio of the gross calorific value (CV) of the gas to the square root of the relative density and will vary with different compositions of gas.

23. This proposal was presented to HSE by the Gas Quality Working Group (GQWG) and aims to enable more gas resources to be accessed from the UKCS with the intention of increasing GB's ability to respond to supply issues and generating greater security of energy supply.

#### Question 1

24. All respondents were asked “Do you agree or disagree with the proposal to decrease the lower WN limit to  $\geq 46.5 \text{ MJ/m}^3$ ?”

**Table 4** Do you agree or disagree with the proposal to decrease the lower WN limit to  $\geq 46.5 \text{ MJ/m}^3$

Response	No. of responses
Agree	35
Disagree	6
<b>Total</b>	<b>41</b>

25. The responses equated to 35 of 41 responses in agreement with this proposal. There were 11 respondents who chose 'Don't know'. Six of the consultation respondents disagreed with this proposal.

26. The main issues for those who disagreed were:

- long-term effects of lower WN gas on equipment/pipelines/appliances are unknown;
- adjustment of appliances in the field will be problematic as gas engineers have no way to assess gas quality on site;
- requirement to adjust equipment, appliances and re-tune turbines;
- main expenses fall to power generators with the implication that costs may be passed through to electricity consumers.

### **HSE response**

27. In bringing the proposal to decrease the lower WN limit to consultation, HSE was satisfied that there was no prejudicial effect on safety but recognised that there would be impacts on operation or performance of gas infrastructure and equipment. This was based on the body of evidence that had been accumulated prior to public consultation in support of this proposal, including prior testing, as well as considerations on the actual effects that lower WN has on gas infrastructure and equipment. Testing had been undertaken on G23 gas (45.66 MJ/m<sup>3</sup>) as part of the 'OGM' report and with a range of test gases that explored both high and low WN effects through the Hydeploy project<sup>10</sup>, as well as a number of other laboratory studies on the impact of a wider gas quality specification. Evidence submissions received and analysed by HSE<sup>11</sup> also included testing on lower WN gas and presented analysis of the impacts of:

- lower WN gas emissions of carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>) and nitrogen oxides (NO<sub>x</sub>);
- measurement of flue-gas temperatures;
- thermal efficiency;
- ignition and flame stability;
- operation of oxygen depletion sensors, flame supervision safety devices; and
- the impacts of the rate of change of fuel gas.

28. As stated, the conclusions were that the proposal did not lead to a diminution in safety standards.

29. As for operation and performance, HSE has modelled the impacts and presented them in the cost benefit analysis section of the final impact assessment. In this way long-term effects were estimated and quantified where possible and the impact assessment was a critical tool used in final decision-making. A summary of the expected impacts and their costs is provided in Section 9. The impact assessment recognised that some equipment would need to be adapted and that gas turbines could need additional tuning and maintenance. The impact assessment also outlined how the largest costs would be borne by power-generators. In assessing these costs it was important to consider the degree of network penetration of any new lower WN gas that would be enabled by the change. Analysing where new lower WN gas

---

<sup>10</sup> HyDeploy: Summary of Gas Appliance and Installation Testing, HyDeploy, 2018  
<https://www.h2knowledgecentre.com/content/project3110>

<sup>11</sup> IGEM/TSP/19/363 Neptune lower WI Interim Report, DNVGL, 2019

would enter the NTS, and at what volumes, enables predictions to be made about how far the gas would permeate into networks and how many consumers might actually receive lower WN gas. An understanding of this would enable impacts and costs to be better determined. This was especially important in the estimation of ongoing costs as these are only relevant if lower WN gas is being supplied to the cost bearer. HSE found it reasonable to assume that many stakeholders would bear upfront costs regardless of network penetration as they would need, or would make, a commercial decision that making preparations for lower WN gas would be necessary, or better than waiting until impacts were felt. However, elsewhere, network penetration analysis has been used to assess the level of ongoing costs that impacted sectors will bear.

30. Estimations of the future distribution of different gas qualities presented in the evidence submissions to HSE from the GQWG were used to model the extent of equipment that would be affected. Here, lower WN gas was assumed to have a weighed proportion of 7.5% of future gas distribution. This figure was coupled with network penetration analysis completed by the NTS<sup>12</sup>. Under a variety of scenarios in the NTS network penetration analysis, the future distribution of lower WN gas appeared to be less than the GQWG figure. Combining the two pieces of analysis, and accounting for the inherent uncertainty meant that a range of estimations has been deployed for network penetration. A mid-estimate of 4.1% has been used and this is HSE's best estimate of the proportion of gas users that will receive lower WN gas should this change be made. This range has been applied to the ongoing costs resulting from this change in the final stage impact assessment.

31. Field adjustment was another theme of those disagreeing with this proposal. In a proportion of domestic appliances the fuel air ratio can be field adjusted. A gas engineer could adjust the air-gas ratio valve in response to a deviation from the manufacturer's specified combustion readings when performing combustion analysis on the flue gases. It is important that the gas pressures, flue integrity, terminal position and combustion chamber seals have been checked and found to be satisfactory before the gas valve settings are altered. A very slight incorrect change to the fuel air ratio settings can lead to extremely poor combustion. As such, field adjustment should be done by qualified engineers following the manufacturer's instructions and should only be done when strictly necessary and when all other potential causes of the defect have been ruled out. In commercial or industrial settings, adjustment of equipment is more common. In either context HSE is satisfied that the proposed changes would not cause significant increase in risk either through increased numbers of adjustments or any additional problems associated with making the adjustment so long as manufacturer's instructions are followed.

## Question 2

32. All respondents were then asked whether they agreed or disagreed with HSE's assessment "**that there will be no adverse safety implications associated with reducing the lower limit on WN to  $\geq 46.5$  MJ/m<sup>3</sup>**". The responses to this question are summarised below:

---

<sup>12</sup> GS(M)R Review NTS Penetration Analysis, National Grid, 2022, <https://www.gasgovernance.co.uk/sites/default/files/ggf/2022-09/3.0%20GS%28M%29R%20Review%20-%20Network%20Penetration%20Analysis%20-%208.9.22.pdf>

**Table 5** Do you agree or disagree that there will be no adverse safety implications associated with reducing the lower limit on WN to  $\geq 46.5$  MJ/m

Response	No. of responses
Agree	33
Disagree	5
<b>Total</b>	<b>38</b>

33. A minority of respondents disagreed that there would be no adverse safety implications and responded that:

- there is a potential for CO<sub>2</sub> corrosion in carbon steel systems;
- testing has not considered the efficiency or effects of long-term operation of appliances on lower WN gas and that industrial and commercial equipment is being adjusted during servicing and without the known gas quality being received;
- field adjustment to prevailing gas quality has safety implications of increased CO production;
- the current evidence strongly points at and suggests studies are based on room sealed appliances (specifically boilers) only; and
- the wider negative impacts on security of supply of the electricity system and consequent safety issues were not included in the scope of the evidence, and will have adverse safety implications.

### HSE response

34. HSE retains its position that this proposal would not result in adverse safety implications.

35. Firstly, with CO<sub>2</sub> corrosion, GSMR already stipulates in schedule 3 that the water dewpoint of gas must not be at a level such that it would interfere with the integrity or operation of pipes or any gas appliance which a consumer could reasonably be expected to operate. The risks of corrosion are also commonly referenced by controls on water content in network entry agreements and, it is in the interests of gas conveyors that their pipelines are dry therefore limiting the potential for corrosion.

36. Field adjustment has been discussed in paragraph 31. The fourth point argued that there is an increased risk of incomplete combustion and CO production and that there are open flued appliances with insufficient ventilation and flueless appliances with inadequate space or lack of ventilation. The evidence submitted to HSE assessing the effects of widening the WI range<sup>13</sup> does not reflect an increased risk of incomplete combustion and CO production for domestic users of gas. Arguments surrounding ventilation or flueing are not a consequence of the proposed change as it has no impact upon the physical environment of where the gas is being burned. Adequate flueing and ventilation are clearly important. However, there is no evidence

<sup>13</sup> IGEM-TSP-21-396-DLC189\_D – Impact of widening WI range on CO poisoning risk, Dave Lander Consulting, 2021



to indicate that the proposed new lower WN limit will exacerbate any flueing or ventilation deficiencies that may already exist.

37. HSE has considered the potential for electricity security of supply disruption as an indirect consequence of the proposed change. Analysis of this point is reflected in the final impact assessment and determined that it was not possible to estimate or quantify the effect on electricity security of supply (and consequent impacts on public health and safety) or on electricity prices, due to the structure of the electricity market, and unknowns around prevailing weather conditions during power outages and whether outages would be incurred during planned maintenance cycles or not. Analysts from HSE, BEIS and Ofgem were engaged on this point and the predominant view was that electricity supply would not be disrupted to the extent that it created a security of supply risk. The more likely effect is that the increased potential for outages of electricity generating gas turbines would mean supply switching to costlier, less efficient generation methods. As power generators already have maintenance schedules planned years in advance and market arrangements for ensuring continuity of supply, they are strongly incentivised to minimise unplanned outages and to conduct maintenance or adaptation work during periods of lower demand (such as the summer). However, the systematic nature of the change could put strain on these arrangements. These risks have influenced decision-making to the extent that a significant transition period will apply before this change comes into force, to allow those impacted adequate time to prepare for the change and to avoid, or minimise costs and disruption to business activities.

### Question 3

38. The final question on the lower WN limit that all respondents were asked was **“Do you foresee any unintended consequences (positive or negative) in the proposed decrease to the lower WN limit?”**

**Table 6** Unintended consequences of the proposed decrease to the lower WN limit

Response	No. of responses
Yes	19
No	25
<b>Total</b>	<b>44</b>

39. Nineteen respondents reported an unintended consequence. These responses are categorised in the table 7:

**Table 7** Categorisation of unintended consequences of the proposed decrease to the lower WN limit

Unintended consequence	No. of responses
Operational issues with equipment	8
Engineer competency with gas quality	2
Unnecessary replacement or repair of components	2
Incompatibility with some interconnector arrangements	2



Impacts on interconnected markets not evaluated	1
Insufficient research	1
Deaths and illness	1
Increased capacity at one gas production site	1
Increased potential for hydrogen blending	1
<b>Total</b>	<b>19</b>

40. Two positive unintended consequences were submitted, the first referenced how the reduction in WN limit would allow a nitrogen rejection unit to start up (and cool down) whilst a gas production site is producing at full rates from one of the higher WN reservoirs in the asset. This would mean the protection of production volumes of gas. The second stated the reduction would increase the number of days per annum that hydrogen could be blended into a network whilst remaining within the WI limits. This would have a positive impact in situations where an exemption to allow blending has been issued, and potentially, should a further amendment to the regulations be made to permit hydrogen blending. This was not explored further however, as the hydrogen limits permitted within GSMR were not in scope of this consultation.

### **HSE response**

41. Operational issues with equipment were the most common response and HSE's consideration of this issue is documented in the impact assessment for these changes and in section 9. Although not a matter of engineer competency, there is potential for appliances to be set on gas at or close to the new lower WN limit and then operated on a higher WI supply. However, detailed studies have shown that any potential increased risk from this is more than offset by the reduction in risk associated with malfunctioning devices producing very large quantities of CO. Manufacturer's instructions also provide the framework for engineers actions in the field. The potential for an unsafe situation to arise as a consequence of the proposed change will be mitigated by HSE communication and guidance to the sector on the effects gas engineers would likely see in the field. Such a strategy will also be used in response to the unintended consequence of unnecessary replacement or repair of components.

42. A new lower WN limit will be incompatible with interconnector arrangements to north-west Europe, where legal gas quality limits in certain jurisdictions are higher than the proposed new lower limit. HSE held discussions with the NTS operator as to how this could be managed and how far this may prevent injection of lower WN gas elsewhere in the network. The view of the NTS was generally positive in that prior engagement with other European Transmission System Operators (TSOs) had indicated a willingness to find solutions to enable a similar reduction in WI gas in Europe as this would be mutually beneficial. It would not be possible to test this though until formal negotiations were underway. It was noted by HSE that there were currently no apparent levers (including legislative) that could be used to guarantee the acceptance of lower WN gas in Europe. This has led to uncertainty as to whether the interconnector agreements can be revised for lower gas quality and this was acknowledged by the NTS. For Belgian and Netherlands interconnectors, this will depend on the lower limit specification for WI that applies in these jurisdictions but

also that which is contained in Interconnection Agreements that apply in respect of cross-border points between the Belgian, Dutch, French and German TSOs. Where such limits are greater than those sought by the proposal for a new lower WN limit of  $\geq 46.5$  MJ/m<sup>3</sup> we would require the TSOs in those jurisdictions to be willing/able to make a similar change. With changes required across multiple jurisdictions, and all co-dependent on one another, the uncertainty of interconnector agreements being successfully revised is increased and contingent upon actions and changes out of HSE's control. This presents a risk to the implementation of the policy for a new lower WN limit.

43. Further research was conducted with the NTS to establish whether the interconnector agreements would act as a lower ceiling for entry points elsewhere in GB. The NTS advised that it would be possible to agree different WI limits at different entry points but this must be done on a non-discriminatory basis. The expectation was that there would be a large number of entry points requiring or requesting new WI parameters that would interact with one another and it would become much more difficult to determine which entry points the full relaxation to 46.5 MJ/m<sup>3</sup> could be granted to. The prevailing view of the NTS was that the interconnector agreements would set a baseline for other entry points in the grid. This means that despite a legislative change permitting gas with a lower WN to be conveyed in GB networks, implementation of the change could be complicated by the requirement to renegotiate interconnector agreements and NEAs. HSE deemed it prudent to model the potential for the interconnector agreements to act as a baseline and restrict the conveyance of lower WN gas. Assessing the gas quality values of these European partners, this would be the Belgian set lower limit of  $\geq 46.62$  MJ/m<sup>3</sup>.

44. To further understand the problem the view of the NTS was sought as to how long it would be before these interconnector agreements could be renegotiated. The NTS stated that in the most optimistic circumstances the agreements could be revised within one year. However, given the regulatory changes required elsewhere in Europe there was significant uncertainty of the timescale and an acknowledgement that in a worst-case scenario, agreements may not be reached at all. Further research interviews were then conducted with a gas producer who had responded to the consultation indicating the lower WN change would enable them to produce more gas. The gas producer was asked what would be the effect of a de-facto lower WN limit of  $\geq 46.62$  MJ/m<sup>3</sup>, and what would be the effect of a delay in the implementation of the policy whilst interconnector/NEAs were renegotiated. An adjusted, lower estimated volume of gas production was given which enabled HSE to refine the benefits of this proposal with assistance from the NSTA. In subsequent interviews the same gas producer also suggested solutions to this problem have been identified using the onshore terminal infrastructure at its reception terminal. Although agreement would be needed with the terminal operators and the NTS, the gas producer suggested that this solution could enable lower WN gas to flow into the gas network at times when the interconnectors were importing gas, but also during times of interconnector export. Such solutions will need to materialise during the implementation of this policy, but could serve as mitigations against the risk of interconnector agreements not being renegotiated down to the GB regulatory level, or them going beyond the coming into force date for this change.

45. In modelling, the impacts were presented as three scenarios for the effect this problem would have on gas production. A 'low' estimate in which interconnector or NEAs were not able to be agreed at all and so no additional lower WN gas was achieved through the proposal. A 'high' estimate in which the interconnector/NEAs were agreed, and agreed within one year, but only to a lower limit of 46.62 MJ/m<sup>3</sup>, and then a mid-estimate in which the agreements took two years to reach a positive conclusion. The effect that these scenarios have on estimates for gas production and the calculation of benefits is stark given the low estimate presents no additional gas at all. HSE does feel that this scenario is least probable but that it was right to reflect the possibility so that decision-makers had the full extent of risks available. The two-year transition period that will apply before this change takes effect reflects HSE's view of the more certain scenario, that documented in the mid estimate where interconnector/NEAs are agreed within two years, and that these agreements do not prevent the supply of lower WN gas to the network.

46. It was also prudent to use the same methodology in the representation of the costs that the lower WN proposal brings. If in the low estimate no additional gas is realised then it is reasonable to model that some stakeholders may be able to avoid costs altogether. And in a mid-estimate of a two year implementation period before lower WN gas could be injected into the NTS, to model a scenario where some stakeholders, predominantly those that could have the flexibility to await the outcomes of interconnector/NEA changes, could delay or avoid costs. The presentation of this modelling is found in the final stage impact assessment and served to reduce the costs of the proposal in some cases.

47. It is also true that the accompanying impact assessment of these changes did not model in-depth impacts on interconnected markets, most notably the single electricity market on the island of Ireland. HSE sought the advice of the Regulatory Policy Committee on this point who advised that the impacts and cost benefit analysis should concentrate only on the territorial application of the regulations in question. This is GB only, and this is what was done with the consultation stage impact assessment and final stage impact assessment.

48. Responses of unintended consequences suggesting insufficient research, deaths and illnesses are not commensurate with the detailed evidence submissions provided to HSE as part of this review and it's assessment of this evidence.

#### **v. Gas production and gas processing/blending**

49. It was important to be able to assess whether this proposal meets the policy objectives of:

- enabling or making viable greater volumes of gas resources to be accessed from indigenous sources; and
- enabling additional gas supplies as a consequence of reducing gas processing or blending requirements.

50. The consultation asked relevant respondents whether, and to what degree, the change would result in increased gas production.

#### Question 4

51. Respondents involved in gas production (or bodies representing or advising them) were asked several questions on their current processing/blending activities such as, whether this would reduce and whether there would be savings. The same groups were then asked what effect the change would have on gas production. The questions were disaggregated into the biomethane sector and the UKCS sector. The first question asked was **“As a gas producer, what effect would the proposed decrease to the lower WN limit have on your gas production?”** Table 8 shows the results.

**Table 8** Effect on gas production

Response	No. of responses
Increase production a lot	2
Increase production a little	1
No change to production	2
Decrease production a little	0
Decrease production a lot	0
<b>Total</b>	<b>5</b>

52. Respondents who stated they would increase production were then asked by what proportion their gas production would increase per annum as a result of the proposed change to the lower WN limit. Two responses were given which were 22.5% and 16.8% respectively and were based on 2021 production outputs. The respondent who stated they would ‘increase production a little’ did not estimate a proportion but advised the change would more likely mitigate against the production loss suffered through the unavailability of blend gas.

#### HSE response

53. To equate these figures from these producers against the baseline of current production they were compared against the current NSTA forecast of UKCS production for 2022<sup>14</sup> of 31 BCM<sup>15</sup>, and totalled an additional volume of gas of 3.2%. For ongoing production, this figure must be taken in the context of the declining demand for gas that is projected in subsequent years though as a result of net zero policy, as well as resource and production profile and cessation of production dates. But 3.2% serves as an indicative figure for 2022. Further research showed that the responses given were comprised of a list of possible discoveries and prospects that might be enabled but with limited justification. Subsequent analysis of these responses, expanded in Section 10, did lead to a reduction in this percentage though.

#### Question 5

54. Gas producers, professional bodies and consultancies were asked about the development of additional gas resources: **“If you are a gas producer operating in**

<sup>14</sup> Production and expenditure projections, NSTA, 2022 <https://www.nstauthority.co.uk/data-centre/data-downloads-and-publications/production-projections/>

<sup>15</sup> BCM = Billion Cubic Metres

the UKCS, what effect would the proposed decrease to the lower WN limit have on the development of additional volumes of gas for extraction?” See answers summarised in table 9.

**Table 9** Effect on development of additional volumes of gas

Response	No. of responses
Much more likely to develop additional volumes of gas	2
Somewhat more likely to develop additional volumes of gas	1
No effect on likelihood of developing additional volumes of gas	1
Somewhat less likely to develop additional volumes of gas	0
Much less likely to develop additional volumes of gas	0
<b>Total</b>	<b>4</b>

### HSE response

55. Answers echoed those to the previous question on gas production and suggested that the change would lead to additional development, albeit minimal. This is potentially explained due to complexities of developing gas resources pitted against what is a modest proposed change to the lower WN limit.

### Question 6

56. Gas producers, gas processors/importers, gas interconnectors and gas distributors were then asked “**What effect would the proposed decrease to the lower WN limit have on processing activities undertaken by your organisation to change the WN of gas?**” This question was aimed at testing consultation stage assumptions that savings may be achieved in processing activity and that reduced processing activity would enable greater gas production. The responses suggested some positive changes to processing activity, but the majority of those who answered this question reported there would be no change.

**Table 10** Effect on processing activities

Response	No. of responses
Much less processing activity	1
Less processing activity	3
No change to processing activity	8
More processing activity	0
Much more processing activity	0
<b>Total</b>	<b>12</b>

57. Those who did respond that there would be a reduction in processing activity were asked “**How much additional volume of gas would your organisation produce per annum as a result of less processing activity?**” There were two

answers to this question, one respondent suggested 22.5% and the second 488 MCM<sup>16</sup>.

### HSE response

58. These responses, taken as a whole, suggest that the proposed change to the lower WN limit would mean less processing activity for four respondents, which translated into modest increases in production capability.

59. The full analysis and presentation of consultation responses in these areas are found in the impact assessment, and are summarised in Section 10 of this response. In summary, biomethane producers did not anticipate any reduction in their processing activities and just one advised that the proposed new lower WN limit would mean they were 'somewhat more likely' to develop new projects. The consultation therefore suggested that there would be no increase in biomethane production arising from this change. HSE agrees that the proposed change would have little effect on biomethane production, as this is primarily dependent on the billing regime and the requirement for gas to be of a target CV when it enters a charging zone. Research undertaken with gas distributors as part of the consultation activity also supported this conclusion.

60. For the UKCS, the policy objectives appear to be delivered, on a modest scale. The change appears to unlock additional gas production and the responses suggested this would be from existing resources rather than new developments. Responses indicated the potential for an additional 3.2% increase in baseline production in 2022. However, the difficulties associated with the implementation of this change in interconnector/NEA negotiations meant the raw data received from the consultation needed to be refined further. This was done through further consultation with one of the gas producers who responded, and with the NTS, with critical additional analysis and advice provided by the NSTA. This resulted in adjusted and deflated estimates in gas production, explained fully in the final stage impact assessment. The key conclusion being that the change does not yield substantial additional volumes of gas, but that the additional quantities can play a vital role in GB's energy independence and are an important tool in providing supply diversity and resilience.

### Question 7

61. The consultation also sought to establish the lead times for any additional gas production as a means of understanding how soon policy objectives may be realised. Gas producers operating in the UKCS (or bodies representing or advising them) were asked **"If you do expect to develop additional volumes of gas from new gas fields as a result of the proposed decrease to the lower WN limit, when do you expect such volume to be developed?"**

**Table 11** Lead times to develop additional volumes of gas

Response	No. of responses
Less than three years	1
3 to 5 years	2

<sup>16</sup> MCM = Million Cubic Metres

6 to 10 years	0
More than ten years	0
<b>Total</b>	<b>3</b>

62. Three respondents answered this question, with two stating that the lead time would range between 3 and 5 years before first volumes were seen, with production profile then extending over several years. Evidence from the consultation also indicated that some gas could be produced quicker, this was gas that was currently being curtailed by the availability of higher WN gas which is being used to blend the lower WN gas to bring it within permitted GSMR specifications. The change would mean this blend gas would not be required, and therefore that gas could flow as soon as NEAs were changed. As already explained, the extent to which this is possible, or when this is possible, is highly uncertain.

63. The other respondent groups were asked a similar question, accounting for their own perspective and knowledge of activities that may introduce lead times for additional volumes of gas. The question was **“If the proposed decrease to the lower WN limit is made, how soon do you foresee lower gas quality being injected into the grid?”**

**Table 12** Lead times for injection into the gas grid

<b>Response</b>	<b>No. of responses</b>
Less than one year	8
1 to 2 years	2
3 to 5 years	2
6 to 10 years	0
More than ten years	0
<b>Total</b>	<b>12</b>

64. Many respondents did not have insight into this area but those that did answer generally thought lower WN gas could be injected quickly.

### **HSE response**

65. Overall, consultation responses suggest that some volumes of additional gas have the potential to be delivered fairly quickly, but are contingent on interconnector/NEA negotiations. The greater proportion of additional volumes would be realised over a longer period of time, introducing a lead time into the realisation of the policy objectives. This is to be expected given that extraction of gas from strata is not straightforward.

66. Relevant respondent groups were then asked a series of questions on the impact the proposal to reduce the lower WN limit would have on their operations or equipment. Responses received about this are summarised in Section 9 and showed a number of significant impacts for those affected by this change.



## vi. Emissions

### Question 8

67. The consultation sought evidence on the proposal for a new lower WN limit on emissions attributable to GB. Industrial users of gas, commercial users of gas and power-generators were asked “**How would the proposed change to the lower WN limit likely affect ability to stay within emission control limits?**”

**Table 13** Effect on emission control limits

Response	No. of responses
It would be much more difficult to stay within emission control limits	1
It would be somewhat more difficult to stay within emission control limits	4
It would not affect ability to stay within emission control limits	1
It would be somewhat easier to stay within emission control limits	0
It would be much easier to stay within emission control limits	0
Don't know	1
<b>Total</b>	<b>7</b>

68. Of those that answered, the majority thought the changes would make it more difficult. One respondent provided an explanation of their answer stating that the change would increase NO<sub>x</sub> and CO emissions from a gas turbine plant. A wider WI range will mean turbines may be more frequently required to operate further away from their tuned for fuel, causing increases in emissions of NO<sub>x</sub> and CO.

### HSE response

69. HSE examined this point at the relevant consultation analysis workshop with the HSE Science Division. Workshop attendees did not recognise the potential for increases in CO emissions. With NO<sub>x</sub>, for a fully premixed burner, NO<sub>x</sub> emissions are fundamentally correlated to the flame temperature and depend on:

- air dilution  $\lambda$  value; and
- higher  $\lambda$  values lower the flame temperature and reduce the NO<sub>x</sub> emission.

70. The gas type will influence the flame temperature by relation to its CV and so it follows that lower WN gas will increase the excess air factor and reduce NO<sub>x</sub> production.

71. HSE also sought evidence on the effect on emissions from UKCS gas production. This was achieved through collaborative working with the NSTA and BEIS. Analysis showed the proposed change in lower WN limit would have a positive influence on emissions emanating from the UKCS. Details are provided in Section 10.



## vii. Conclusion

72. The evidence obtained from this consultation has shown that policy objectives of enabling or making viable greater volumes of gas resources to be accessed from indigenous sources, and reducing gas processing or blending, potentially enabling additional gas supplies, are achieved through the proposal for a new lower Wobbe Number limit of  $\geq 46.5$  MJ/m<sup>3</sup>.

73. Consequently, and in recognition of the continued demand for gas that all future energy scenarios<sup>17</sup> predict, alongside the continued pressures over the supply of gas facing GB, HSE has decided to pursue this policy proposal. The change to the lower WN also brings some modest health and safety benefits, discussed in section 10. This is a complex matter though, with competing priorities for different sectors of the gas industry and consumers, and HSE is mindful of the following factors identified through this consultation;

- the additional volume of gas is subject to a degree of uncertainty as to the benefits and when they would be obtained;
- there is the potential for this proposal to generate widespread impacts;
- there is the possibility of disruption to power generation;

74. The decision was also influenced by the network penetration analysis that has been undertaken, and in considering these factors HSE feels these impacts to the gas industry and gas consumers necessitate mitigatory measures and therefore the policy has developed to impose a two-year transition period before this change takes effect. Delaying the commencement date will enable impacted sectors time to complete actions they will need to undertake to prepare themselves for a wider gas specification and allow them to minimise costs where possible, or at the very least spread them. This transition period is intended to enable the significant benefits resulting from this change to be obtained whilst allowing measures to mitigate the risks and potential unintended consequences identified through consultation. The change to the lower WN limit creates added flexibility in gas supply and builds greater resilience into the system.

## **4. To remove the Incomplete Combustion Factor (ICF) and the Soot Index (SI) limits in schedule 3 and introduce a relative density of $\leq 0.700$**

75. This proposal was put forward by the GQWG and is supported by HSE. GSMR schedule 3 places limits on the gas quality that can be distributed to consumers and two parameters controlling the gas that can be conveyed in networks are the ICF and the SI. These limits were derived from British Gas Corporation (BGC) standards that were in force up to privatisation in 1986. The basic approach to control of gas quality was originally based on test work conducted by B.C. Dutton and others (working for BGC) in the late 1970's and early 1980's.

---

<sup>17</sup> ESO Future Energy Scenarios, National Grid ESO, 2021

76. It is not possible to derive appropriate limits on gas quality solely from fundamental considerations of gas combustion properties. This is because the production of CO and soot, flame lift-off and other undesirable effects depends on the design of the equipment in use (such as boilers, fires, cookers) as well as the nature of the gas supplied. Over the last 40 years different types of equipment have come to dominate the use of gas in homes and businesses and so it is reasonable to review the existing limits to determine whether they remain appropriate.

77. The GQWG has proposed a fundamental change in the way gas quality is controlled, with the proposal to replace ICF and SI in schedule 3 with a relative density (RD) control measure. The current method involves calculating equivalent mixtures of methane / propane / nitrogen / hydrogen. The sum of the propane and nitrogen concentrations (the propane-nitrogen number PN) is then used as a secondary parameter (with the WI) to account for the effects of higher hydrocarbons on sooting and CO production, that are not simply related to gross calorific value. This approach is supported by a fairly comprehensive body of experimental data that correlated sooting and CO production, with WI and PN (for low hydrogen mixtures).<sup>18</sup> The reliability of the method calculating equivalent mixtures was also tested experimentally with gas mixtures containing a range of fuel gases and diluents.

78. The proposal is to move away from using equivalent mixtures and values of PN, for which there are direct experimental correlations, to a simpler scheme that is based on the calculated values of RD of the actual mixture under consideration. Limiting the relative density to  $\leq 0.700$  provides an alternative means of controlling the content of higher hydrocarbons in low hydrogen mixtures. The way equivalent mixtures are defined guarantees that changes in hydrocarbon components of gas mixtures (for a fixed WI and RD) have little effect on PN. Where the diluent is fixed, wide changes in fuel gas have little effect on PN and consequently on the ICF (related to CO production) or to the SI.

79. Where the diluent changes there is some variation in PN for a given value of RD. According to the Dutton scheme these variations would be associated with some minor variation in ICF and SI.

80. Overall, for low hydrogen mixtures, it is reasonable to use RD as the gas quality limit that controls the content of hydrocarbons and to therefore remove the ICF and SI as controlling parameters.

### Question 1

81. All consultation respondents were asked “**Do you agree or disagree with the proposal to simplify the Dutton interchangeability diagram?**”

**Table 14** Do you agree or disagree with the proposal to simplify the Dutton interchangeability diagram

Response	No. of responses
Agree	34
Disagree	4

<sup>18</sup> A new dimension to gas interchangeability. IGE Communication 1246. B.C. Dutton, 1984.

<b>Total</b>	<b>38</b>
--------------	-----------

82. Only four respondents did not agree. Respondents were asked to explain why they disagreed, and three respondents provided reasons. One respondent stated that sooting can cause problems in heat exchanger passageways and flues. One respondent stated that the proposed RD limit could prevent the supply and distribution of richer gas in the event that the upper WN limit was changed. The third respondent believed the proposal would introduce risk due to insufficient testing and research assuring that gas products remain safe should the parameters be changed.

### **HSE response**

83. HSE does not recognise problems in heat exchanger passageways and flues as a consequence of the proposed change being discussed. Sooting in passages and flues is related to contact between the flame and cold surfaces preventing full combustion. For gases that can be supplied under the proposed GSMR arrangements such sooting will not become a more serious problem. Where such flame contact with chilling surfaces does *not* occur, combustion of gas will not produce soot unless the ventilation is grossly defective. This will not change because of the replacement of the SI with controls on relative density. As for the supply and distribution of richer gas, HSE notes this but a proposal to increase the upper WN limit is not currently being taken forward. And on the third explanation given as to why the respondent disagreed with the proposal to simplify the Dutton interchangeability diagram, having independently assessed the evidence presented in support of this proposal, HSE is satisfied that the proposal does not appear to have any significant adverse safety implications.

### **Question 2**

84. Respondents were also asked “**Do you foresee any unintended consequences (positive or negative) in simplifying the Dutton interchangeability diagram?**” Six respondents submitted an unintended consequence for consideration.

**Table 15** Unintended consequences in simplifying the Dutton interchangeability diagram

Response	No. of responses
Yes	6
No	44
<b>Total</b>	<b>50</b>

85. Five of these respondents explained their answer. The unintended consequences were:

- gas quality monitoring systems may be required to ensure RD is no greater than 0.7 (two responses highlighted this);
- higher incidence and risk of CO. SI is a simple indicator of complete and efficient combustion;
- insufficient evidence to support the change and wanted appliances to be designed and tested to this specification; and

- lack of confidence in the regulator and the industry in making changes.

### HSE response

86. HSE agrees that new alarms and telemetry points will be required to monitor RD across networks. The costs of this have been quantified in the final impact assessment. HSE does not agree that this proposal will result in greater production of CO and is also satisfied that the body of evidence supporting this change is sufficient. The change to RD will simplify the calculations, based on gas composition, that are necessary to demonstrate interchangeability. The training and accreditation of engineers will not have to include the complex, non-standard and outdated references to SI (which cannot now be measured) and incomplete combustion value. These variables will be replaced by a standard variable - RD - which can be readily measured or calculated and is used internationally as a basis for gas interchangeability. The final point raised here is a subjective view.

## viii. Incomplete Combustion Factor

### Question 3

87. Respondents were then asked specifically about the ICF; “Do you have any concerns about the removal of the Incomplete Combustion Factor?”

**Table 16** Concerns about the removal of the Incomplete Combustion Factor

Response	No. of responses
Yes	3
No	32
<b>Total</b>	<b>35</b>

88. A small number of concerns were raised in proportion to the overall number of consultation responses. Two comments were concerned there may be an increase in CO production. The third response was concerned that appliances may be impacted by soot deposition.

### HSE response

89. HSE is content that increased CO production would not occur. The concern regarding soot deposition does not relate to the proposed removal of the ICF. Sooting will only occur during incomplete combustion when the flame is in contact with a cold surface or in the event of grossly defective ventilation, neither of which are dependent on ICF (or SI).

## ix. Sooting Index

### Question 4

90. The same question was asked in regards to the SI; “Do you have any concerns about the removal of the Sooting Index?”

**Table 17** Concerns about the removal of the Sooting Index

Response	No. of responses
Yes	5
No	34
<b>Total</b>	<b>39</b>

91. The proportion of responses was similar to the ICF responses, with the majority stating they had no concerns. The five responses that raised concerns can be summarised as:

- environmental impact of sooting;
- gas engineers use the SI to assess burn quality and removing the parameter could lead to incorrect interventions and reduced efficiency of gas appliances;
- SI is a simple indicator of complete combustion and this would be lost;
- risk of spillage of poisonous gas should sooting occur; and
- lack of confidence in the regulator and the industry in making changes.

### HSE response

92. The final three responses shown here are repetitions of responses given to previous questions on simplifying the Dutton interchangeability diagram and ICF. The response represented by the first bullet point here mistook the proposed changes as a signal that soot would be produced by all gas appliances. As previously explained, this is not the effect these changes would have. Boilers for example only produce soot if they are grossly under-ventilated. The response represented by the second bullet point again mistook the effect these changes will have. The sooting behaviour of malfunctioning appliances will not change significantly as a result of these proposed changes. Soot will be produced in the same way as it is now, and this will continue to provide engineers with an immediate visual indication that an appliance requires urgent repair, adjustment or disconnection.

## x. Relative Density

### Question 5

93. Next, a similar question was raised in respect of RD; **“Do you agree or disagree with the proposal to replace propane plus nitrogen content (PN) with relative density, limited to 0.7, in the interchangeability diagram?”**

**Table 18** Do you agree or disagree with the proposal to replace propane plus nitrogen content (PN) with relative density, limited to 0.7, in the interchangeability diagram

Response	No. of responses
Agree	28
Disagree	1
<b>Total</b>	<b>29</b>

94. 28 out of 29 respondents agreed with the proposal. A high number (21) of respondents chose 'Don't know' as their answer to this question. The one respondent who disagreed repeated a previous answer they had given in that they believed there was insufficient evidence to support the change and wanted appliances to be designed and tested to this specification.

### **HSE response**

95. The consultation responses have shown few concerns around the proposal to replace the ICF and SI with RD limited to  $\leq 0.700$ . HSE remains satisfied that there will be no prejudice to existing safety standards as a consequence of this proposal and so the decision will be to implement this proposal through the new statutory instrument.

## **5. To incorporate the HSE class exemption limit of $\leq 1\%$ (molar) for oxygen in gases conveyed at pressures up to 38 barg**

96. Using the powers conferred by GSMR regulation 11(1), HSE issued a class exemption in 2013 exempting any persons from the duty to convey gas with an oxygen content of less than or equal to 0.2% (molar) in a network. This exemption was granted under the condition that the oxygen content of the gas conveyed is less than or equal to 1% (molar), the pipes used to convey the gas are operated at pressures below 38 barg and that the gas complies with the other requirements of schedule 3 part I.

97. This class exemption has meant that gas from non-conventional sources such as biomethane, which typically has higher concentrations of oxygen than permitted by GSMR, can be conveyed in GB networks and distributed to consumers without conveyors having to request exemptions from HSE, specifying the extension of the oxygen limit required, describing the extent of the affected network and demonstrating that there is no additional risk of harm to employees or members of the public as a result. This process can be time consuming and costly, with cost-recoverable assessment time also charged to the gas conveyor.

98. To date, the practical demonstration of the safety of conveying gas with higher concentrations of oxygen in GB has worked well, complementing the previous consideration of the principal safety issue of higher oxygen content and rates of internal corrosion of ferrous gas pipes in the presence of water<sup>19</sup>.

### **Question 1**

99. Through this consultation, HSE sought views on making the class exemption law through an amendment to GSMR.

---

<sup>19</sup> 'Hazards arising from the conveyance and use of gas from Non-Conventional Sources (NCS)', Research Report RR882 prepared by GL Noble Denton, D.Broomhall et al, HSE, 2011  
<https://www.hse.gov.uk/research/rrhtm/rr882.htm>

100. The first question asked in this part of the consultation was **“Do you agree or disagree with the proposal to raise the oxygen content to ≤1% (molar) at network pressures below 38 barg?”**

**Table 19** Do you agree or disagree with the proposal to raise the oxygen content to ≤1% (molar) at network pressures below 38 barg

Response	No. of responses
Agree	30
Disagree	4
<b>Total</b>	<b>34</b>

101. Four of 34 respondents disagreed with the proposal and one of these simply requested that the pipelines be allowed to convey the higher oxygen content at higher pressures. One disagreement was due to the respondent’s view that there would be an increased risk of biofilms developing inside gas mains and valves. Another disagreement raised concern over electrostatic ignition occurring in compressor equipment however, the respondent acknowledged that limiting the oxygen content to ≤1% (molar) should preclude this risk from happening and that the probability of them receiving gas with a higher oxygen content was low on the basis of the pressure restriction. The fourth disagreement was on the basis of a new oxygen limit curtailing the ability to inject hydrogen into the network.

### HSE response

102. Microbes growing inside biofilms can encourage microbially-influenced corrosion of carbon steel pipelines in wet conditions, which would present a safety risk. This topic has been subject of previous research<sup>20</sup> which provides sufficient understanding of the corrosion mechanism (and in particular its relation to pipeline pressure) for HSE to be satisfied that a wider approach is justified.

103. HSE recognises that hydrogen may play a significant role in the decarbonisation of the gas network. However, until the evidence of hydrogen usage as an energy component is obtained and assessed, there are no proposals to include changes to current hydrogen limits in the gas composition specification, and therefore should not be included within current decisions concerning these regulations.

### Question 2

104. The second question on this proposal, asked of all respondents, was **“Since the class exemption was issued in 2013, raising the permitted oxygen content, has the presence of biomethane in the network contributed to any operational safety issues?”**

**Table 20** Operational safety issues from the presence of biomethane in gas networks

Response	No. of responses
----------	------------------

<sup>20</sup> ‘Corrosion aspects of non-conventional gases in the natural gas pipeline Network’ Commissioned by Wales & West Utilities Ltd, GL Noble Denton, 2013 and ‘Validation of the corrosion probability estimate by field examinations’ Commissioned by Wales & West Utilities Ltd, GL Noble Denton, 2013



Yes	5
No	17
<b>Total</b>	<b>22</b>

105. This question helps to test the veracity of the observation that the practical demonstration of higher oxygen contents in networks allowed by the class exemption has not diminished safety standards. A minority thought there has been a contribution to operational safety issues. Two respondents stated corrosion, one in Emergency Control Valves or governor sets requiring response due to pressure relief valves venting and the other in distribution networks. Three respondents fed back issues with siloxanes. These were pitched in theoretical terms rather than active demonstrations of safety risks and appeared to be concerned with the effectiveness, durability and efficiency of appliances rather than any safety issue.

### HSE response

106. Crucially, none of the respondents who identified as gas distributors stated there had been a contribution to operational safety issues, and the greater weighting must be given to responses from this group given they are predominantly the owners of the risk. The control of siloxanes is achieved through impurities, hydrocarbon dewpoint and water dewpoint parameters in schedule 3 of GSMR and consolidated by network entry agreements.

### Question 3

107. The consultation then asked for views of any unintended consequences from formalising the class exemption in the regulations. All respondents were asked “**Do you foresee any unintended consequences (positive or negative) in raising the oxygen content to  $\leq 1\%$  (molar) at network pressures below 38 barg?**”

**Table 21** Unintended consequences in raising the oxygen content to  $\leq 1\%$  (molar) at network pressures below 38 barg

Response	No. of responses
Yes	7
No	42
<b>Total</b>	<b>49</b>

108. As evident, a high proportion saw no unintended consequences. Seven respondents did though, and these were:

- restriction of pressure tier to 38 barg and some pipelines conveying biomethane operating at higher pressures (two responses);
- effect on the procedures gas engineers undertake with flue gas analysers when calculating either the CO<sub>2</sub> or excess air in the combustion gases;
- effect on gas turbines;
- accumulation of biofilms;
- future inclusion of hydrogen in gas networks would mean further change to the regulations; and
- lack of confidence in the regulator and the industry in making changes.



## **HSE response**

109. There were a number of requests raised during this consultation to raise the pressure limit at which pipelines conveying gas with a higher oxygen content can be operated. HSE has received site specific exemption requests for biomethane entering networks via pipelines operated at pressures above 38 barg and there seemed to be a general consensus in the consultation that raising this limit to 79 barg would be beneficial for the industry. HSE has considered this point carefully and conducted a review of the existing body of evidence supporting any increase but has determined that a formal evidence submission and assessment demonstrating it is safe to increase that pressure limit would be required. In its absence the approach is inherently precautionary and so no increase in the pressure limit is being considered at present. There is the further point of interconnector agreements and a change which may impinge upon UK trade responsibilities. This may have ramifications for other jurisdictions if the higher oxygen content was permitted in the transmission system. Dutyholders can continue to use regulation 11(1) and submit exemption requests if they wish to convey such gas at higher pressures. Limiting the pressure tier to 38 barg also prevents the risk of the effects on gas turbines, that was submitted as another unintended consequence described above. HSE does remain open to further consideration of the pressure tier limit in the future though. For gases conveyed at pressures beyond 38 barg, the oxygen content limit will remain at  $\leq 0.2\%$  (molar) in schedule 3.

110. The second unintended consequence echoed previous comments in Section 3 about gas engineer procedures and commissioning of appliances. Here, It is worth noting that the volume flow of air to a burner exceeds that of gas fuel by a factor of about 8 or more. Oxygen concentrations of  $\leq 1\%$  (molar) in the fuel will therefore contribute minimally to the overall oxygen supply to the flame. Effects of oxygen as a simple fuel diluent will be controlled via limits on WI and RD. Biofilms and hydrogen were repetitions of areas already addressed in this section, and lack of confidence in the regulator and industry, in Section 3.

111. Given that this proposal merely formalises the regulation of an activity already permitted to take place through the class exemption, and overall the proposal received broad support from respondents, HSE has concluded it is appropriate to proceed with this proposal. HSE is satisfied that the issues, safety concerns and unintended consequences raised at consultation are being controlled through a combination of regulation, guidance, and industry standards. They do not outweigh the benefits of facilitating the entry of non-conventional sources of gas into the GB network by raising the limit of oxygen content to  $\leq 1\%$  (molar).

## **6. Clarity that biomethane pipelines are to be considered part of the gas network**

112. Prior to consultation HSE's view was that GSMR, coupled with the class exemption in place for oxygen content, already stipulated that biomethane pipelines are part of the gas network as defined by GSMR and therefore, subject to the duties placed on gas conveyors. HSE was aware of some confusion within the industry and

had received a regular stream of enquiries asking for advice and clarification. Confusion generally stemmed due to regulation 2(4) which states:

*“(4) Where gas which does not conform with the requirements referred to in regulation 8(1) is conveyed from a gas processing facility for treatment or blending so as to bring it into conformity with those requirements, any pipes used exclusively for conveying gas from that facility to the point where the gas is treated or blended or to non-domestic premises or to both, shall not be treated as part of a network for the purposes of these Regulations.”*

113. GSMR regulation 8(1) and schedule 3 sets gas quality requirements for GB gas networks and includes limiting the oxygen content to  $\leq 0.2\%$  (molar). Biomethane generally meets these gas quality requirements with the exception of the oxygen limit. The class exemption in place to allow gas with oxygen concentrations up to  $\leq 1\%$  (molar) to be transported in the network at pressures up to 38 barg therefore makes biomethane suitable for injection into the gas network.

114. The interpretation of regulation 2(4) could be that biomethane connection pipelines are not part of the network because, at the connection point with the gas network, the gas mixes with gas in the network which brings the combined oxygen levels within GSMR requirements. However:

- a. Regulation 2(2) defines a gas network as any network of pipes transporting gas from one of three starting points, where gas is mainly methane – and biomethane fulfils this criteria;
- b. HSE guidance (L80) states that when gas which conforms to GSMR requirements is conveyed periodically, that these pipes will form part of the network; and
- c. the class exemption for oxygen content enables compliance with regulation 8(1), so the biomethane is not being conveyed for blending.

115. Biomethane pipelines should therefore be considered part of the gas network.

116. HSE consulted on proposals to clarify the position so that in particular all biomethane pipelines are operating under the safety case regime. The biomethane production plant would be upstream of the gas network and would not be subject to the safety case requirements for GSMR and the proposed changes will only impact on Anaerobic Digestion and biomethane production that feeds into a gas network; it has no impact on those that have their own on-site bio-gas fired electrical generators.

### Question 1

117. Respondents were first asked **“Do you agree or disagree with the proposal to amend GSMR to provide clarity that biomethane pipelines are part of the GB gas network as regulated by GSMR?”**

**Table 22** Do you agree or disagree with the proposal to amend GSMR to provide clarity that biomethane pipelines are part of the GB gas network as regulated by GSMR

Response	No. of responses
Agree	33



- the costs associated to this change will deter new biomethane projects and will not maximise the opportunity to reduce carbon emissions in line with government targets.

### **HSE response**

122. HSE agrees with the point being made about the definition of end points and better clarity and definition of the network is what is intended to be achieved through this proposal.

123. HSE understands that a resulting effect of this proposal could be that gas in biomethane pipelines would need to be compliant with regulation 8(1) and schedule 3. The principle of regulation 2(4) of non-compliant gas being transported to points at which treatment or blending can take place to bring that gas into GSMR specification needs to be retained. It was never the envisaged outcome that these pipelines would now need to convey compliant gas all of the time. HSE considers that the current arrangements for bringing this gas into GSMR specification are adequate. Therefore the drafting of the amendment will ensure that the requirements for the content and other characteristics of gas, outlined in schedule 3 part I, do not apply to these biomethane pipelines when they are conveying gas which needs to be treated or blended so as to bring that gas into specification. The final effect being that biomethane pipelines are subject to regulations 3, 4, 5, 6, 7 and 9 and that a new regulation 8(1A) will apply.

124. L80 guidance will be updated following the amendment of GSMR. HSE's position is that pipelines within a gas production facility, gas processing facility boundary, or secure site, are not deemed to be on the network as for regulatory purposes they are considered to be 'pipework' and subject to other regulatory requirements. These assets, which are typically shorter in length, will not require a safety case. The ownership of these sites should be clear. Those pipelines extending beyond the boundary of the biomethane production or processing facility to connect to a network will be considered as part of the network defined by GSMR by consequence of this proposal. The ownership of these pipelines is largely irrelevant, but the operatorship is important. In understanding who the duty will apply to we need to defer to PSR. PSR places duties on the pipeline operator which is defined as *"the person who is to have or (once fluid is conveyed) has control over the conveyance of fluid in the pipeline"*. Under GSMR the duties primarily fall on the person conveying gas. The pipeline operator, as the person with control over the conveyance of the biomethane (the fluid) in the pipeline will therefore have a duty to comply with GSMR, including the proposal to prepare a safety case for a pipeline conveying biomethane. There is no expectation that the downstream operator of the network has any additional responsibility on them by consequence of this proposal aside from the normal co-operation duties outlined in regulation 6.

125. In response to the detailed submission, it is inevitable that one of the outcomes of this proposal will be costs for preparation, acceptance and review of safety cases for those operators who do not currently have one. HSE has estimated these costs in its final impact assessment, and they are likely to be a small proportion of the overall cost of setting up a new biomethane production plant that is supplying gas to the network. They are unlikely to be the main consideration or determining factor in whether a project goes ahead. This change may disincentivise new projects, but

HSE's assessment is that it will have a minimal impact on the establishment and continued growth of new biomethane projects. These have historically been stimulated by government subsidies as the overriding economic and commercial force.

126. HSE also acknowledges that biomethane pipelines have a different footprint in terms of their connectivity to consumers than other pipelines regulated by GSMR and that there could be an argument for a two-tiered approach. When making regulations, we must look to the future and consider whether regulations we make now will be adequate for the future. With the government's policy commitment to be Net Zero by 2050, biomethane supply and demand is expected to increase and bioresources have an important role to play in all of the NTS Future Energy Scenarios. This means it is reasonable to assume that connections to consumers from biomethane production will also increase, weakening the argument for a different approach to managing risks associated with the operation of biomethane pipelines. Furthermore, it is HSE's contention that a consistent regulatory approach to the conveyance of gas in connected pipelines that form networks is right and GSMR adopts a permissioning regime elsewhere. All are pipelines with the potential to cause harm and a precautionary approach is appropriate and proportionate.

127. This response discussed the potential for higher pressure pipelines to be extended towards biomethane sites as a result of this change. This was discussed in a biomethane pipeline workshop attended by subject matter experts as part of HSE's analysis of consultation responses. The workshop concluded that the likelihood of this situation occurring was low as most biomethane sites are close to medium or high-pressure pipelines already and that land use planning restrictions<sup>22</sup> on pipelines operating above 7 bar would dissuade the extension of such pipelines, particularly over precious agricultural land. If it was accepted that some higher pressure pipelines may become extended by virtue of this change, the controls around higher pressure pipelines are better so the overall risk is not too different. Also, this change would not have any effect on the adoption of the safety case regime for biomethane pipelines, as a safety case is required for gas being conveyed in a network irrespective of what pressure the pipeline is operating at.

#### **xi. How this policy intention may be achieved**

128. The next questions in this section were concerned with how to achieve the policy intent of clarity that biomethane pipelines are to be considered part of the gas network. At consultation, HSE proposed removing regulation 2(4) and creating a new definition of a 'gas processing facility'.

#### **Question 2**

129. Gas producers, gas shippers, gas suppliers, gas distributors, professional bodies and consultancies were asked **"HSE believes that removing regulation 2(4) of GSMR will ensure that all parts of the network which are conveying gas periodically have a safety case in place. Do you agree or disagree?"**

#### **Table 23 Do you agree or disagree with removing regulation 2(4)**

---

<sup>22</sup> Land Use Planning (LUP) – Public safety advice, HSE, 2022 <https://www.hse.gov.uk/landuseplanning/>

Response	No. of responses
Agree	13
Disagree	3
<b>Total</b>	<b>18</b>

130. The majority of those who answered this question agreed that the policy intent could be realised by removing regulation 2(4). The lower total of respondents reflects that not all stakeholder groups were asked this question.

131. Of those who disagreed one referred to the concern that this would mean these pipelines would be obliged to convey GSMR compliant gas. A second response disagreed with the policy intention outright, as they had done with the first question, and the third disagreement stated that a legal interpretation of the Gas Act 1986<sup>23</sup> and the current Ofgem licence requirements would be required.

### HSE response

132. HSE will ensure that the provisions for conveying non-compliant gas to processing or blending points can be retained.

133. HSE has interpreted the response regarding the Gas Act and Ofgem licensing requirements as referring to licensed gas transporters and the responsibilities that GSMR places upon its dutyholders deferring to the downstream GNO. This is not the intention, and responsibilities and operatorship should rest with the dutyholder that is conveying the gas in the biomethane pipeline. This is expected to be the relevant pipeline operator as defined in PSR in these circumstances.

### Question 3

134. All respondents were then asked **“Do you agree or disagree with the proposal that the definition of a gas processing facility should be redefined to also include biomethane production sites in order to achieve the policy intention?”**

**Table 24** Redefining the definition of a gas processing facility

Response	No. of responses
Agree	31
Disagree	3
<b>Total</b>	<b>34</b>

135. This shows consensus that re-defining the definition of a ‘gas processing facility’ would provide greater clarity. Of those who disagreed, one disagreed with the overarching policy objective and referenced previous answers. A second respondent felt that the biomethane sites are small and the regulatory burden will deter new producers. The third respondent argued that biomethane production sites fall under

<sup>23</sup> Gas Act 1986, legislation.gov.uk, 1986 [Gas Act 1986 \(legislation.gov.uk\)](https://www.legislation.gov.uk/ukpga/1986/44/section/1)



the definition of the ‘gas production facility’, and so it is not necessary to redefine the ‘gas processing facility’ definition to capture them.

### HSE response

136. While HSE does not fully agree that this proposal will deter biomethane production and connection to the gas grid, it is sympathetic as to the potential impacts on biomethane producers, particularly when some will be small and micro businesses, and when all are playing an important role in the pathway to decarbonising the energy system. HSE’s tailored guidance in the form of ‘*The Safety Case Assessment Manual*’ will act as a resource to aid with the preparation of the safety case. This publication includes a section on the safety case requirements for small networks, which would be applicable for biomethane connections. HSE also intends to provide transitional provisions for these proposals allowing biomethane operators additional time for familiarisation, preparation of safety cases and the spread of costs over different financial years. These arrangements are elaborated on in Section 12.

137. The definitions of production facility and processing facility are not easily applied to the operation and conveyance of biomethane, as GSMR predates the advent of biomethane in the gas networks. HSE therefore maintains it is necessary to redefine the definition of a gas processing facility in order to provide greater clarity that biomethane pipelines are part of the gas network. This may be achieved through a change to the current definition, or the creation of a separate definition for biomethane production sites as another starting point for the network.

### Question 4

138. Respondents were asked “**Do you have an alternative proposal for how to provide clarity that biomethane pipelines are to be considered as part of the gas network?**”

**Table 25** Alternative proposal for how to provide clarity that biomethane pipelines are to be considered as part of the gas network

Response	No. of responses
Yes	5
No	10
<b>Total</b>	<b>15</b>

139. Thirty-six respondents chose not to answer this question. The five alternative proposals are summarised as:

- a requirement could be made for biomethane sites to have a safety case without the requirement to comply with GSMR schedule 3 part I (two responses suggested this);
- providing additional guidance to industry alongside the regulatory change;
- clear articulation in the regulations between the plant and equipment, ie what is a production facility vs a pipeline and therefore what is in scope and where are the demarcations; and
- the biomethane network should be independent.

## HSE response

140. HSE does not accept the final suggestion that the biomethane network should be independent of these regulations. Exempting the conveyance of biomethane from the duties imposed by GSMR would present serious risk to operators of these pipelines, their employees and potentially the general public. Given the level of harm that can occur, it is proportionate that all safety measures apply consistently across the breadth of gas conveyance and that the same permissioning regime applies to all.

141. HSE welcomes the first three proposals and intends to implement them through the drafting of the legislative amendment and the update to the L series guidance for GSMR, albeit it will be the biomethane pipeline that requires a safety case, not the biomethane site. It is also useful to re-emphasise that while HSE believes the safety case regime should extend to all biomethane pipelines, it is content that the gas conveyed within may be out-of-specification with schedule 3 until it reaches a treatment or blending point.

## Question 5

142. Finally, for this proposed amendment, the consultation sought views on any unintended consequences of making this policy change. Respondents were asked **“Do you foresee any unintended consequences (positive or negative) in providing clarity that biomethane pipelines are part of the GB gas network as regulated by GSMR?”**

**Table 26** Unintended consequences in providing clarity that biomethane pipelines are part of the GB gas network as regulated by GSMR

Response	No. of responses
Yes	12
No	30
<b>Total</b>	<b>42</b>

143. Twelve of the 42 respondents who answered this question answered ‘Yes’. Table 27 outlines those 12 responses received. Some respondents made more than one point in their response so the total number of unintended consequences that were highlighted through this question was in fact 16.

**Table 27** Categorisation of unintended consequences in providing clarity that biomethane pipelines are part of the GB gas network as regulated by GSMR

Unintended consequence	No. of responses
Costs and regulatory burden will deter biomethane production	4
Confusion over ownership of the duty	4
Established practice for gas quality management is sufficient	1
Presence of siloxanes in biomethane	2



Effect on the calculations for CO <sub>2</sub> or excess air within electronic flue gas analysers	1
Possible complications introduced if a virtual pipeline (tanker) in use between the Anaerobic Digester and the injection point.	1
Inconsistency with other pipelines and network definition	1
Procurement of emergency response for biomethane pipelines	1
Clarification on how excursions from the gas quality specification are regulated	1
<b>Total</b>	<b>16</b>

### HSE response

144. The first three rows of these responses have been discussed previously in the consultation response.

145. Two respondents stated that the presence of siloxanes in biomethane was a safety concern when the gas is burned. This proposal will neither increase nor decrease levels of siloxanes as it is solely related to network definition and how the duties that follow are applied. GSMR does not impose a specific or prescriptive limit on siloxanes, but schedule 3 does control impurities and how they “*shall not contain solid or liquid material which may interfere with the integrity or operation of pipes or any gas appliance (within the meaning of regulation 2(1) of the 1994 Regulations) which a consumer could reasonably be expected to operate*”. Hydrocarbon dewpoint and water dewpoint are also regulated in the same way. In practice, gas network operators provide guidance to those who wish to inject biomethane into the system. One example is Northern Gas Networks ‘*Minimal Functional Specification*’.<sup>24</sup> Such guidance discusses control measures that biomethane producers can deploy before their gas enters the network. These are typically the installation of additional activated carbon siloxane filters which remove the possibility of siloxanes entering the gas network. HSE is satisfied that these arrangements are sufficient in managing the risk to an acceptable level. Biomethane has been conveyed in gas networks for a long time now and the class exemption facilitating the entry of biomethane into GB networks has been in place since 2013, and provides a good body of evidence that the current arrangements are working as intended.

146. The working practices of gas engineers and known gas quality during the time of commissioning was highlighted again. One respondent stated that engineers would need to know that biogas was the fuel being supplied to the appliance whilst using an electronic flue gas analyser to calculate CO<sub>2</sub> content of excess air. This is not directly related to this proposal in question and HSE’s position on this has been set out previously in this response at paragraphs 31 and 41.

<sup>24</sup> *Minimal Functional Specification* Northern Gas Networks, 2015  
<https://biomethane.northerngasnetworks.co.uk/wp-content/uploads/2015/01/GEU-Minimum-Functional-Specification.pdf>

147. The concept of virtual pipelines is prominent in the biomethane sector as some production sites can be remote or isolated from infrastructure. These virtual pipelines transport the gas from the remote point of production to a gas network entry point. The biomethane is compressed on site and transferred into tanks or trailers and transported by road to a facility with a gas network entry point. Such virtual pipelines are controlled by other regulations and are not subject to GSMR and so are not in scope of this consultation.

148. One respondent felt the proposal to provide clarity that biomethane pipelines are part of the gas network would be out of step with how GSMR treats pipelines connecting storage facilities. Regulation 2(2) of GSMR states *“Any reference in these Regulations to a network is, subject to paragraphs (3) and (4), a reference to a connected network of pipes used for the conveyance of gas from a gas processing facility, a storage facility or an interconnector, except a connected network of pipes used exclusively for conveying gas to non-domestic premises”*. A network therefore starts from a storage facility and the pipeline connecting it is part of the gas network too, save for where there are no domestic connections on that pipeline. The proposal and statutory instrument being prepared to implement this proposal will replicate the same arrangements for biomethane pipelines.

149. The next unintended consequence raised was how the pipeline operator procures its emergency response, which is a requirement for a person conveying gas in a network under regulation 7(4), and that the gas escape and investigation landscape becomes more complicated if the biomethane pipeline’s operator does not arrange for a third-party to provide their response. In HSE’s view this doesn’t appear to be a major safety issue and is primarily a question of compliance. If operators comply with their duties under regulation 7, then the risk is adequately controlled. These proposals, alongside those regarding the continuously manned telephone service for gas emergencies, should result in an improved regulatory framework for managing the risks associated with gas conveyance and responding to incidents. HSE is also satisfied that how operators choose to comply with regulation 7(4) is at their discretion and that businesses should have the freedom to use the model that best works for them, as owners of the risk and as commercial entities.

150. The final unintended consequence regarding biomethane pipelines raised via this consultation was how the regulator would manage excursions from the permitted gas quality specifications set out in schedule 3 should biomethane pipelines be considered as part of the gas network. As it is not HSE’s intention to require biomethane pipelines to convey in-specification gas all of the time, this should not be a consequence of the policy proposal. There should not be any change to gas quality management arrangements as a result of this proposal; operators of networks downstream of the ROV will continue to monitor gas quality and will still retain the ability to close the remote valve if non-compliant gas is at risk of entering the network and being supplied to consumers.

151. After careful consideration of all of the issues consultation respondents have provided regarding this proposal, and, assessing the broad support overall for the policy intention, HSE believes that all pipelines conveying gas in a network should be operated under the safety case regime, including where those are biomethane pipelines. A consistent regulatory approach to the conveyance of gas in the

connected pipelines which form a network is desirable and would be likely to result in better safety outcomes. These pipelines have the potential to cause death or serious injury and a precautionary approach is appropriate and proportionate. Failure to apply GSMR consistently could lead to pipelines being operated below industry recognised standards and without adequate emergency arrangements or suitable land use planning arrangements being in place.

152. HSE is sympathetic to the concerns raised through this consultation over the costs and regulatory burden for biomethane pipeline operators and has considered mitigations for this. There will be an extended transitional period before these proposals take effect, providing additional time for biomethane operators to familiarise, and prepare safety cases should they not have an existing one. HSE will also provide tailored guidance for operators who need or request it so that the application of this proposal can be smoother and simpler for dutyholders.

## **7. Clarity that co-operation duties apply to operators of liquefied natural gas (LNG) import facilities**

153. A fundamental principle of GSMR is co-operation between dutyholders. Co-operation can aid compliance, which in turn helps to protect people and places. Co-operation is also very important in the event of a gas supply emergency, where the Network Emergency Co-ordinator (NEC) must be able to compel dutyholders to comply with their directions, so that supply can be maintained to certain groups or areas of strategic importance and so that the emergency can be dealt with safely. GSMR regulation 6 imposes the principles of co-operation between those conveying gas in a network, the NEC and a list of dutyholders, or persons.

154. Currently, the co-operation duty covers gas production facilities, onshore processing terminals, and gas storage facilities but may not cover LNG import facilities. The legal interpretation of both *gas production facilities* and *gas processing facilities* provided by the Government Legal Department (GLD) has advised that as the definitions of both refer to 'gas' which is defined under GSMR as "*any substance in a gaseous state which consists wholly or mainly of methane*", LNG terminals could be interpreted as out of scope of this definition as they contain liquified natural gas and not methane in its gaseous state. GLD therefore advised this was a possible gap in legislation.

155. The UK has three operational LNG import facilities - two in Wales (Dragon and South Hook) and one in southeast England (Isle of Grain) and these three facilities play a critical role in meeting GB's gas demand needs. It is important to address any legal uncertainty and so as part of this consultation, HSE took the opportunity to close the gap in legislation by proposing an amendment to clarify that LNG import facilities are subject to regulation 6.

### **Question 1**

156. Respondents were asked “**Do you agree or disagree with the proposal to change the regulations so that co-operation duties are placed upon LNG import facilities?**”

**Table 28** Do you agree or disagree with the proposal to change the regulations so that co-operation duties are placed upon LNG import facilities

Response	No. of responses
Agree	29
Disagree	0
<b>Total</b>	<b>29</b>

157. No respondents disagreed with the proposal.

### HSE response

158. As there were no disagreements to this policy proposal, HSE will proceed with implementing it through amendments to GSMR.

159. In terms of how the policy objective is achieved, HSE proposed that a definition of an LNG Import Facility was created and then that the defined LNG Import Facility be added to the list of persons to whom the co-operation duty applies.

### Question 2

160. Gas producers, gas processor/importers, gas interconnectors, gas distributors, professional bodies and consultancies were asked whether they agreed or disagreed with this proposal. The results of this question were as follows:

**Table 29** Do you agree or disagree that a definition of an LNG Import Facility is required

Response	No. of responses
Agree	13
Disagree	0
<b>Total</b>	<b>13</b>

### HSE response

161. Although the vast majority of respondents were not asked this question or did not answer this question (34), tellingly, no respondent disagreed.

### Question 3

162. Next, all respondents were asked to submit views of alternative means of achieving the policy objective. The question asked was “**Do you have an alternative proposal for how to provide clear co-operation duties for operators of LNG Import Facilities?**” and the results shown in Table 30.

**Table 30** Alternative proposal for how to provide clear co-operation duties for operators of LNG Import Facilities

Response	No. of responses
Yes	2
No	46
<b>Total</b>	<b>48</b>

163. Of the two ‘Yes’ answers only one suggested an alternative proposal which was to class LNG Import Facilities as a ‘gas processing facility,’ avoiding the need to list them specifically within regulation 6(2).

#### HSE response

164. HSE recognise the value of this suggestion but following the drafting of the Statutory Instrument it has been decided that the simplest and most efficient way of making this change was to implement the HSE suggestion of a definition for an LNG Import Facility and adding this to the list of persons to whom regulation 6(2) applies. The creation of a definition of an LNG Import Facility will be inserted into regulation 2 alongside other definitions and will become another of the starting points of the gas network as defined by GSMR to further aid clarity of network definition.

#### Question 4

165. As before, the consultation asked whether respondents foresaw any unintended consequences of this proposal; **“Do you foresee any unintended consequences (positive or negative) in the proposal to change the regulations so that co-operation duties are placed upon LNG import facilities?”** See Table 31.

**Table 31** Unintended consequences in the proposal to change the regulations so that co-operation duties are placed upon LNG import facilities

Response	No. of responses
Yes	1
No	46
<b>Total</b>	<b>47</b>

166. The one respondent who reported an unintended consequence stated they would not support this proposal if there were additional costs associated with the inclusion of LNG co-operation, particularly if there are no specific safety concerns with the current approach.

#### HSE response

167. Evidence was specifically sought on any costs associated with this proposal at consultation. One respondent highlighted a potential cost of updating manuals and checking existing documentation for compliance errors. HSE thinks this can be subsumed in the familiarisation costs related to all amendments and has very limited financial cost.

168. In conclusion, assessment of the answers to the questions raised in this section shows clear support and no barriers to prevent its adoption in the amended GSMR.

## **8. A general duty on the industry to provide a continuously manned telephone service**

### **xii. A continuously manned telephone service now and in the future**

169. A key part of GSMR is *Regulation 7: Gas escapes and investigations*. This provides for a continuously manned telephone service, contactable within GB by the use of one telephone number enabling persons to report an escape of gas from a network or gas fitting. The regulation imposes duties on gas conveyors or their appointees to attend the gas escape and prevent it. This regulation also provides that investigations should be undertaken in incidents giving rise to fire or explosion to determine their cause. These provisions enable appropriate responses to the potential hazards of gas conveyance in pipelines and are a crucial part of ensuring the health and safety of this major hazard activity.

170. Since the inception of GSMR, the duty to provide the continuously manned telephone service has fallen to British Gas plc. As British Gas plc are no longer a commercial entity, HSE has issued exemptions to allow National Grid Gas Distribution Ltd, now Cadent, (legal successors to British Gas plc) to operate this service. As GSMR still references British Gas plc as the dutyholder, they require updating so that they reflect current operations and so that the duty is retained and safeguarded in this liberal market.

171. Market liberalisation does pose challenges for the regulation of the emergency response to gas escapes and investigations. In changing GSMR and without wishing to reference a named entity, HSE must ensure that the service continues in perpetuity, and is resilient to factors such as insolvency or independent commercial decision-making and autonomy (for example the current dutyholder wishing to relinquish the responsibility). A larger pool of gas network operators could also lead to fragmentation of the service if operators wanted to run their own service for their own networks and this poses questions for regulation. HSE must ensure that the standards of the continuously manned telephone service remain adequate in responding to hazards as time passes and as the duty passes from one provider to another (if it does) or if there are multiple providers.

172. HSE also believes that the current telephone number for accessing the service, 0800 111 999, should remain unchanged so as to avoid public confusion over who to contact in the event of a gas escape or emergency. Confusion or dilution of the public message and accessibility of the service could present itself in unsafe situations or gas consumers exposing themselves to hazards.

173. These considerations need to be reflected in sensible and future-proof regulation, so far as possible. During consultation, at the formative stage of policy development, HSE proposed that the continuously manned telephone service duty should be directed to the industry under the principle of risks being managed by those who create them, but without referencing a named entity. HSE did not wish to be too prescriptive over who the duty should apply to or the construct of the service and so the consultation sought views on how best to discharge this duty.

### Question 1

174. The first question that respondents were asked was “Do you agree or disagree with the proposal to place the duty to provide the Emergency Call Handling Service upon the industry?”

**Table 32** Do you agree or disagree with the proposal to place the duty to provide the Emergency Call Handling Service upon the industry

Response	No. of responses
Agree	34
Disagree	4
<b>Total</b>	<b>38</b>

175. The answers showed 34 in agreement and four in disagreement. The rest of the responses were made up of either respondents who ‘didn’t know’ or who did not answer the question. The low proportion of those disagreeing suggests that the consultation has shown that this duty should sit with industry.

176. Three of the four respondents who disagreed stated they were unsure what is meant by the ‘industry’ and wanted clarity on who the duty would apply to. Two of these respondents agreed with the proposal in principle but were concerned over what would be meant by ‘industry’. The fourth respondent disagreed with the proposal that the Emergency Call Handling Service Provider be the only public interface for accessing the service. Other written responses that HSE received echoed this point, highlighting how in some cases such as on secure government sites or multi-occupancy buildings or in social housing, separate arrangements for reporting gas escapes are in place. An example of this might be a local authority who provides housing. The local authority provides their tenants with a number to contact for all estate management issues. This could be anything from a smashed window, to graffiti, to a gas escape. The tenants know and are familiar with the local authority number and the process to follow when they have an issue, so rather than using the national gas emergency call handling service they might use the local authority estate management number.

### HSE response

177. The consultation revealed that most stakeholders thought gas industry participants should provide the service and there was a consensus around that being the collective owners of gas networks. HSE will provide clarity on what is meant by ‘industry’ and who the duty should apply to via revised HSE L80 guidance. Inserting a definition into GSMR risks being too prescriptive and may unnecessarily restrict competent service providers from taking on this duty.

178. HSE agrees that the separate arrangements occurring in what could be described as private or separate networks can function adequately and, in some cases, can be crucial in ensuring the incident is managed safely. The intention is not to prevent private or separate networks from providing their own advice and reporting lines, but HSE believes it is right that the national emergency telephone service number remains unchanged and that the public have only one interface into



it, as explained earlier. Consultation responses convey that a distinction therefore needs to be made between the 0800 111 999, or *national* telephone number, and those independent, private telephone numbers providing localised information and responses. HSE therefore intends to place the duty to provide a continuously manned telephone service on an *Emergency Reporting Service provider (ERSP)*.

179. Continuing without a named entity as the dutyholder presents risks in continuity of service. HSE has considered ways of mitigating against this and put to consultation the proposal that no network should be allowed to operate unless the ERSP is in place. Legally linking the two activities means mutual exclusivity and should ensure that the ERSP continues to operate where gas is being conveyed in a network. This proposal would remove any requirement for an accountable body to oversee the provision of the service and appears less bureaucratic and simpler whilst also safeguarding against other business continuity risks.

### Question 2

180. Respondents were asked “**Do you agree or disagree with the proposal that no part of the network should be allowed to operate unless the Emergency Call Handling Service provider is in place?**”

**Table 33** Do you agree or disagree with the proposal that no part of the network should be allowed to operate unless the Emergency Call Handling Service provider is in place

Response	No. of responses
Agree	35
Disagree	0
<b>Total</b>	<b>35</b>

### HSE response

181. No respondents disagreed and so HSE will proceed with this proposal. The obvious limitation to this proposal was that there could be the potential for the entire gas network to cease operation if for whatever reason the ERSP was not in place, and this was highlighted in one answer provided to the consultation. Clearly this would be undesirable and would not be in the best interests of health and safety. Here, the new regulations will mirror the approach already taken with the NEC so that there is consistency, with the NEC playing a similarly important role in network safety and so an obvious model to work from.

182. To further strengthen the arrangements for continuity of service HSE also asked respondents whether a two-year notice period should apply to the ERSP. Two years was proposed on the basis that the ERSP is an essential part of the GSMR control measures.

### Question 3

183. The question asked was “**Do you agree or disagree with the proposal for the Emergency Call Handling Service provider to provide a 2-year notice period should they wish to relinquish the role?**”



**Table 34** Do you agree or disagree with the proposal for the Emergency Call Handling Service provider to provide a 2-year notice period should they wish to relinquish the role

Response	No. of responses
Agree	30
Disagree	3
<b>Total</b>	<b>33</b>

184. Few disagreed with this proposal but of those that did one perhaps misinterpreted the question in saying that the telephone number must remain in place irrespective of who operates the service. A second respondent agreed with the two-year proposal but were concerned over the ramifications if the notice period did not engender a transition to a new operator. The third disagreement felt the two-year period was excessive, particularly in a competitive market.

185. Similarly, another respondent asked HSE to consider whether a two-year notice period would stifle other providers who may wish to operate the service in a 'better' way, a more efficient way, or a more cost-effective way.

### **HSE response**

186. HSE agrees that the telephone number to call to access the service should remain in place, and remain unchanged.

187. HSE shares the concern over the transition between service operators, but is satisfied that a new regulation providing that no network may operate without an ERSP is sufficient to ensure continuity of service without being too burdensome on industry.

188. Although there was one respondent who disagreed with the length of time for the proposed notice period, given the support elsewhere, HSE does not intend to reduce the length of the notice period but has drafted the new regulations to facilitate quicker notice periods under certain conditions.

189. The two-years notice period will not apply where another dutyholder has had a safety case accepted by HSE, and should resolve the issue. As below HSE consulted on a proposal for the ERSP to operate under a safety case regime. Regulation 3(1)(a) states *"he has prepared a safety case containing the particulars specified in schedule 1 and that safety case has been accepted by the Executive"*. "Accepted" being the operative word here. In this case, the new provider submits their ERSP safety case to HSE whilst the existing provider remains in place, and once that safety case is accepted by HSE, the new provider then becomes the dutyholder. In this way the two-year notice period can be avoided when a new, competent service provider has been accepted as the new dutyholder.

### **xii. A safety case and new schedule**

190. HSE's approach to ensuring appropriate standards of service remain, in the potential scenario where the ERSP dutyholder changes over time, was to consult on a proposal for the ERSP to prepare a safety case. This safety case should

demonstrate how the service will be operated safely and competently, allowing HSE to assess how those standards are maintained.

#### Question 4

191. We asked at consultation **“Do you agree or disagree with the proposal for the Emergency Call Handling Service provider to prepare a safety case?”**

**Table 35** Do you agree or disagree with the proposal for the Emergency Call Handling Service provider to prepare a safety case

Response	No. of responses
Agree	30
Disagree	0
<b>Total</b>	<b>30</b>

192. There was clear support for this proposal, however, one respondent fed back that the telephone service operability should not need to be demonstrated independently of a gas conveyors safety case, where the same entity is performing both functions.

#### HSE response

193. HSE agrees that as these safety demonstrations are wrapped up into one existing safety case which has been accepted it would not serve any safety purpose to impose separate safety case demonstrations. HSE therefore intends to exempt any dutyholder from complying with the new schedule by applying transition arrangements until their three-year safety case review is due as set out in regulation 4(3). Beyond the three-year review, HSE believes the better regulatory framework lies in having the safety case for emergency call handling complying with the particulars to be included in the new schedule that will be created.

194. In practice, the proposal for a safety case regime for emergency call handling mirrors current arrangements and it follows, in terms of ensuring appropriate standards of service remain over time, that a new schedule be created that sets out expectations of any new or additional dutyholder operating this service.

#### Question 5

195. As such HSE asked respondents whether they **“agree or disagree with the proposal that a new schedule should be created which identifies the particulars to be included in the safety case of the Emergency Call Handling Service?”**

**Table 36** Do you agree or disagree with the proposal that a new schedule should be created which identifies the particulars to be included in the safety case of the Emergency Call Handling Service

Response	No. of responses
Agree	35
Disagree	1

<b>Total</b>	<b>36</b>
--------------	-----------

### HSE response

196. Again, there was clear support for this proposal. The one respondent who disagreed referenced a previous answer given to the question over whether no network be allowed to operate unless the ERSP was in place.

197. Similar levels of support were received over proposals to define the ERSP in GSMR, and to apply the co-operation duties of regulation 6 to the ERSP. Agreements to these proposals were 35 and 34 respectively, with each receiving just one disagreement. HSE therefore intends to implement these proposals.

### Question 6

198. Consultation respondents were again asked to share their knowledge of any unintended consequences arising from these proposals. All stakeholder groups were asked **“Do you foresee any unintended consequences (positive or negative) in placing the duty to provide the Emergency Call Handling Service upon the industry?”**

**Table 37** Unintended consequences in placing the duty to provide the Emergency Call Handling Service upon the industry

Response	No. of responses
Yes	13
No	33
<b>Total</b>	<b>46</b>

199. For ease of presentation, the unintended consequences provided by respondents are displayed in Table 38:

**Table 38** Categorisation of unintended consequences in placing the duty to provide the Emergency Call Handling Service upon the industry

Unintended consequence	No. of responses
Competency and standards of service of the provider	3
No clear accountability	2
Additional costs	2
Uncertainty over one provider or multiple	2
Dependent on the definition of ‘the industry’	2
CO incidents require better identification	1
Possible local confusion	1
<b>Total</b>	<b>13</b>

## HSE response

200. Three respondents felt that the dutyholder must demonstrate call handling mechanisms that are fit for purpose and staffed by trained and competent call handlers. The content of these responses suggested they had interpreted the question as applying to any new service provider. The existing service provider has already had a safety case accepted which details their arrangements for operating the service. Should a new provider take over or emerge, the safety case regime and new schedule is designed to ensure that all manner of service standards and competency are demonstrated. This would range from record keeping; to business continuity and disaster recovery; to adequate resourcing of competent staff, and what advice this staff should provide during a call.

201. Two respondents felt that without an accountable body in place to ensure continuity of service, or to appoint a provider, there would be a lack of accountability for providing the service. HSE's response to these risks is discussed at paragraphs 179 to 197.

202. Two respondents highlighted additional costs. One of providing additional call handling services and one, if the new schedule places more onerous requirements for the operation of the service than it does currently. HSE believes that its proposals around the ERSP will not dictate that there is additional call handling services, but recognises nothing in its proposals prevents this. There is no evidence though that any of these proposed amendments to GSMR will increase demand for the service or the number of calls received. The requirements of the new schedule have been modelled on the existing accepted safety case for the operation of the service, so should not impinge on costs.

203. Two respondents flagged uncertainty over whether the proposal is for a sole national provider, or multiple providers, down to it being split between assets or individual pipelines. One of the respondents suggested there could be benefits of 'in house' services in creating efficiencies or increased effectiveness of the service. HSE is not opposed to multiple providers and as discussed earlier; independent, private providers already exist. HSE feels its intervention can be minimised here and believes that the gas industry is best placed to make decisions on the evolution of the service; in the knowledge that through these proposals, HSE has made provisions:

- a. for defining the service;
- b. for distinguishing between the national service (and its unchanged number) and independent providers;
- c. for regulation that intrinsically connects the conveyance of gas in a network with the provision of ERSP;
- d. for an extensive notice period; and
- e. for a safety case regime with a new schedule outlining the particulars to be included within that safety case.

Such provisions will ensure that the service maintains appropriate safety standards irrespective of the service provider landscape.

204. Two respondents echoed previous answers in that any consequences would be dependent on the definition of the duty applying to the industry. One respondent expected that the duty would be placed upon Licenced Gas Transporters only. As stated, HSE intends to publish revised guidance which clarifies who the duty is expected to apply to. Nonetheless, the overall policy intention is to maintain the status quo whilst building in safeguards to mitigate against the fact that a named entity will no longer be carried within GSMR.

205. One respondent thought that there may be local confusion in end users with large and multiple sites. HSE has interpreted this as a statement surrounding any fragmentation of the service and public interface to it. HSE will regulate to ensure that the public telephone number of 0800 111 999 stays the same, to retain that clarity and public messaging on what the national service is and how to access it.

206. The final potential unintended consequence that was shared concerned CO production. It stated that the industry as a whole should do more to identify CO related incidents and that the ERSP would need improved training and accreditation to prevent incidents in the first instance. Clearly this is a sentiment to be agreed upon but in regulatory terms prevention of incidents is the duty of the gas conveyor as dictated by regulations 3(1)(a), 5(1), 7(4) and 7(5). Regulation 7(14) also dictates that gas suppliers investigate incidents involving CO to establish the cause of escape and accumulation of CO. The Gas Safety (Installation and Use) Regulations<sup>25</sup> also control hazards arising from CO production. All gas transporters are subject to Ofgem's Standard Licence Condition 6 (Gas Transporter Standard Licence Conditions)<sup>26</sup> which provides for them to undertake some limited additional work (and at minor material cost) on a consumer's premises when attending a gas emergency. HSE considers these regulatory provisions are adequate.

207. The consultation has clearly shown that the continuously manned telephone service is an essential tool in managing the occupational hazards and exposure of the public to the hazards of gas conveyance and that there is support for the operation of this service to remain the responsibility of the gas industry. HSE intends to transpose the dutyholder for this service from British Gas plc to the ERSP and update L80 guidance. This will provide clarity on who the duty should apply to, thereby providing a distinction between the national service (contactable by the 0800 111 999 number), and other independent, private network operators keeping their gas escape and investigation response in house. The amendments and accompanying revised guidance will address the concerns raised via consultation over definitions of the dutyholder, public interfaces into the service and transitions between providers. HSE contends that the measures proposed will ensure continued standards of service in a liberal marketplace and that the intended safety case regime supported by the creation of a new schedule is agreed by consultation respondents. HSE will be mindful to review the proposed approach through its monitoring and evaluation plan accompanying these changes. This plan is set out in the final stage impact assessment. Should the concerns raised over accountability

---

<sup>25</sup> The Gas Safety (Installation and Use) Regulations 1998, Legislation.gov.uk, 1998  
<https://www.legislation.gov.uk/uk/si/1998/2451/contents/made>

<sup>26</sup> Gas Transporters Licence: Standard Conditions, Ofgem, 2021  
[https://epr.ofgem.gov.uk/Content/Documents/Gas\\_transporter\\_SLCs\\_consolidated%20-%20Current%20Version.pdf](https://epr.ofgem.gov.uk/Content/Documents/Gas_transporter_SLCs_consolidated%20-%20Current%20Version.pdf)

materialise in the future then HSE will have the powers to intervene and determine a different approach.

## 9. Costs

208. Initial cost estimates of the six proposals were presented in the consultation stage impact assessment. Estimates were reached through prior research and evidence gathering and stakeholder consultation comprising a stakeholder survey in January 2021 and numerous interviews with stakeholder groups in 2021. This was supplemented by evidence and data from existing sources, such as the 'Digest of United Kingdom Energy Statistics 2021'<sup>27</sup> and BEIS' 'Updated energy and emissions projections: 2019'<sup>28</sup> amongst many others.

209. These estimates were then tested at consultation, with respondents being asked questions to estimate whether the costs were too high, too low, or about right. Respondents were also asked supplementary questions where they were able to provide their own estimates of costs if they disagreed with the consultation stage impact assessment figures.

210. In addition, respondents were asked to provide evidence to estimate costs where no quantified evidence was yet available and, to highlight other impacts that could lead to costs.

211. Consultation responses were then analysed by HSE social researchers, economists, and policy officials. Subject matter experts from HSE and across government attended workshops to review evidence and provide consensus of impacts leading to costs for the final stage impact assessment. Where consultation responses pointed to costs that were not anticipated or not well understood, further research, evidence gathering and some stakeholder follow-up was undertaken in spring, summer and autumn 2022. This activity was supported by BEIS, NSTA and Ofgem.

212. Full and detailed assessment of the costs associated to the six proposals can be found in the final stage impact assessment.

### **xiv. A new lower WN limit of $\geq 46.5$ MJ/m<sup>3</sup>**

213. GB gas appliances and networks are designed to operate safely using the gas specification defined in GSMR. The lifecycle of this gas begins from production and processing, to transmission and distribution, to final consumption by all manner of end users. There are therefore many affected sectors with many constituent apparatus that produce gas, move gas, use gas and even rely on gas and in which the gas is moving, compressed and combusted. Plants, pipelines, pipework,

---

<sup>27</sup> Digest of United Kingdom Energy Statistics Annual data for UK, 2020, BEIS, 2021  
<https://www.gov.uk/government/statistics/digest-of-uk-energy-statistics-dukes-2020>

<sup>28</sup> Updated energy and emissions projections: 2019, BEIS, 2020  
<https://www.gov.uk/government/publications/updated-energy-and-emissions-projections-2019>



equipment and legacy materials in gas networks can all be affected by a change to gas composition, and a changing supply of gas compositions. Initial evidence informing the consultation stage impact assessment showed that impacts on the operability of such equipment from a wider specification of gas would generate significant adaptation costs. The consultation activity revealed this to be true, with evidence received showing that the proposed new lower WN limit would be the proposal resulting in the most impacts and the most costs.

*The total estimated ten-year present value costs of this proposal are between £40.4 million to £329.4 million.*

214. The affected sectors that will bear these costs have been determined as:

**Table 39** Sector groups bearing costs from a new lower WN limit of  $\geq 46.5$  MJ/m<sup>3</sup>

<b>Group</b>	<b>Description</b>
Gas producers/importers	Those bringing gas to shore via pipelines and via imports of LNG, and processing this gas to enter the National Transmission System (NTS)
Gas distributors: National Transmission System (NTS), Gas Distribution Networks (GDNs) and Independent Gas Transporters (IGTs)	GB's gas transmission network, the NTS, is the high-pressure gas network which transports gas from the entry terminals to Gas Distribution Networks (GDNs), or directly to power stations and other large industrial users.  Regional GDNs and Independent Gas Transporters (IGTs) transport gas to other end-users across GB.  This group also includes interconnectors, which transport gas between GB and other countries – Belgium, Ireland, the Netherlands and Norway.
Domestic end-users	Households that use gas primarily for central heating (e.g., boilers) or cooking
Commercial end-users	Organisations and businesses using gas in a similar manner to domestic users (for heating and cooking), but on a larger scale – for example hotels, conference centres
Industrial end-users	Organisations and businesses that do not use gas to heat water or use gas for cooking, but use gas in a more directed way (e.g., glass making, oil and gas extraction) or as a constituent of a chemical process (eg producing hydrogen; pharmaceuticals).
Power generators	Large-scale organisations using gas to drive sizeable engines and turbines generating electricity for businesses and consumers, e.g., EDF, Centrica (British Gas), E.ON, RWE npower, Scottish Power and Southern & Scottish Energy. Smaller power generators use gas to drive turbines and/or engines to generate electricity for their own needs rather than to sell.

215. At consultation, respondents were asked to identify themselves as one of these groups. This meant that each group could be asked specific questions designed to establish the costs on their operations or equipment, leading to the final assessment contained in the final stage impact assessment.

216. The following section presents a summary of the impacts that HSE accepts will be incurred by each sector as identified and obtained through all of the consultation activity and analysis that has been undertaken:

#### Gas producers/importers



- UKCS producers undertaking administrative work to assess and understand what additional gas resources or reserves could be extracted;
- UKCS producers having to change entry agreements with the NTS;
- Biogas producers having to update contractual arrangements; and
- Biogas producers having to adjust alarm activation levels.

*The total present value cost of these impacts was estimated to be between nil and £1.2 million.*

#### Gas distributors

- Testing and surveying equipment for a wider gas specification;
- Remapping of NTS compressors; and
- Updates to gas monitoring software and setting new alarm activation levels.

*The total present value cost of these impacts was estimated to be between £750,000 and £1.15 million.*

217. Consultation responses and activity with gas distributors discounted the potential for costs arising from the maintenance or replacement of equipment; insurance or warranties; gas supply arrangements; and billing and shrinkage. For the latter, the NTS completed an assessment of CV shrinkage risk in April 2022 which indicated little impact as a result of the change.

#### Domestic end-users and manufacturers maintaining domestic appliances under warranty

- Increased gas engineer call-outs; and
- Increased manufacturer call centre calls.

*The total present value cost of these impacts was estimated to be between nil and £6 million.*

218. HSE's view ahead of consultation was that the proposal for a new lower WN limit would not affect the safety of domestic appliances and that there would not be a requirement to replace or modify equipment, and neither that equipment would suffer reduced life expectancy.

#### **Question 1**

219. We tested this at consultation with the following question; **“Initial evidence indicates that no costs would be incurred in respect of domestic appliances. Do you agree or disagree with this assessment?”**

**Table 39** Do you agree or disagree that no costs would be incurred in respect of domestic appliances

Response	No. of responses
Agree	8
Disagree	8

Total	16
-------	----

220. Four of those disagreeing highlighted that lower WN gas will have lower energy input and reduced hot water temperatures and that this may manifest itself in increased customer complaints over the performance of domestic appliances. These respondents then described the potential for engineer service calls and minor repairs, or unnecessary replacement of equipment due to engineers not being able to ascertain real-time gas quality, leading to incorrect diagnosis. One response went on to estimate the costs of this.

### **HSE response**

221. HSE recognises this as a possible impact of the change and has included such costs in the final stage impact assessment.

222. Other responses stated that:

- a. burners would need to be checked depending upon changes in gas composition;
- b. modern appliances would need some degree of adaptation or conversion;
- c. older appliances would need replacing;
- d. appliance alterations and maintenance schedules would increase; and
- e. a final response disagreed but did not expand.

223. These responses were discussed in the analysis workshops but subject matter experts did not agree that such impacts would materialise, or would be attributable to appliances operating on lower WN gas. This was largely due to the proposed new lower WN limit being a marginal decrease within existing emergency limits and the range of WI over which equipment is tested for safe and effective operation.

### Commercial end-users

- Increased gas engineer call outs.

*The total present value cost of these impacts was estimated to be between nil and £1.8 million.*

### **Question 1**

224. As for domestic end-users the policy view ahead of consultation was that commercial appliances would not require remedial action and so no costs would be incurred. Consultation responses of this view were broadly similar to that for domestic end-users and so are not replicated here. Six respondents disagreed that there would not be any costs for commercial users and duplicated, or gave very similar reasons as for the domestic user costs.

### **HSE response**

225. The effect of lower WN gas and associated lower energy input on appliance performance and operability is relevant for commercial end-users. The costs of the potential for increased engineer calls-outs from dissatisfied appliance users has been estimated as above.

## Industrial end-users

- Addition of adaptive combustion control systems for industrial appliances.

*The total present value cost of these impacts was estimated to be between £600,000 and £24 million.*

226. Prior research and evidence gathering activity into the effect of lower WN gas on industrial end-users did not yield much certainty. Some stakeholders suggested their equipment would cope with a wider gas specification, others did not know or understand the potential impact, while others stated that equipment would require adaptation for a wider gas specification.

### **Question 1**

227. The approach taken at consultation was to ask the industrial user stakeholder group what pieces of equipment they operated, what proportion would require adaptation, what action would need to be taken and what would the cost of that be. Responses convened around the need for changes to combustion controls and air/fuel ratio controls.

### **HSE response**

228. HSE discussed this in analysis workshops and agreed that industrial end-users would need to equip their equipment with adaptive combustion control systems so that set parameters of gas quality can be maintained, mitigating against the effects on performance and operability this change would bring.

## Power generators

- Engineering surveys;
- Gas turbine control system upgrades;
- Additional tuning of gas turbines;
- Additional maintenance outages of gas turbines;
- Reciprocating engine control system upgrades;
- Reciprocating engine internal monitoring equipment alterations;
- Reciprocating engine tuning;
- Combined Heat and Power (CHP) units internal monitoring equipment alterations; and
- CHP tuning.

*The total present value cost of these impacts was estimated to be between £35 million and £280 million.*

### **Question 1**

229. Consultation responses for power generation were very detailed, in-depth, well-informed and demonstrated a consensus around the expected impacts and the operational response that would be required. The impacts and costs described tended to be severe, with some outliers estimating costs significantly above initial estimates and other consultation responses. Where this was the case, the views of subject matter experts were considered to measure such outliers against other consultation responses and an agreed position was reached. HSE also considered

that the proposed change was within existing emergency specification WI limits, the usage of which is risk assessed by the gas networks and where equipment is tested for safe and effective operation. Taking this approach, HSE has made a reasonable estimate of the likely affects and their costs for power generators. Responses indicated that equipment used for power generation is highly sensitive to changes in gas quality and would require adaptations and tuning in order to maintain operability under this proposed change. For gas turbines using gas to generate electricity, the responses indicated that the change would mean turbines would be required to be switched off more regularly, with resulting disruption to electricity generation and supply.

230. Cost estimates of adaptation, tuning and maintenance established at consultation stage for gas turbines were refined by respondents and reviewed by subject matter experts in analysis workshops. HSE was able to reach quantified estimate ranges for these impacts as a result. This also enabled a better understanding of which were one-off costs and which would be ongoing costs. For control system upgrades, respondents were asked to verify the consultation stage estimates of between £360,000 and £440,000 cost per turbine.

**Table 40** Estimates of one-off upgrades to control systems costing between £360,000 and £440,00 per turbine

Response	No. of responses
Much too high	0
Too high	0
About right	6
Too low	3
Much too low	1
<b>Total</b>	<b>10</b>

### HSE response

231. Six responses thought this was ‘about right’, three responses thought ‘too low’ and one response thought ‘much too low’. The upgrading of these costs varied from an additional £100,000 to as much as £16.7 million. The variance was due to the turbine type and configuration, and whether the work could be done during a planned outage or not. Taking into consideration all of the responses here, subject matter experts agreed to increase the upper end of the cost range, taking an average across GB stock, by £360,000 per turbine taking the high estimate to £800,000 per turbine for control system upgrades.

### Question 2

232. Respondents were asked “**Initial evidence indicates that operators of gas-fuelled turbines might incur one-off tuning costs of around £44,000 per turbine on average. Do you think this estimate is...**” Table 41 shows the answers.

**Table 41** Estimates of tuning costs of £44,000 per turbine

Response	No. of responses
----------	------------------

Much too high	0
Too high	2
About right	6
Too low	2
Much too low	1
<b>Total</b>	<b>11</b>

### HSE response

234. Responses suggested general agreement with the consultation stage figure, and indicated that these costs were not one-off costs and would be required if the supply of gas exceeds the turbines tuned range. Subject matter experts agreed that it was likely that power generators would have to conduct additional tuning on an ongoing basis, as the effects of not taking any action would be more severe, with turbines having to follow a reduced output profile or reducing their load, leading to reduced electricity supply. Using information obtained from power generators in research interviews, HSE applied this as an ongoing cost with an assumption of 1.5 additional tunings per turbine. This cost was then adjusted for the network penetration range described in paragraphs 29 to 30.

### Question 3

235. HSE estimated the cost of additional maintenance of gas turbines to be between £100,000 and £400,000 per annum per turbine. Again, respondents were asked their view of these estimates.

**Table 42** Estimates of additional maintenance of gas turbines to be between £100,000 and £400,000

Response	No. of responses
Much too high	0
Too high	2
About right	4
Too low	1
Much too low	1
<b>Total</b>	<b>8</b>

### HSE response

236. No replacement estimates were provided by those who thought the estimate was too low and responses suggested a degree of uncertainty about what maintenance might be required; this seemed very difficult for respondents to predict. Coupling consultation responses with information taken from research interviews with original equipment manufacturers and opinion from subject matter experts, HSE has taken the approach that on balance, its cost estimates at consultation are reasonable. Costs were then adjusted for assumed network penetration of lower WN gas.

### Questions 4 and 5

237. During the consultation, we anticipated that no costs would be incurred in respect of reciprocating engines and CHP unit's. We asked respondents whether they agreed or disagreed with this assessment.

**Table 43** Do you agree or disagree that no costs would be incurred in respect of reciprocating engines

Response	No. of responses
Agree	4
Disagree	3
<b>Total</b>	<b>7</b>

**Table 44** Do you agree or disagree that no costs would be incurred in respect of CHPs

Response	No. of responses
Agree	5
Disagree	5
<b>Total</b>	<b>10</b>

238. Overall, respondents were split, with four agreeing and three disagreeing for reciprocating engines; and five agreeing and five disagreeing for CHPs. In addition, qualitative descriptions of possible impact from respondents provided the HSE expert review group with a compelling argument in favour of impacts in some cases.

### HSE response

239. Estimates have been updated accordingly to recognise that interventions are likely for some reciprocating engines and CHPs for internal monitoring equipment and that tuning and control system upgrades will be required for some of these units.

240. There is a subsequent risk that the impacts described result in outages in generation for these units.

### Question 6

241. Respondents were subsequently asked “**Do you anticipate that the proposed changes to GSMR could lead to disruptions to your ability to supply electricity?**” Answers are shown in Table 45.

**Table 45** Do you anticipate disruptions to your ability to supply electricity

Response	No. of responses
Yes	4
No	4
<b>Total</b>	<b>8</b>

### HSE response

242. Quantifying the cost of such disruptions or their implications for security of supply has not been possible. No respondents were able to do so and subsequent research and interrogation of additional available data and information has not led to a position where costs can be quantified or the effect on security of supply properly understood. Evidence suggests that disruptions to power generation and their impact are dependent on several factors such as turbine design, rate of gas quality fluctuation, duration of outage, time of year of outage, whether the outage was scheduled or unplanned, simultaneous outages across the GB fleet or individual outages, prevailing weather conditions, market conditions during outages, market balancing costs and penalties. Such factors carry much uncertainty and are impossible to predict for the purposes of this policy. Analysts in HSE, BEIS and Ofgem have surmised that the change would be unlikely to result in widespread disruption or loss of power events.

### **Question 7**

243. The group identifying as power generators also highlighted other costs or issues associated with the proposal to reduce the lower WN limit, either through the online consultation or through written submissions.

- some power generators may decide not to invest in the work that is required to cope with the change, which will result in lost output to varying degrees;
- the costs may encourage earlier closure of power generating plants or inhibit their ability to compete in the Capacity Market, which results in lost electricity outputs;
- competent engineering resource is scarce, and there is uncertainty as to whether the resource exists to make the changes required efficiently and without generating additional costs;
- the change could have a significant impact on interconnected markets, especially the island of Ireland and the costs and impacts of interconnected markets have not been considered;
- there could be increased CO<sub>2</sub> corrosion in carbon steel systems; and
- gas control valves may need replacing.

### **HSE response**

244. Of the first four bullet points above, HSE accepts these issues may be a consequence of the proposed change. As described above, it has not been possible to translate these issues into a quantified cost estimate. Studies of interconnected markets were not undertaken as the territorial jurisdiction of the regulations only applies to England, Scotland and Wales but it is recognised that the impacts on interconnected markets are unknown. HSE's analysis is that they would be on a similar level of magnitude to those in GB.

245. It is HSE's view that the impacts described by the latter two bullet points will either be controlled by the gas quality specifications stipulated in schedule 3 part I of GSMR; by operational practices of gas network operators or were simply a precautionary response unlikely to result in major disruption or cost.

**xv. To remove the Incomplete Combustion Factor (ICF) and the Soot Index (SI) limits in schedule 3 and introduce a relative density of  $\leq 0.700$**



246. This change brings limited impacts and costs and there were no specific questions on its costs in the consultation. However, research interviews with the NTS and GDN's revealed that gas quality monitoring and alarm systems which aid compliance with GSMR will need to be changed to the proposed RD value. The NTS advised that this would need to be done at four of their sites and at 11 NTS entry points.

*The total present value cost of these impacts was estimated to be £150,000.*

247. No other costs or impacts were identified for this proposal.

**xvi. To incorporate the HSE class exemption limit of  $\leq 1\%$  (molar) for oxygen in gases conveyed at pressures up to 38 barg**

248. This proposal does not change the regulatory framework as the oxygen limit of  $\leq 1\%$  (molar) is already permitted under a class exemption issued by HSE in 2013. This change will remove the need for certification of an exemption and transfer the permitted limit into the regulations. As such, we are not attributing any costs or impacts as a result of this change.

*The total present value cost of this proposal was estimated to be nil.*

**xvii. Clarity that biomethane pipelines are to be considered part of the gas network**

249. The effect of this proposal will be that those gas producers transporting biomethane to the defined gas network, will now require a safety case if they were not previously operating under one.

250. The safety case regime requires the dutyholder (in this case the gas producer transporting biomethane from the biomethane production plant to the connection point with the gas network through pipelines) to produce a document containing all of the information the dutyholder uses to manage the risk of gas conveyance. Schedule 1 of GSMR outline the particulars to be included. The safety case must be submitted to HSE and assessed, and HSE must confirm acceptance of the safety case to the dutyholder before gas conveyance can commence. These processes mean administrative costs for the dutyholder and cost recovery costs too for the assessment time of HSE. Following acceptance of a safety case GSMR also states the dutyholder must review its content every three years. Review submissions will also incur an administrative cost to the dutyholder. And should there be a material change in the dutyholders undertaking, operations or their assessment of risk at the review, then there will be additional cost recovery costs for the dutyholder from HSE assessment time.

**Questions 1 and 2**

251. At consultation HSE asked “**Would you need to take any additional actions to comply if the proposed changes to GSMR clarify that biomethane pipelines are part of the network?**”

**Table 46** Additional actions to comply if biomethane pipelines are part of the network

Response	No. of responses
Yes	1
No	5
<b>Total</b>	<b>6</b>

252. To supplement the information obtained from this question we also asked whether respondents foresaw **“any unintended consequences (positive or negative) in providing clarity that biomethane pipelines are part of the GB gas network as regulated by GSMR?”** The answers to this question can be found in table 26. These questions were designed to elicit information on the extent to which gas producers would need to enter the safety case regime, as well as identify whether there may be additional impacts that had not been considered. Three respondents thought that the costs and administrative burden associated with this proposal could curtail future biomethane connections or threaten the viability of future operations.

### **HSE response**

253. HSE’s response to this has been described in Section 6, paragraphs 125 and 136. In terms of quantifiable costs, post consultation, HSE worked with a professional body representing the biomethane sector to estimate the costs of the preparation and review of the safety case, and with financial and regulatory experts in HSE to estimate the cost recovery costs. HSE experts were able to provide evidence on the GSMR charge rates, average assessment time (based on HSE time recording data) and trends on the proportion of safety case reviews that are determined to be a material change. The professional body that HSE followed-up with were able to provide an estimate of £25,000 per site for the development and preparation of the safety case, and £25,000 per site per annum for the costs of review. These review costs did not correlate with the data and estimates held by HSE for reviews of safety cases and have not been included. HSE felt that its own data and estimates were more accurate. Final calculations of the review costs have been based on HSE’s estimation of the assessment time required multiplied by the charging rate. All of the costs were applied to all 100 known biomethane sites connected to the gas network. This is a precautionary approach given that we expect some producers will already have a safety case, and some will be able to apply economies of scale.

254. The full assessment of the impacts and costs associated with this proposal can be found in the final stage impact assessment, but in summary:

- Preparation and submission of safety cases;
- Review of safety cases; and
- HSE assessment of safety cases.

*The total present value cost of these impacts were estimated to be between £3.1 million and £6.1 million.*

**xviii. Clarity that co-operation duties apply to operators of LNG import facilities**

255. The regulations are already intended to compel operators of LNG import facilities to co-operate with other dutyholders in order that they may comply with their responsibilities and to safely manage the effects of a gas supply emergency. However, there is a possible gap in legislation which we are seeking to close through this amendment. As this proposal will not substantially change how LNG import facilities operate, communicate or discharge their responsibilities HSE anticipated there would be no impacts or costs associated to this change.

**Questions 1 and 2**

256. To test this assumption during consultation, the following question was asked to all respondents: **“HSE do not anticipate any costs arising from the proposal to require LNG import facilities to co-operate with gas conveyors and the network emergency co-ordinator to allow them to comply with their responsibilities under the regulations. Do you agree or disagree with this assessment?”**

**Table 47** Do you agree or disagree that there will be no costs arising from requiring LNG import facilities to co-operate

<b>Response</b>	<b>No. of responses</b>
Agree	11
Disagree	2
<b>Total</b>	<b>13</b>

257. Of those who responded to this question, the vast majority chose ‘Don’t know’ as their answer (35 of 55). Those who disagreed were then asked **“What changes will have to be made that will generate costs?”** and whether they could estimate these costs. One respondent stated that this change will mean reporting costs and costs associated with testing the shipments of LNG to ensure it meets specification. The second disagreement stated that updating documentation will create expense for the operator.

**HSE response**

258. HSE could not reconcile how the testing of LNG shipments related to the proposal to clarify co-operation duties. Neither of these respondents estimated the cost of the answer they gave. HSE agrees that LNG import terminal operators will probably need to update documentation or undergo other administrative tasks as a result of this change however it is expected that these costs will be minimal and can be absorbed under existing business functions and budgets.

*Consequently, the total present value cost of this proposal is estimated to be nil.*

**xix. A general duty on the industry to provide a continuously manned telephone service**

259. The proposals for changes to the existing gas emergency telephone service were not expected to result in costs. As for other proposals this was generally due to the fact that the measures in question already exist under the current regulatory framework and the proposed changes were not deemed significant enough to impose costs to the current system, with limited parties affected too.

### Question 1

260. As with LNG import terminals, all respondents were asked the following question aiming to establish whether they agreed that there would not be any costs: **“HSE do not anticipate any costs arising from the proposal to remove the named entity from the requirement to deliver a continuously manned telephone service to report a gas escape. Do you agree or disagree with this assessment?”**

**Table 48** Do you agree or disagree that there will be no costs arising from removing the named entity from the requirement to deliver a continuously manned telephone service

Response	No. of responses
Agree	24
Disagree	4
<b>Total</b>	<b>28</b>

261. This question also elicited many ‘Don’t know’ (20) answers. Respondents who disagreed were asked what changes would generate costs and whether they could estimate these.

262. Of those who described changes and estimated costs, one thought that the opportunity for multiple providers of the service would make its provision more expensive. This respondent did not provide a cost estimate. Another stated the proposals made it unclear who is providing the service and who is paying for it. They did not give a cost estimate. Another thought that costs would be incurred if the existing provider would need to amend their existing safety case, and that this would include costs recoverable by HSE for the assessment of the safety case. They estimated costs between nil and £25,000. The fourth respondent who disagreed stated that the lack of a duty to test air or appliances for CO led to inflated costs for the National Health Service as survivors of CO poisoning require expensive medical treatment. No cost estimate was given.

### HSE response

263. With the policy still in development and the consultation aimed at enhancing its development, it appears the first two reasons for these disagreements may be due to some uncertainty to whom both the duty and any cost wills apply. The service is currently funded by Ofgem and these proposals do nothing to alter those arrangements. The proposals should not generate costs for these reasons. HSE agrees that a dutyholder having to amend their safety case in order to comply with these proposals will incur costs. HSE has proposed adaptations to the policy described in Section 8 so that this is not expected to occur. With regards to CO testing and NHS costs these are not related to the proposals and are therefore not in scope of the consultation and so have been discounted in the cost benefit analysis.

264. HSE's view that this change will not result in costs was reinforced by 24 of the consultation respondents. The policy intent is to maintain the health and safety benefits of the status quo whilst making provisions that can enable co-regulation and resilience within the service. It is not expected that these changes will result in disruption or an immediate change in provider and so the assessment remains that this change will not generate costs.

*The total present value cost of this proposal is therefore estimated to be nil.*

## **xx. Familiarisation**

265. When GSMR is amended, some organisations will need to spend time understanding what the change means for them, constituting an additional cost to business.

266. To ascertain a quantifiable cost of familiarisation, consultation respondents were asked what they would have to do to familiarise themselves with the changes and how many person-hours this would take. HSE then used data from the Annual Survey of Hours and Earnings<sup>29</sup> as the second parameter alongside the respondents estimates of person-hours in order to calculate these costs.

### **Question 1**

267. Forty of the 55 respondents stated they would incur a familiarisation cost. These respondents were comprised of the gas producer, gas interconnector, gas distributor, gas engineer and manufacturers/engineers of gas appliances and equipment groups. Qualitative analysis of the reasons given by respondents for these familiarisation costs showed that these were generally as a result of the proposed changes to gas quality. For these sectors, the costs emanated from administrative duties such as issuing internal communications, conducting internal audits or reading updated information and guidance. For gas engineers and manufacturers/engineers of gas appliances and equipment, there was some concern that additional training would be required and that appliance manuals and supporting guidance would need to be refreshed.

### **HSE response**

268. HSE investigated this further during workshops attended by subject matter experts and during a research interview with Energy & Utility Skills in spring 2022. The effects of supplying and burning lower WN gas were discussed, how this would manifest in appliance/equipment behaviour and, the professional response required. The assessment revealed there would need to be a form of awareness raising amongst these sectors through updated information and guidance, but that additional training or accreditation would not be necessary. This meant that lower estimates of person-hours for these affected sectors were given greater weight.

---

<sup>29</sup> Annual Survey of Hours and Earnings (ASHE), Office for National Statistics, 2021  
<https://www.ons.gov.uk/surveys/informationforbusinesses/businesssurveys/annualsurveyofhoursandearningsash>  
e

Estimates and analysis can be found in the final stage impact assessment but *the total present value cost of familiarisation is estimated to be between £4.6 million and £14 million.*

## 10. Benefits

269. Data gathered from respondents has been used to inform the final impact assessment and monetise benefits where possible.

### xxi. Safety

270. The key policy objective of the proposed changes to GSMR is to maintain or improve the safety standards that have been achieved to date. HSE believes that the amendments concerning biomethane pipelines, co-operation duties for LNG import terminals and the gas emergency telephone service will be the contributors towards this objective but, it has not been possible to monetise these benefits. Evaluation of the effect of these amendments on safety will be an ongoing task for HSE once these changes are made.

#### A new lower WN limit of $\geq 46.5$ MJ/m<sup>3</sup>

271. Evidence presented by the GQWG has also shown that the proposal to reduce the lower WN limit will result in improvements to the safety of using gas. HSE has been able to quantify the benefits of this using existing statistics on CO poisoning fatalities and the costs to society of a fatality from Costs to Britain<sup>30</sup> estimates. Lower WN gas equals lower calorific value and consequently CO production is reduced in malfunctioning appliances that have abnormally low air-fuel ratios. The evidence submissions presented to HSE by the GQWG in support of this proposal showed between around 0.032 and 0.072 fewer fatalities from CO poisoning each year. These figures were adjusted over the ten-year appraisal period to account for future reductions in gas consumption but did enable a quantified benefit to be produced. That said, CO poisonings would continue to be dependent upon other external factors such as inadequate flueing or ventilation.

*The total present value benefit of this impact was estimated to be between nil and £1 million.*

### xxii. Gas production

#### A new lower WN limit of $\geq 46.5$ MJ/m<sup>3</sup>

272. The prescriptive nature of the gas quality specifications set out in schedule 3 of GSMR is problematic in terms of enabling additional supplies of gas to GB or flexibility in the supply of gas and so the proposal to reduce the lower WN limit is

---

<sup>30</sup> Costs to Britain of workplace fatalities, self-reported injuries and ill health, HSE, 2018/19  
<https://www.hse.gov.uk/statistics/pdf/cost-to-britain.pdf>

intended to adapt the restrictions placed on gas quality by the regulations and provide the ability to diversify accessible gas resources. This consultation identified that additional production of gas could be generated from the UKCS by reducing the lower WN limit. The questions eliciting this information are presented in Section 3. Using the estimates of additional production of gas given by respondents enabled HSE to establish estimates of the value of that additional production using the estimated volumes given at consultation and a range of projected gas prices from forecasts by the research and consultancy firm Wood Mackenzie<sup>31</sup>.

273. Given that gas production is sensitive to a number of factors and is not an area of HSE expertise, support in the analysis of consultation responses on additional production, as detailed in Section 3, was obtained from the NSTA. Additionally a number of research interviews with one gas producer who had responded to the consultation were also conducted. The purpose of this extra activity, analysis and support was to:

- assess to what extent additional volumes of gas be attributed to the change;
- assess how certain the volumes given by respondents are; and
- assess the likelihood of these volumes being produced.

274. HSE was able to quantify the benefits of additional production of gas where there was good confidence that returns met the three conditions above. Some estimates given by respondents were discounted for this analysis if there was sufficient uncertainty that the conditions above had been met. Such factors leading to uncertainty included assessment of the gas composition of resources, the estimated volume of the resource, infrastructure and location of resources, capital expenditure and cessation of production dates. Where relevant, information and data taken from Stewardship Surveys, Standard Economic Templates and Field Development Plan Addendum's was used to aid analysis. To account for the uncertainty in the estimations of additional volumes, a range of estimates was deployed which attempts to reflect the three conditions described in the bullets above, alongside other sensitivities and assumptions. In the 'low' case the change does not result in any additional production because we model a scenario in which NEAs do not get changed down to the new lower limit, or the negotiating period of these NEAs is too long, making the investment required for additional production unattractive or unviable. In this scenario, the benefits are therefore nil. In the 'high' case we model a more favourable negotiating window for NEAs of one year, meaning that the additional volumes are realised sooner and for longer.

275. This approach has led to the establishment of three credible routes to additional gas production. The first is increases in production from existing sources as a result of the change, meaning that some gas processing can be averted. Currently some gas must be blended with other sources of gas to bring it into GSMR specification before it can enter the NTS. Availability of such blend gas can be limited and when it is not available, production from the source reserve is curtailed. The proposed reduction in the lower WN limit means that the source reserve of gas no longer requires the same amount of blending. Curtailments are avoided and additional production is enabled. The second route is additional development of reserves within

---

<sup>31</sup> Q2 2022 gas prices subscription, Wood Mackenzie, 2022



existing fields. In these cases estimates of 15.75% of additional production above the current baseline for that producer have been ascertained from respondents answering questions about the effect on gas production. The third route is the development of one discovery in the UKCS which has not currently been developed due to capacity constraints at its production hub. Although the gas producer has indicated this development is likely to go ahead irrespective of the proposed changes to GSMR, HSE can attribute an additional 5% production from this field to GSMR as it enables spare capacity in the production hub due to the reduction in gas processing and so this reserve can be tied back to the production hub and an additional 5% of gas pushed through.

*The total present value benefit of these impacts is estimated to be between nil and £499 million.*

276. While this is a substantial benefit of the proposed reduction in lower WN limit, taken in the wider context, the additional production that has been identified with confidence through the responses given to this consultation peaks at around an extra 1.0% of baseline UKCS production in 2026 and 2027 and reduces thereafter.

### **xxiii. Gas processing**

#### A new lower WN limit of $\geq 46.5$ MJ/m<sup>3</sup>

277. The proposed change to the lower WN limit means that some gas processing/blending activity can be averted. HSE assumed that this would result in a saving as a result of the change however, further exploration with a gas producer of the financial and commercial arrangements for paying for blend gas revealed that the arrangements did not represent an economic resource cost and so the estimates of savings were not included in the analysis.

#### Removal of the ICF and the SI

278. Two respondents highlighted in the unintended consequences question in the lower WN part of the consultation, that this amendment would mean that some gas producers could reduce their nitrogen ballasting activity where the gas composition in question was at the upper end of the WI. A reduction in this activity saves money from bills for nitrogen and operating costs of ballasting. Estimates given at consultation have been taken from respondents and modelling applied of future gas demand and NEA arrangements to calculate the savings over the appraisal period.

*The total present value saving of this impact is estimated to be £460,000.*

### **xxiv. Emissions**

#### A new lower WN limit of $\geq 46.5$ MJ/m<sup>3</sup>

279. HSE considers that the proposed reduction in the lower WN limit could generate additional production of gas from the UKCS and that this could mean carbon

emissions savings. The NSTA advise that additional UKCS production would entail virtually zero incremental emissions, as it would use existing infrastructure whose emissions are not sensitive to throughput. So additional volumes of gas do not result in increased emissions. As analysis expects supply of gas to balance against demand, to calculate the benefits, comparison of this additional UKCS production was made to the equivalent emissions from supplies which may be displaced. Displaced gas was assumed to be imported supplies, based on historical trends, but HSE was not able to ascertain which source of imported gas would be displaced. The final stage impact assessment assumes for its calculations that Norwegian gas from the interconnector is displaced (Norwegian interconnector emissions are 17 kg CO<sub>2</sub> e / boe<sup>32</sup>) as this is the lowest emission production. This tends to underestimate savings, rather than risk overestimating them. BEIS estimates<sup>33</sup> of the cost of emissions were used for the calculations.

*The total present value saving of this impact is estimated to be between nil and £1.5 million.*

## **xxv. Gas prices**

280. It is HSE's evaluation that none of the amendments being proposed to GSMR will result in a reduction on wholesale gas price. The gas market is driven by global factors and traded globally meaning that domestic changes are unlikely to have an impact on the price for GB consumers. The additional volumes of gas that will be generated under the proposal to reduce the lower WN limit are not sufficient enough to affect global supply and so will have no bearing on gas prices in GB. Domestic prices will still be expected to be set based on global gas prices. The savings identified through this consultation are not expected to be passed through to consumers either and so no effect for gas prices. If anything, the potential for disruption to electricity security of supply identified as an impact of reducing the lower WN limit has the potential to result in short-term increases in the price of electricity if power generators seek to recover their costs through wholesale power prices or capacity market clearing prices. Where this is price setting, this could increase prices across the whole market for short periods.

## **11. Other costs and benefits**

### **Question 1**

281. All consultation respondents were asked the following: “**Do you anticipate any other costs or benefits from the proposed changes?**” Eighteen respondents said they could not foresee any further costs as a result of the proposed GSMR amendments, and 11 said there would be other costs.

### **Table 49 Other costs or benefits**

---

<sup>32</sup> boe = barrel of oil equivalent

<sup>33</sup> Valuation of greenhouse gas emissions: for policy appraisal and evaluation, BEIS, 2021

Any other cost or benefit?	No. of responses
Yes	11
No	18
<b>Total</b>	<b>29</b>

282. Of the 11 responses that stated there would be additional costs or benefits, three responses highlighted the benefits of additional gas production and one response highlighted the benefit of reduced nitrogen ballasting from the removal of the ICF and the SI. These benefits have been calculated as above. The other seven respondents provided more information on what they believe will be additional costs and table 50 shows what costs were cited by those respondents:

**Table 50** Categorisation of costs or benefits

Other costs	No. of respondents who cited this cost
Testing of appliance settings	3
Familiarisation	1
Power generators having to assess their impacts	1
Commissioning and servicing of commercial appliances	1
Cost of CO poisonings	1
<b>Total</b>	<b>7</b>

### HSE response

283. These costs and benefits have already been discussed in this response and fed into the final stage impact assessment where relevant.

## 12. Transition arrangements

284. HSE recognises that these proposed amendments have the potential to require dutyholders and others to adopt different patterns of behaviour, or alter their operations and that it is good practice to allow those affected a reasonable period in which to adapt to the changes required. Transition arrangements are intended to do this and help alleviate uncertainty and provide conditions under which business continuity can be maintained so far as possible.

### Question 1

285. HSE sought the views of consultation respondents on potential transition arrangements. All respondents were asked “**What do you think would be the minimum transition period necessary for your organisation to make arrangements for the regulation changes to be successfully implemented?**”. A range of answers were presented and the results are summarised in Table 51:

**Table 51** Transition periods for implementation

Period	No. of responses
As soon as the regulations change	9
Up to 1 year	17
1-2 years	7
3-4 years	2
5 years or more	5
<b>Total</b>	<b>40</b>

### HSE response

286. The majority of respondents stated they could successfully implement the changes from as soon as the regulations change up to 2 years. Those who stated they would need much longer periods were all from the power generation sector, with the exception of one consultancy who did not provide an explanation for their answer. One gas producer stated that software changes will be required at all grid entry units, which will require development and testing by manufacturers. Other answers that highlighted similar issues chose shorter transition periods. To arbitrate on this discrepancy HSE sought the view of Ofgem as they would be required to approve such software. Their view fell on the side of an earlier transition period. The answers given by power generators were due to the proposed changes to gas quality and the preference to align the required adaptations with scheduled outages coupled with the resource availability of original equipment manufacturers to undertake the work required. HSE has determined that a two-year transition period applying to the lower WN change balances the need for industry to make operational changes against the realisation of the benefits arising from the change.

287. As identified elsewhere in this consultation response, the amendments concerning the removal of the ICF and the SI, the incorporation of the HSE class exemption limit of  $\leq 1\%$  (molar) oxygen and clarity that co-operation duties apply to operators of LNG import terminals result in minimal impacts and costs, will not impose significant burdens on businesses and in the latter two cases, are formalising in law operational procedures that are already in place. The consultation has validated these conclusions; costs are assessed to total just £150,000 for these amendments and none of them featured as reasons respondents gave to the transition or familiarisation questions. Consequently, HSE is not considering transition arrangements for these amendments.

### Biomethane pipelines

#### Question 1

288. Consultation respondents fed back concerns that the amendment concerning clarification that biomethane pipelines are to be considered part of the gas network will have an adverse effect on the viability of biomethane operations and/or will discourage new biomethane connections to the grid. Respondents representing the biomethane or gas distribution sectors who answered the question on the minimum transition period mostly chose 'up to 1 year' (four). Two chose '1-2 years'.

### HSE response

289. HSE agrees that the proposed provisions for biomethane pipelines will be more onerous than before and that a transition period is required for this amendment to mitigate against the potential impacts consultation respondents have described. HSE has considered these responses and decided that a two-year transition period will be allowed before the amendment that clarifies that biomethane pipelines are to be considered part of the gas network takes effect. This period should be sufficient for dutyholders to take the necessary action that is required and reflects the fact that this sector has many small or micro businesses that require greater support in dealing with this regulatory burden. HSE also feels that a two-year transition period does not delay the new duty so long that the safety objective behind the amendment becomes severely compromised. Dutyholders newly captured by this provision will be required to submit a safety case within 18 months of the commencement date of this amendment, providing six months for HSE to assess the safety case application and issue a decision.

#### Continuously manned telephone service

290. The proposed changes to the continuously manned telephone service will place the duty on the 'Emergency Reporting Service Provider'. It will:

- a. require the service provider to have a safety case for the service;
- b. create a new schedule describing the particulars to include within that safety case;
- c. impose a notice period for transition between providers; and
- d. regulate that no network may operate unless there is an ERSP for the network.

#### **Question 1**

291. Some consultation respondents pointed that the provision for the service provider to have a safety case will generate costs or administrative burdens.

#### **HSE response**

292. HSE intends to pursue this policy but will provide transition arrangements before it takes effect designed to remove the potential costs and ease the burden. This provision will only take effect when the existing providers gas conveyor safety case is due for its three review under regulation 4(3). There should also be nothing written into the amended regulations that would stipulate that a gas conveyor safety case and a ERSP safety case have to be separate documents when the same organisation requires both.

### **13. Wider concerns/issues raised during consultation**

293. The consultation provided opportunities for respondents to highlight other concerns/issues through some generic questioning. Other respondents chose to provide written submissions to do this. The main concerns/issues related to the proposed GSMR amendments were in relation to the following (with HSE policy responses):

### Lower WN emergency limit

294. One respondent stated that the proposal for a new lower WN limit would mean that the lower emergency limit, prescribed in schedule 3 part II of GSMR, would no longer be required as the new lower WN limit under normal conditions of  $\geq 46.5$  MJ/m<sup>3</sup> would be the same as the lower emergency limit.

295. This is correct, albeit HSE has decided to retain the lower emergency limit at within  $\geq 46.5$  MJ/m<sup>3</sup> the regulations just to ensure absolute clarity in what the limit is. There had been no request or evidence provided for a new lower emergency limit, possibility due to the absence of any commercially viable gas below the new lower limit. The upper emergency limit will also be retained as one tool in the measures the regulations provide for to prevent a gas supply emergency.

### Capacity Market

296. Several respondents fed back that the proposal for a new lower WN limit would cause problems with the electricity Capacity Market model and its obligations for suppliers. Aside from the operational challenges that have already been described in this consultation response, and their impact on the functionality of gas-fired power generation equipment, respondents stated that they may struggle to fulfil their contractual obligations. With Capacity Market Contracts already extended into 2026 respondents also said that their bid prices were not reflective of the costs this proposal would place on them in their generation of the electricity. One respondent believed that compensation for generators should be considered in this case.

297. HSE has flagged these concerns to BEIS as part of the BEIS consultation into Electricity Capacity Market reform.

### Status of interconnectors and the gas network

298. One respondent thought clarification on whether interconnectors conveying gas to GB from another country are part of the GSMR network would be helpful.

299. HSE agrees that clarification is required. GSMR and L80 series guidance predates the advent of bi-directional capacity on the Belgian interconnector and the construction of the bi-directional Netherlands interconnector and so it is no longer clear whether these interconnectors form part of the gas network when they are importing gas into GB. The solution is not straightforward. The stock response would be changes to network definition or interconnector definition within the regulations but, such proposals were not consulted upon, would involve complex legal drafting and could result in unintended consequences, as this consultation has shown. Other solutions considered have been to distinguish the status of the interconnectors based on whether they have offtakes to domestic consumers in GB, or to draw a network boundary up to the mid-sea UK territorial waters limit. These also appear to involve a level of complexity that is disproportionate to the severity of the problem. The two bi-directional interconnectors in question are of course conveying gas from GB as well as to GB and so, in line with GSMR both have submitted and have had accepted safety cases which would be the intended outcome anyway should the regulations be changed to provide greater clarity. HSE therefore intends to provide

the clarification sought by revised L80 guidance and in particular, by updating the schematic of the network provided in figure 1 of that guidance.

### Innovation in the continuously manned telephone service

301. Some respondents stated that the proposals for the continuously manned telephone service may stifle innovation as they continue to rely on the telephone as the primary means of communication for reporting gas escapes, providing advice to the public and dealing with incidents. The consultation had not considered whether innovative communication solutions such as 'Live chats' or any other form of digital online communication could improve the standards of the service.

302. It is HSE's position that the freephone 0800 111 999 telephone number allowing members of the public to report gas escapes performs an important health and safety function and the policy intention is that this telephone number continues to be available to the public. There are risks that more innovative practices isolate or exclude vulnerable members of the public that do not have access to the internet or do not know how to use it. Or a risk that innovation could fragment what is currently a clear reporting and advice mechanism. That said, technological advancements could have the potential to improve the reporting of gas escapes and the health and safety response. HSE will set down the duties for the ERSP in the amended regulations and the freephone number will be a prerequisite but flexibility will be given regarding alternative communication methods. Such methods will also need to be continuously manned and upheld to the same standards as the telephone service. The new schedule of the particulars that the service provider will need to demonstrate in their safety case for operating the service will outline expectations and responsibilities for managing the safety risks inherent in operating the service. This will include the management of competent personnel, the desired standards of service, record keeping and business continuity and disaster recovery. As long as there is compliance with the new schedule, HSE believes that there is room for service providers to innovate outside of those parameters and that the amended regulations should provide sufficient freedom for service providers to do this if they choose, so long as they maintain compliance. Any such innovation will be observed by HSE to assess its impact on health and safety standards with HSE retaining the ability to regulate further if required in the future.

### Safety case review

303. A small number of respondents asked that the three year review period stipulated in regulation 4(3) be increased as a means of reducing regulatory burdens on business.

304. HSE has carefully considered the advantage of easing this regulatory burden against the impact it may have on safety standards. An increase in the review period to five years would align GSMR with other regulations that operate using safety cases, providing a degree of consistency. Control of Major Accident Hazards (COMAH) 2015<sup>34</sup> and Offshore Installations (Offshore Safety Directive) (Safety Case

---

<sup>34</sup> The Control of Major Accident Hazards Regulations 2015, legislation.gov.uk, 2015  
<https://www.legislation.gov.uk/ukxi/2015/483/contents>



etc.) 2015<sup>35</sup> being examples. However, HSE would need to be satisfied that increasing the safety case review period would not lead to a reduction in safety standards, and with the potential for alternative sources of gas in the future to aid decarbonisation of the gas network, there is also a question of whether increasing the safety case review period is appropriate at this time. Whilst recognising the merits of this proposal, HSE believes that further consultation would be required with interested parties before any decision could be made to progress this proposal. This would enable full stakeholder input and enable HSE to discharge its duty to consult under Section 50 of HSWA. Given commitments from government and industry to consider the future decarbonisation of the gas network, there are likely to be further opportunities for consultation on GSMR in the future.

### Regulation 5 defence clause

305. One respondent flagged that there is currently no duty for the continuously manned telephone service to co-operate with other gas conveyors and the NEC so that gas conveyors and the NEC may comply with the provisions of GSMR. If introduced, the respondent said that a new clause would be needed in regulation 5 stating it would be a defence in criminal proceedings not to comply with the continuously manned telephone service if the direction resulted in a risk to safety.

306. HSE will extend the co-operation duties to the ERSP by adding them to the list of persons that must co-operate with gas conveyors and the NEC under regulation 6(2) which in turn will bring them into scope of regulation 5(2)(b). Regulation 5(2)(b) references co-operation duties and is intended to manage the issue raised by the respondent, providing a defence in criminal proceedings if *“the commission of the offence was due to a contravention by another person of regulation 6 and the accused had taken all reasonable precautions and exercised all due diligence to ensure that the procedures or arrangements were followed”*. Under the amended regulations, this regulation will capture the ERSP and any direction they make if that direction leads to the contravention of regulation 5(1) by a person with an accepted safety case. HSE considers these arrangements sufficient. In addition, no other person of regulation 6(2) is specifically named in regulation 5 as a person to whom a defence may be relied upon if they are not complied with, and HSE does not see the case for the ERSP to be treated exceptionally here.

307. There were other concerns/issues raised during this consultation which are not in scope of the proposed GSMR amendments but have been recorded and addressed briefly below:

### Higher WN

308. Ahead of this consultation, industry proposals had focussed on an increase to the higher WN limit set down in schedule 3 and evidence submissions assessing the risk of increasing this limit were provided to HSE in October 2021. HSE decided not to consult on this proposal due to concerns over safety, control measures and cost. A small proportion of the consultation responses expressed disappointment in the decision not to consult on an increase to the higher WN limit, or propagated the

---

<sup>35</sup> The Offshore Installations (Offshore Safety Directive) (Safety Case etc.) Regulations 2015, legislation.gov.uk, 2015 <https://www.legislation.gov.uk/ukxi/2015/398/contents>

benefits of an increase to security of supply and in reduced nitrogen ballasting activity. One respondent provided an extensive written submission on higher WN gas including arguments on overall risk reduction when considering societal risks such as fuel poverty.

309. HSE's policy on an increase to the higher WN limit in schedule 3 of GSMR is that such a proposal will not be taken forward or prioritised at present. HSE has concerns over the reduction in health and safety standards associated with an increase in the higher WN due to increased CO poisoning and the effectiveness of mitigatory controls. HSE would also like to see mitigatory controls researched further and tested for their effectiveness. Indicative analysis also shows the proposal may be entirely cost-prohibitive.

310. HSE is content to engage in further discussions with industry on this proposal and will reflect on its position, alongside other changes that may be required to achieve Net Zero policy. Should the current cost of living problems or supply squeezes become more acute, an increase in the higher WN limit may become a necessary health and safety measure.

311. Until there is demonstrable change in either the health and safety landscape or political landscape, HSE will prioritise the conclusion of the amendments that have been consulted upon.

#### Strategic exemptions

312. One respondent suggested that strategic exemptions could be made for higher WN gas at locations of important gas supply, such as LNG import terminals.

313. HSE would not encourage the use of strategic exemptions for the same reasons as the proposal for a higher WN limit under normal conditions was not taken forward to consultation. But HSE would consider any exemption request from any part of GSMR in accordance with its policy on granting exemptions<sup>36</sup>, its guidance on GSMR assessment<sup>37</sup> and in compliance with the conditions outlined in regulation 11 of GSMR. This could, conceivably be a route to strategic exemptions.

#### Hydrogen

314. Some respondents wanted more information on the vision for hydrogen.

315. The increased use of hydrogen is a government priority to achieve its pledge of net zero carbon emissions by 2050, aligning with the Ten Point Plan for a Green

---

<sup>36</sup> Granting Exemptions to Health and Safety Legislation, HSE, 2022

<sup>37</sup> Gas Safety Management Regulations 1996 Safety Case Assessment Manual, version 7.1, HSE, 2017  
<https://www.hse.gov.uk/gas/supply/gasscham/gsmrscam.pdf>

Industrial Revolution<sup>38</sup> and the Sixth Carbon Budget<sup>39</sup>. The Energy White Paper<sup>40</sup> and the Hydrogen Strategy<sup>41</sup> have set out plans to enable up to 20 per cent hydrogen blending on the gas networks by 2023 (subject to trials and testing). There are also commitments to reach a policy position on hydrogen in heat decarbonisation by 2026.

316. HSE currently has a programme of work aiming to reach an authoritative view on the safety impacts of hydrogen for heating to feed into government policy decisions in the mid-2020's. This will include assessing the evidence and regulatory framework required for the safe distribution, storage and use of hydrogen gas in domestic, industrial and commercial premises, and contribution to policy proposals for widespread implementation. HSE is helping to co-ordinate the evidence review process and providing input into the Hydrogen Heating Programme trials strategy and proposals evaluation. HSE will use expertise across the organisation, engage with stakeholders and work with industry and BEIS to guide the development of an appropriate evidence base, providing regulatory oversight of hydrogen trials. Whilst this work remains ongoing there are no plans to change the hydrogen content limit permitted in GSMR.

#### Gas quality changes at once

317. One respondent stated that it would be preferable for the government to bring forward gas quality changes, such as the WI limits or hydrogen content, in one go. This would enable stakeholders to respond to only one set of changes which makes implementation easier. This sentiment was echoed by others but not as explicitly.

318. The safety of hydrogen in gas networks continues to be assessed and the policy surrounding hydrogen blending and hydrogen for heating remains outstanding. As such there is no guarantee that there may be the opportunity to make future regulatory changes concerning gas quality in unison and such an approach would jeopardise the benefits associated with signalling the lower WN change at this time.

319. HSE's future regulatory activity on gas quality, including any additional amendments to GSMR, is undecided and will continue to be informed by the best available evidence.

#### Gas quality information

320. Several consultation respondents stated that real-time gas quality data and information would assist in their evaluation of the implementation measures they would need to deploy in the event that the gas quality specifications are changed in

---

<sup>38</sup> Ten Point Plan for a Green Industrial Revolution, HM Government, 2020, [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/936567/10\\_P\\_OINT\\_PLAN\\_BOOKLET.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/936567/10_P_OINT_PLAN_BOOKLET.pdf)

<sup>39</sup> The Sixth Carbon Budget, The Climate Change Committee, 2020, <https://www.theccc.org.uk/wp-content/uploads/2020/12/The-Sixth-Carbon-Budget-The-UKs-path-to-Net-Zero.pdf>

<sup>40</sup> Energy White Paper, BEIS, 2020, [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/945899/201216\\_BEIS\\_EWP\\_Command\\_Paper\\_Accessible.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/945899/201216_BEIS_EWP_Command_Paper_Accessible.pdf)

<sup>41</sup> Hydrogen Strategy, HM Government, 2021, [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1011283/UK-Hydrogen-Strategy\\_web.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1011283/UK-Hydrogen-Strategy_web.pdf)

GSMR. An example being the procedures a gas engineer would follow in the commissioning and servicing of industrial and commercial appliances were there a mechanism to enable the prevailing gas quality to be known on site.

321. HSE recognises that real-time gas quality data and information would add value for professionals in the field, and aid in the operability of certain types of gas equipment. It may perform a health and safety function too. HSE is aware of one industry project which is considering how gas quality data and information may be made available but, has no plans to conduct any regulatory activity on this topic at present. It is considered that the existing regulatory framework for managing the risks associated to gas quality is working as intended.

## 14. Conclusion and next steps

322. HSE is grateful to those who took the time to provide considered and detailed responses to this consultation. The consultation has informed the development of proposals for GSMR, the evidence and data gathered has been fed into a final stage impact assessment which analyses and assesses the impacts, costs and benefits of the proposals, and, the consultation has helped to influence and refine the detail of amended regulation.

323. This consultation response has provided an indication of HSE's intentions regarding the proposals and in response to the broad support for:

1. a new lower WN limit of  $\geq 46.5 \text{ MJ/m}^3$
2. the removal of the Incomplete Combustion Factor and the Soot Index limits in schedule 3 and
3. the introduction of a relative density of  $\leq 0.700$ ; the incorporation of the HSE class exemption limit of  $\leq 1\%$  (molar) for oxygen in gases conveyed at pressures up to 38 barg;
4. clarity that co-operation duties apply to operators of liquefied natural gas import facilities;
5. for a general duty on the industry to provide a continuously manned gas emergency telephone service, and
6. the support for clarity that biomethane pipelines are to be considered part of the gas network.

HSE intends to bring forward these measures by amending the 1996 regulations.

324. The consultation responses received regarding these proposals have helped to develop the policymaking and feedback has directly been incorporated so that biomethane pipelines, whilst now being classed as part of the gas network as defined by GSMR, can retain the ability to convey gas that is not compliant with schedule 3 part I to treatment or blending points. Additional guidance on whom the responsibility for submitting and owning the safety case for pipelines conveying biomethane will be provided through updated L80 guidance. HSE has also heard respondents say that greater clarity is needed over whom the duty to provide the continuously manned gas emergency telephone service applies to and this will be achieved through updated L80 guidance. HSE has sought to distinguish and isolate the duties of the Emergency Reporting Service Provider from independent, private services that are in place to respond to gas emergencies in other settings such as social housing. And where HSE has heard respondents say that these proposals will introduce burdensome duties or significant costs it has applied transition periods to help dutyholders adapt and provide greater time to comply.

325. These amendments will maintain or improve the safety standards that have been achieved to date, ensure clarity and consistency in how pipeline operators and Liquefied Natural Gas import terminals are regulated by GSMR and ensure that industry changes are reflected within the gas emergency call handling service and that it remains accessible to the public. The compilation of the final stage impact assessment of these proposals has shown where costs and impacts are significant,

and mitigatory measures have been adopted to mitigate against these. HSE considers that these proposals are proportionate and will be effective for the ongoing regulation of gas conveyance.

326. Consultation responses have informed an evolution in policy on the proposal for a new lower Wobbe Number limit of  $\geq 46.5$  MJ/m<sup>3</sup>. This proposal will be taken forward as analysis shows it will help to deliver some of the key policy objectives around gas supply, but it will be subject to a delayed commencement date of spring 2025. HSE and BEIS are satisfied that this is a just measure which balances the need to obtain the associated benefits against helping to reduce the risks of unplanned outages for power generators and onerous and expensive changes for other businesses. UKCS reserves currently supply a significant proportion of GB demand and are estimated to for many decades to come<sup>42</sup> and in the immediate short-term the opportunities for additional supply that the reduction to the lower WN limit brings will increase viable supplies and therefore aid energy independence and resilience. Gas composition varies between reservoirs and the relatively narrow band of the current acceptable Wobbe Index range in the GB specification adversely impacts the ability to maximise economic extraction of these reserves and supplement supply. Current global gas market forces are manifesting themselves in increases in gas price. Consequently, policy solutions to enhance supply resilience are beneficial and the change to the lower WN is a helpful step in mitigating against risks to gas supply and the associated public health risks.

327. HSE will now move to progress the legislative changes to be taken forward that this consultation has helped to identify, in accordance with Parliamentary timelines. A new statutory instrument will be published alongside the final stage impact assessment.

---

<sup>42</sup> Reserves and resources, North Sea Transition Authority, 2022, [North Sea Transition Authority \(NSTA\): Reserves and resources - Data downloads and publications - Data centre \(nstauthority.co.uk\)](https://www.nstauthority.co.uk/data-centre/publications-and-downloads/reserves-and-resources)