Consultation

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Wormington Compressor Emissions – Final Preferred Option

Subject	Details
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We are consulting on our preferred option for investment at the Wormington Compressor Station to ensure compliance with the Medium Combustion Plant Directive. We are seeking views from all interested stakeholders in particular, network companies, gas shippers, consumer groups, environmental groups, and the public.

This document, sets out our assessment of the preferred option, seeks responses to a number of specific questions and sets how you can get involved. Responses to this consultation will be taken into consideration before we issue our final decision on the preferred option. We want our consultations to be transparent, so we intend publishing the non-confidential responses received alongside our decision on our website at Ofgem.gov.uk/consultations. If you want your response – in whole or in part – to be considered confidential, please tell us and explain why. Please clearly mark the parts of your response that you consider to be confidential, and if possible, put the confidential material in separate appendices to your response.

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Executive summary

Wormington Compressor Emissions - Final Preferred Option

In our RIIO-T2 Final Determinations we accepted the 'needs case' for investment at the Wormington Compressor Station to ensure compliance with the Medium Combustion Plant Directive (the Directive). The Directive requires that existing gas turbines, between 1MW and 50MW net thermal input, must not exceed an emissions limit of 150mg/m^3 Nitrogen Oxide (NOx) by 1st January 2030.

However, given the level of uncertainty at the time with respect to both the 'preferred option' and the level of funding required, we decided that this project, alongside similar Compressor Emissions projects, should be funded through our Gas Transmission Project Assessment Process. This process is set out in Special Condition 3.11 Compressor Emissions Re-opener and Price Control Deliverable.

At Final Determinations we provided £14.83m (2018/19 prices) of baseline funding in the form of a Price Control Deliverable for the Wormington Compressor Station project. The required deliverables were a Final Option Selection Report in August 2022 and a re-opener application seeking a funding Direction in November 2024. The Final Option Selection Report must contain a Final Preferred Option along with supporting evidence necessary for the Authority to either accept the recommendation or approve an alternative as the Final Preferred Option. The Re-opener application must be based on the Final Preferred Option approved by the Authority following submission of the Final Option Selection Report.

In compliance with Special Condition 3.11 a Final Option Selection Report was submitted in August 2022, which identified the Final Preferred Option for compliance with the Directive as being the replacement of the two existing non-compliant gas turbines with two new compliant gas turbines on a greenfield site on land already owned by NGGT outside the existing site. Ten alternative options, including the counterfactual 'do nothing' had been shortlisted and the Final Preferred Option was identified based on both a Cost Benefit Analysis and a Best Available Technology assessment. The Final Preferred Option was identified as having advantages over the alternatives in terms of ongoing compressor availability and the level of required outages during construction and commissioning. These were regarded as significant, given the critical role that Wormington plays in providing security of supply for energy consumers in Great Britain.

Having assessed the Final Option Selection Report, we propose rejecting the Final Preferred Option identified and approving one of the alternative shortlisted options as the Final Preferred Option. The proposed final preferred option by Ofgem is the replacement of one of the existing gas turbines with a new compliant gas turbine and refurbishment of the other under a 500-hour Emergency Use Derogation. Separately, should Avon Dry Low Emissions Retrofit technology become available for the 500hr derogation unit then we would expect NGGT to carry out the retrofit of the derogated gas turbine and we would seek to identify an appropriate mechanism for funding the retrofit.

Next Steps

We welcome responses to our consultation, in particular to the specific questions we have included in Chapters 4 and 5. Please send your response to: graham.craig@ofgem.gov.uk by 9 January 2023. We expect to publish our final decision on the 'preferred option' no later than 3 March 2023.

1. Introduction

What are we consulting on?

1.1. This consultation sets out our minded to position not to approve the Final Preferred Option identified by NGGT in the Wormington Compressor Station Final Option Selection Report (replacement of the two existing non-compliant gas turbines with two new compliant gas turbines on a greenfield site on land already owned by NGGT outside the existing site) but to approve one of the other shortlisted options as the Final Preferred Option (replacement of one of the existing gas turbines with a new compliant gas turbine and maintenance of the other under a 500 hours Emergency Use Derogation).

1.2. This consultation sets out our assessment of the options set out in the Final Option Selection Report (FOSR) and the elements we have considered when reaching our minded to position. We are seeking views from interested stakeholders on or assessment of the options and our minded to position as to the Final Preferred Option.

Consultation Process

1.3. Figure 1 shows the stages of this consultation process:

Stage 1	Stage 2	Stage 3	Stage 4
Consultation open	Consultation closes (awaiting decision). Deadline for responses	Responses reviewed and published	Consultation decision/policy statement
05/12/2022	**09/01/2023**	**03/03/2023**	**03/03/2023**

How to respond

1.4. We want to hear from anyone interested in this consultation. Please send your response to the person or team named on this document's front page.

1.5. We have asked for your feedback in each of the questions throughout. Please respond to each one as fully as you can.

1.6. We will publish non-confidential responses on our website at www.ofgem.gov.uk/consultations.

Your response, data and confidentiality

1.7. You can ask us to keep your response, or parts of your response, confidential. We will respect this, subject to obligations to disclose information, for example, under the Freedom of Information Act 2000, the Environmental Information Regulations 2004, statutory directions, court orders, government regulations or where you give us explicit permission to disclose. If you do want us to keep your response confidential, please clearly mark this on your response and explain why.

1.8. If you wish us to keep part of your response confidential, please clearly mark those parts of your response that you *do* wish to be kept confidential and those that you *do not* wish to be kept confidential. Please put the confidential material in a separate appendix to your response. If necessary, we will contact you to discuss which parts of the information in your response should be kept confidential, and which can be published. We might ask for reasons why.

1.9. If the information you give in your response contains personal data under the General Data Protection Regulation (Regulation (EU) 2016/679) as retained in domestic law following the UK's withdrawal from the European Union ("UK GDPR"), the Gas and Electricity Markets Authority will be the data controller for the purposes of GDPR. Ofgem uses the information in responses in performing its statutory functions and in accordance with section 105 of the Utilities Act 2000. Please refer to our Privacy Notice on consultations, see Appendix 4.

1.10. If you wish to respond confidentially, we will keep your response itself confidential, but we will publish the number (but not the names) of confidential responses we receive. We will not link responses to respondents if we publish a summary of responses, and we will evaluate each response on its own merits without undermining your right to confidentiality.

General feedback

1.11. We believe that consultation is at the heart of good policy development. We welcome any comments about how we have run this consultation. We would also like to get your answers to these questions:

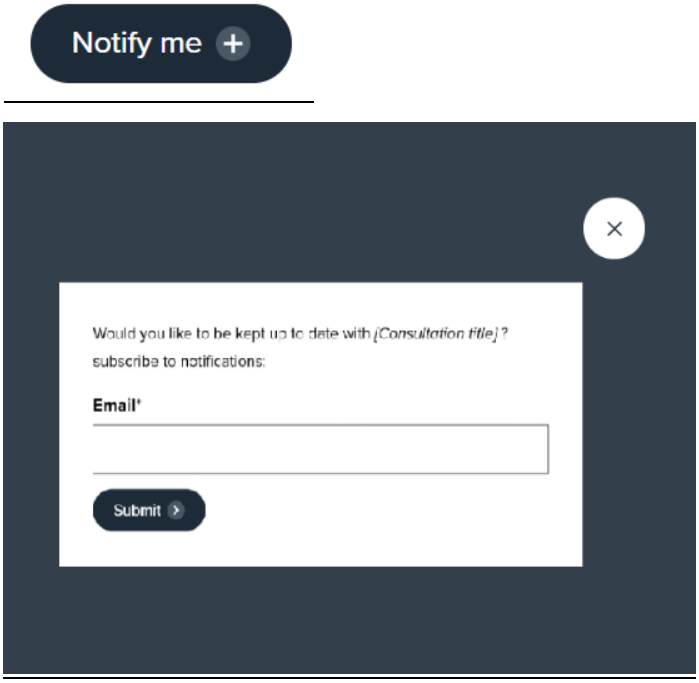
1. Do you have any comments about the overall process of this consultation?

2. Do you have any comments about its tone and content?
3. Was it easy to read and understand? Or could it have been better written?
4. Were its conclusions balanced?
5. Did it make reasoned recommendations for improvement?
6. Any further comments?

Please send any general feedback comments to stakeholders@ofgem.gov.uk

How to track the progress of the consultation

You can track the progress of a consultation from upcoming to decision status using the 'notify me' function on a consultation page when published on our website. Ofgem.gov.uk/consultations.



Once subscribed to the notifications for a particular consultation, you will receive an email to notify you when it has changed status. Our consultation stages are:

Upcoming ▶	Open ▶	Closed (Awaiting decision) ▶	Closed (With decision)

2. Compressor emissions Re-opener and Price Control Deliverable mechanism

Section summary

This Chapter gives an overview of the RIIO-2 Re-opener mechanism and our assessment process.

Overview of the RIIO-2 Re-Opener mechanism

2.1. The gas transmission network in Great Britain is planned, constructed, owned, and operated by National Grid Gas Transmission (NGGT). Economic regulation of the network follows the RIIO (Revenue = Incentives + Innovation + Outputs) price control framework. The current RIIO-T2 price control period will last five years from 1 April 2021 to 31 March 2026. Prior to commencement of the price control period, we set out in our Final Determinations[1] our policy on the economic regulation of the network during the period. These policy decisions were given effect by new Special Conditions in Part C of National Grid Gas plc's gas transporter licence, which came into force on 1 April 2021.

2.2. In our RIIO-T2 Final Determinations we accepted the 'needs case' for investment at a number of Compressor Stations, including the Wormington Compressor Station, to ensure compliance with the Medium Combustion Plant Directive. The Directive requires that existing gas turbines, between 1MW and 50MW net thermal input, must not exceed an emissions limit of 150mg/m³ Nitrogen Oxide (NOx) by 1st January 2030.

2.3. However, given the level of uncertainty at the time with respect to both the 'preferred option' and the level of funding required, we decided that these Compressor Emissions projects, should be funded through our Gas Transmission Project Assessment Process. This process is set out in Special Condition 3.11 Compressor Emissions Re-opener and Price Control Deliverable.

[1] final_determinations_-_nggt_annex_revised (10).pdf

2.4. At Final Determinations, we provided £14.83m (2018/19 prices) of baseline funding in the form of a Price Control Deliverable for the Wormington Compressor Station project. The required deliverables were a FOSR in August 2022 and a re-opener application seeking a funding Direction in November 2024. The baseline funding also allowed for long lead items to be purchased if this was necessary. The FOSR must contain a Final Preferred Option along with supporting evidence necessary for the Authority to either accept the Final Preferred Option identified by NGGT or approve an alternative option as the Final Preferred Option. The subsequent Re-opener application must be based on the Final Preferred Option approved by the Authority following submission of the FOSR.

2.5. Special Condition 9.4 requires that all Re-opener application must be prepared in accordance with our Re-opener Guidance and Application Requirements Document.[2] This includes guidance on the preparation of Engineering Justification Papers and Cost Benefit Analysis (CBA) which are the key tools we expect to be used in the identification of a 'preferred option'.

2.6. In addition, we have published an Indicative Re-opener Application Assessment Process[3]. This working document sets out an indicative process for dealing with Re-opener applications.

2.7. In compliance with Special Condition 3.11, in August 2022, NGGT submitted a FOSR for investment at Wormington Compressor Station to ensure compliance with the Medium Combustion Plant Directive. In accordance with our indicative application assessment process, having determined that a valid submission had been submitted, we proceeded to a detailed assessment of the FOSR and the Final Preferred Option. We made our determination on the validity of NGGT's submission because the FOSR was submitted.[4]

- Compliant with the requirements set out in Special Condition 3.11.8

[2] RIIO2 Re-opener Guidance and Application Requirements Version 2 | Ofgem
[3] RIIO-2 indicative Re-opener application assessment process: working document | Ofgem
[4] Wormington Compressor Emissions FOSR submission in August 2022 - Appendix M – Mapping of Ofgem Requirements to Wormington Compressor Emissions FOSR

- Compliant with the requirement set out Special Condition 9.4.3 to prepare the submission in accordance with our Re-opener Guidance and Application Requirements Document.

- Compliant with the requirement set out in our Price Control Deliverable Reporting Requirements and Methodology Document (Appendix 5).[5]

- Published on the NGGT website within five working days of submission with any redactions in line with our Re-opener Guidance and Application Requirements Document.[6]

- Accompanied by a letter of assurance that met the requirements set out in our Re-opener Guidance and Application Requirements Document.

[5] Price Control Deliverable Reporting Requirements and Methodology Document | Ofgem
[6] Our RIIO-2 re-opener applications (2021-2026) | National Grid Gas

3. Wormington Compressor Emissions Final Option Selection Report

Section summary

This chapter summarises the option selection process set out in the FOSR submitted by NGGT.

Context

3.1. The Medium Combustion Plant Directive requires that existing compressors, between 1MW and 50MW net thermal input, must not exceed an emissions limit of 150mg/m³ Nitrogen Oxide (NOx) by 1st January 2030. Wormington Compressor Station utilises two Siemens (formerly Rolls-Royce) Avon gas turbine driven compressors to provide the required capability and network resilience. These units are not compliant with the Directive implementing legislation and therefore intervention is needed to ensure compliance.

3.2. Wormington plays a critical role in ensuring gas can enter the NTS (National Transmission System) through the Milford Haven Liquified Natural Gas (LNG) import terminal. In addition, there is a live "Planning and Advanced Reservation of Capacity Agreement" (PARCA) request to increase entry capacity by 17% at Milford Haven. The associated needs case, approved by Ofgem in December 2021[7], identified the need for further network reinforcement and the continued need for compression at Wormington. The Annual Network Capability Assessment Report 2022 (ANCAR)[8] shows that the South Wales region is likely to require a further increase in capability. The capability and resilience provided by Wormington is critical to achieving this.

3.3. Due to its bi-directional flow capabilities, Wormington is also required to support demand in South Wales when Milford Haven imports are insufficient. Wormington therefore

[7] Western Gas Network Project FIOC Needs Case Decision | Ofgem
[8] Network Capability | National Grid Gas

plays a critical role in security of supply for energy consumers in Great Britain as a whole and those in South Wales in particular.

3.4. The FOSR provides a summary of all the work performed to date to evaluate, cost, analyse and justify the full suite of feasible options available to achieve compliance with the Directive while ensuring the right levels of network capability and availability are maintained for network users. The FOSR aligns with NGGT's Compressor Emissions Asset Management Plan (CE-AMP).

Wormington Compressor Station

3.5. Wormington Compressor Station comprises of two Gas Turbine (GT) Siemens Avon compressors (Units A and B) and one electric-driven Siemens Variable Speed Drive (VSD) compressor (Unit C). Unit C is the lead unit on site, and in cases of high gas flow (>50mscm/day), there is a requirement for Unit A or B to operate in parallel with Unit C to provide sufficient capability to avoid the risk of entry constraints in South Wales. Units A and B operating in parallel provide resilience when the electric-driven unit is not available due to planned or unplanned outages. Avon Units A and B are not compliant with the Directive and therefore, a solution needs to be operational before the compliance date of 1st January 2030.

3.6. Both units A and B, at over 30 years old, are beyond their originally intended design life of 25 years, and therefore would require significant levels of initial asset health investment to ensure unit reliability beyond 2030 and ongoing investment until 2050 to maintain an acceptable level of unit availability. To understand existing unit condition and how specific asset health interventions impact the NTS overall, NGGT commissioned expert advice to develop a Reliability Availability Maintainability (RAM) model[9], which has evaluated unit availability across the entire NGGT fleet. In addition, a site-specifc availability model was developed for Wormington.[10] The results of the availability modelling undertaken for the site is one of the important inputs to the CBA model and can often drive the conclusions of the analysis.

[9] Wormington Compressor Emissions FOSR submission in August 2022 - Appendix K – [redacted] RAM Study
[10] Wormington Compressor Emissions FOSR submission in August 2022- Appendix B – Site Availability Model

Option Selection Process & Cost Benefit Analysis

3.7. NGGT considered a complete suite of solutions to enable Wormington to comply with the Directive. The high-level options considered included:

- Doing nothing to reduce site emissions (counterfactual), where Units A and B are placed on Emergency Use Derogation (EUD) i.e., limited to 500 run hours per year beyond 2030
- Modification (retrofit) of existing compressors with emissions abatement technology to enable compliance, Control System Restricted Performance (CSRP), Dry Low Emissions (DLE) and Selective Catalytic Reduction (SCR)[11]
- Building new low-emission, high efficiency gas-turbine compressor units
- Delaying the investment decision, to account for uncertainties in the energy landscape

3.8. Table 1 below summarises the ten shortlisted options considered in the FOSR

Option Shortlist	Unit A	Unit B	Unit C	Unit D	Unit E
1 – Counterfactual	500Hr EUD	500Hr EUD	No Change	/	/
2 - 2 x CSRP	CSRP Retrofit	CSRP Retrofit	No Change	/	/
3 - 2 x SCR	SCR Retrofit	SCR Retrofit	VSD Re-Wheel	/	/
4 – 1533 DLE + 500 Hr	1533 DLE Retrofit	500Hr EUD	No Change	/	/
5 - 2 x 1533 DLE	1533 DLE Retrofit	1533 DLE Retrofit	No Change	/	/
6 - 2 x 1535 DLE	1535 DLE Retrofit	1535 DLE Retrofit	VSD Re-Wheel	/	/
7 - New GT + 500	500Hr EUD	Decom.	VSD Re-Wheel	New GT (Greenfield)	/
8 - New GT + CSRP	CSRP Retrofit	Decom.	VSD Re-Wheel	New GT (Greenfield)	/
9 - New GT + DLE	1533 DLE Retrofit	Decom.	VSD Re-Wheel	New GT (Greenfield)	/
10 - 2 x New GT	Decom.	Decom.	VSD Re-Wheel	New GT (Greenfield)	New GT (Greenfield)

Table 1 - Options build up summary

[11] Wormington Compressor Emissions FOSR submission in August 2022 - Appendix J – [redacted] CSRP Performance Testing Report, Appendix H- [redacted] Power Avon DLE Test Report, Appendix I – [redacted] SCR Technical Feasibility Study

3.9. A CBA was run comparing the ten shortlisted options. Table 2 below provides a breakdown of the various costs that were included in the CBA. The cost confidence level for all capex costs is +/- 30%, except in the case of constraint management, compressor fuel (gas and electricity) and the social cost of carbon emissions, where costs have been taken from a probability-based forecasting model and vary based on which Future Energy Scenarios (FES) 2021 is being assessed. The greatest variation in the level of costs between options and between FES is observed in constraint management costs.

Cost Comparison £m (2018-19 prices)	Non-FES	FES Related Opex	
	Capital, Asset Health, Decommissioning + Site Operation	Compressor Fuel + Carbon Emissions	Constraint Managementt
1 – Counterfactual	54.72	96 - 113	689 - 13,778
2 - 2 x CSRP	57.79	137 - 183	412 - 4,531
3 - 2 x SCR	91.37	137 - 183	368 - 3,973
4 – 1533 DLE + 500 Hr	60.10	125 - 163	423 - 4,534
5 - 2 x 1533 DLE	65.49	136 - 179	445 - 4,632
6 - 2 x 1535 DLE	79.75	136 - 179	440 - 4,566
7 - New GT + 500	103.67	98 - 141	235 - 2,955
8 - New GT + CSRP	105.20	123 - 165	235 - 2,865
9 - New GT + 1533 DLE	108.72	122 - 164	245 - 2,973
10 - 2 x New GT	143.17	107 - 145	214 - 2,636

Table 2 - Options Cost Data

3.10. The four scenarios as described in the National Grid ESO FES[12] provide different pathways to a net zero future. These range from the Steady Progression (SP) scenario, which falls just short of the net zero target, to Leading the Way (LW) which achieves net zero ahead of 2050. Each scenario is dependent to varying degrees on a series of changes to, government policy and legislation, energy delivery and consumption, consumer behaviour, technological change, and government incentives and investment. In many ways, these different pathways also represent different potential levels of energy industry change. As such, FES on its own provides no validation of the most appropriate investment option, instead it provides a broad envelope of energy backgrounds against which the merit of alternative investments may be appraised.

[12] Future Energy Scenarios 2022 | National Grid ESO

3.11. The two lower natural gas usage scenarios (Customer Transformation and Leading the Way) meet the targets via electrification either at a transmission or distribution level and involve changes in consumer behaviour and high improvements in energy efficiency. The use of hydrogen is considered in Leading the Way (LW) and System Transformation (ST) scenarios. With LW hydrogen is produced from green sources only and with ST from a combination of green and blue sources, which is the reason for the high long- term natural gas need for ST.

3.12. Constraint management costs, capacity buy backs and locational balancing arise because of the commercial actions the gas system operator takes to match the requirements of network users with the physical capabilities of the network.

3.13. Constraint management costs for each of the ten shortlisted options were forecast for each of the FES[13] using the capability analysis process which has been developed by NGGT to assist in defining the capability of the National Transmission System. Further details of the capability analysis process are given in the Gas Ten Year Statement (GTYS)[14] and Annual Network Capacity Assessment Report (ANCAR).[15] A key element in assessing network capability is compressor availability. Availability is a measure of how ready a given component in a system is to operate on demand, typically measured over an extended period to smooth out the effects of day-to-day maintenance and faults. An overview of how this availability value is assessed and how it is used when assessing network capability is set out in the Compressor Emissions – Asset Management Plan.[16]

3.14. Table 3 below sets out the output from the CBA. The NPV for each option reflects the cost saving that adopting the option is forecast to deliver when compared to the counterfactual. The option with the highest positive NPV is therefore the one that delivers compliance with the Directive at least cost over the period of assessment. The lead option with the highest positive NPV depends on whichever FES is being considered. In the case of Steady Progression and System Transformation this is Option 10 (2 x New GT), whereas in

[13] Within each FES scenario, sensitivities for high continental and high LNG imports are also included, and have been included in the assessment of network capability
[14] Gas Ten Year Statement (GTYS) | National Grid Gas
[15] Network Capability | National Grid Gas
[16] Wormington Compressor Emissions FOSR submission in August 2022 - Appendix K – [redacted] RAM Study

the case of Leading the Way and Customer Transformation this is Option 7 (New GT + 500hr).

Relative NPV £m (2018-19 prices)	Steady Progression	Consumer Transformation	Leading the Way	System Transformation
1 – Counterfactual	0	0	0	0
2 - 2 x CSRP	2,829	196	141	3,846
3 - 2 x SCR	2,933	200	139	4,057
4 – 1533 DLE + 500 Hr	2,802	181	136	3,832
5 - 2 x 1533 DLE	2,719	153	113	3,780
6 - 2 x 1535 DLE	2,722	144	104	3,796
7 - New GT + 500	3,334	327	233	4,531
8 - New GT + CSRP	3,326	315	220	4,560
9 - New GT + 1533 DLE	3,287	303	211	4,509
10 - 2 x New GT	3,377	309	209	4,639

Table 3 - Relative Cost Benefit Analysis Values

3.15. To help quantify the full life cycle environmental impact of each option NGGT produced a Best Available Technology (BAT) assessment.[17] This assessment also identified Option 10 as the lead option from an operational and environmental perspective when it is assumed that the VSD compressor on the site was not available for use. The assessment featured both quantitative and qualitative scoring of all options against key technical and environmental criteria, as well as whole life emissions and costs. Option 10 achieved the highest technical score when compared to all other options in terms of ability to meet compression requirements (versatility), maintenance complexity and availability of spares (ownership), future resilience against tightening of energy efficiency and emissions limits (future proofing) and environmental control (hazard). Regarding emissions reduction, two new units (alongside SCR) ranked as the leading solution for emissions reduction through improved efficiency and fuel consumption. Table 4 below provides a summary of the BAT assessment results presented by NGGT in their option selection report and is the VSD unavailable BAT analysis.

[17] Wormington Compressor Emissions FOSR submission in August 2022 - Appendix G – Preliminary BAT Report Summary

BAT Assessment – (VSD Unavailable)	Technical / Environmental Score (qualitative assessment)	Environmental Score based on (quantitative assessment)	Total Score
1 – Counterfactual	32%	10%	42%
2 - 2 x CSRP	32%	11%	43%
3 - 2 x SCR	28%	30%	58%
4 – 1533 DLE + 500 Hr	28%	12%	40%
5 - 2 x 1533 DLE	40%	15%	55%
6 - 2 x 1535 DLE	46%	13%	59%
7 - New GT + 500	29%	15%	44%
8 - New GT + CSRP	35%	16%	51%
9 - New GT + DLE	44%	23%	67%
10 - 2 x New GT	54%	25%	79%
Max. weighted score available	65%	35%	100%

Table 4 - BAT Analysis Comparison when VSD is Unavailable

3.16. Based on both the CBA and BAT assessment outlined above Option 10 was identified by NGGT as the 'preferred option'. In addition, a number of other key investment considerations were identified by NGGT as favouring Option 10

3.17. There is a difference in unit availability values for new build gas turbines (90%) when compared to retrofit Avons (75% - 80%).[18] Given the critical function of Wormington, availability has a significant impact on network capability and security of supply. Gas Turbines at Wormington are required to provide backup compression capability when the VSD is not available, due to planned or unplanned outages. In addition, capability requirements cannot be achieved by the VSD alone. The difference in availability has a significant impact on network constraints and consistency of supply.

3.18. The difference in required outages during construction and commissioning will impact on the short-term availability of Wormington. Option 10, involving the installation of two new units on an area of NGGT- owned land outside the current site plot, allows most of the construction works to be completed away from operational plant with minimal outages required for tie-in and commissioning. Conversely, options which involve retaining existing

[18] Wormington Compressor Emissions FOSR submission in August 2022 - Appendix K – [redacted] RAM Study

units result in more outages to allow construction and commissioning activities to progress safely.

3.19. As noted above, there are two FES (Customer Transformation and Leading the Way) in which Option 10 was not the lead option. These scenarios see immediate reductions in annual gas demand with consumers changing their behaviour and making significant investment in thermal insulation and heat pumps. However, NGGT has argued that, as there are currently limited incentives in place to drive this behaviour, these scenarios are ambitious and unlikely to occur. Consequently, a strong reliance on gas is likely beyond 2030[19] , which would result in the need for two new gas turbines. For this reason, NGGT has chosen the System Transformation scenario as the appropriate central case for Wormington.

Sensitivity Analysis & Real Option Analysis

3.20. The sensitivity of the CBA was stress tested against variation in a number of key parameters, long term higher gas prices and considering only the high LNG cases from the four FES. In both cases, the lead option remained unchanged. Stress testing demonstrated that a 220% increase in investment cost or an 80% reduction in constraint costs would be required to alter the lead option. The absence of the Western Gas Networks Upgrade PARCA was also shown not to alter the preferred option.

3.21. To assess the impact of delaying the second new gas turbine, a Real Option Analysis with a delay until 2035 was carried out. Overall, this was shown to deliver a small benefit of £5m but it was noted that in two of the FES, Steady Progression and System Transformation, delay would have a negative impact.

Final Preferred Option

3.22. In the FOSR NGGT have identified Option 10 as the Final Preferred Option for approval by the Authority in compliance with Special Condition 3.11.8

3.23. The Final Preferred Option involves the installation of two new gas turbine compressor units to be commissioned by 2028. The new units will be installed on a greenfield site within the existing National Grid boundary. To ensure operation mapping alignment across all site

[19] Detailed arguments Compressor Emissions Asset Management Plan download (nationalgrid.com)

compressors, this option also features a VSD re-wheel. This option also contains decommissioning costs for the existing gas turbines once the new units are commissioned. The requirement for decommissioning will be reassessed following operational acceptance of the new units.

4. Our assessment and proposed Final Preferred Option

Section summary

In this chapter we offer for consideration our assessment of the evidence set out in the FOSR and the reasons for our proposed Final Preferred Option

Questions

Question 4.1: Do you agree with our assessment that, assuming a 50:50 split between constraint management tools, capacity buy back and locational action, is not supported by the available evidence? What do you believe would be a more appropriate assumption?

Question 4.2: Do you agree with our assessment that the VSD available is the correct BAT assessment to use when comparing the shortlisted options?

Question 4.3: Do you agree with our assessment of the evidence presented in the FOSR?

Our assessment of the 'needs case'

4.1. In our RIIO-T2 Final Determinations, we accepted the 'needs case' for investment at the Wormington Compressor Station to ensure compliance with the Directive. The FOSR aligns with NGGT's Compressor Emissions Asset Management Plan (CE-AMP), which has been updated since Final Determinations and continues to demonstrate the need for compliance-related investment at Wormington.

Our assessment of options considered and shortlisted

4.2. Our assessment is that the FOSR considered an appropriate range of available options and shortlisted only those options which would provide a viable solution, given the operational requirements at Wormington. Information on the option evaluation methodology

was clearly articulated and applied in a consistent and logical manner.[20] The shortlisted options included the counterfactual 'do nothing' option, against which all other shortlisted options were assessed. While the shortlist of options assessed in the CBA does not include a market-based solution, constraint management payments, which are the commercial alternative to providing compressor services at Wormington, are central to the assessment of each option in the CBA.

4.3. We did however seek further information from NGGT on one further option which had not been included but which we considered might have been. That was decommissioning of the two existing non-compliant gas turbines with a single compliant gas turbine. The CBA for this option was generated and showed a significant reduction in compressor availability at Wormington resulting in significant constraint management costs. As a consequence, this was the worst performing option, other than the counterfactual 'do nothing' under all FES.

4.4. We also questioned the inclusion of a VSD re-wheel, in those options that include a new build gas turbine, as this activity had previously been included in the Western Gas Network Upgrade FIOC 'Needs Case'.[21] A re-wheel has an estimated £[redacted]m cost and can improve overall site capability by ensuring compression alignment across all units on-site. This potential benefit, however, was not estimated. We expect NGGT to demonstrate that the proposed re-wheel has a positive impact before any funding request is submitted. As the need for the re-wheel is a consequence of compliance with the Directive, it will be included in the Wormington Compressor Emissions funding request.

Our assessment of key Cost Benefit Analysis parameters

Base Assumptions

4.5. Our assessment is that all but one of the key parameters used in the construction of the CBA and set out in Table 5 below are appropriate, with a sound rationale, as they were taken from the existing regulatory framework or published Government guidance. However, we believe that the base assumption of a 50:50 split between the available commercial tools

[20] Wormington Compressor Emissions FOSR submission in August 2022 - Appendix C – Engineering Report and Appendices
[21] Our RIIO-2 re-opener applications (2021-2026) | National Grid Gas

for constraint management, capacity buy back and locational action, is not justified by the available evidence.

Category	Assumption	Base Assumption	Rationale
CBA parameters	WACC	2.81%	Defined in RIIO-T2
	Social Time Preference Rate	3.5% (Years 0 – 30) / 3.0 % (30+)	Defined in Green Book
	Regulated Asset Life	45 years	Defined in RIIO-T2
	Assessment Period	25 years	Based on lifetime of asset
	Depreciation	SOTYD	Defined in RIIO-T2
	Capitalisation	75.00%	Defined in RIIO-T2
Constraints and Fuel	Gas Price	Annual price 50 – 64 p/th	BEIS reference scenario
	Compressor Fuel Costs	Gas Price	
	Constraint management pricing	Locational Sells: 0 Locational Buys: 1.2 * Price Buy Backs: Gas Price	As defined by Commercial Constraint Price Methodology
	Constraint management method	50% buybacks/50% locational actions	Reflective of tools available to manage constraints
Emissions	CO2 cost	Annual price 241 – 378 £/tonne	BEIS Valuation of greenhouse gas emissions: for policy appraisal and evaluation: Central Case
	NOx price	£6,199 £/tonne	DEFRA damage costs

Table 5 - Cost Benefit Analysis Assumptions

4.6. In making this assessment we sought a more detailed justification than was set out in the FOSR. NGGT argued that, as the failure to deliver additional assets could result in more frequent constraint management actions being required, the probability of capacity buy backs being required increased. In addition, as the balance between the two commercial tools would be determined by market participants, a 50:50 split was appropriate.

4.7. Buy back actions were last used in July 2006, whereas other commercial tools including locational balancing action have been used on many occasions to manage network constraints. Over the past 12 years there have been 34 locational balancing actions at the

Milford Haven system entry point with an average volume of 2.3 mcm. We accept the assumptions on constraint management pricing, which would seem to suggest that the cost of capacity buy back, and locational balancing action should be roughly similar. However, a locational action requires the purchase of only that volume of gas which is required to remove the constraint and is matched by a matching sale elsewhere on the network. Whereas a capacity buy back involves the purchase of all capacity held by network users above network capability. This makes capacity buy back a more costly option for constraint management and this, and the structure of NGGTs constraint management incentive mechanism[22], explains the observed preference for other commercial tools.

4.8. The impact on constraint management costs of the base assumption about the balance between capacity buy backs and locational balancing actions is set out for the System Transformation FES in Table 6 below.

Constraint Management Costs £m (2018-19 Prices	Locational Action	Buy Back	Total
1 – Counterfactual	1,679	12,099	13,778
2 - 2 x CSRP	508	4,023	4,531
3 - 2 x SCR	448	3,525	3,973
4 – 1533 DLE + 500 Hr	521	4,013	4,534
5 - 2 x 1533 DLE	531	4,101	4,632
6 - 2 x 1535 DLE	524	4,042	4,566
7 - New GT + 500	320	2,635	2,955
8 - New GT + CSRP	309	2,555	2,865
9 - New GT + 1533 DLE	322	2,651	2,973
10 - 2 x New GT	282	2,354	2,636

Table 6 - Constraint Costs System Transformation

4.9. The FOSR stated that stress testing had shown that an 80% reduction in constraint costs would be required to alter the lead option under the System Transformation FES from Option 10 to Option 7. This is broadly equivalent to an assumption that total buy back costs are equal to locational balancing action costs.

[22] final_determinations_-_nggt_annex_revised.pdf

Capital Expenditure & Asset Health Cost Estimates

4.10. Our assessment is that the Capex, Asset Health (including Retrofit & Re-wheel), Decommissioning and Ongoing Site Operation cost estimates, included in the CBA, have been arrived at using appropriate data sources and assumptions. The level of cost confidence to which these estimates have been made is appropriate for a project at this stage of development and is in line with guidance published by the Infrastructure and Project Authority.[23] This level of cost confidence is appropriate for an option selection process including CBA and BAT assessments.

4.11. In making this assessment, we sought further information on assumptions related to the build-up of costs within the Main Works Contract and project management. We also noted the inclusion of an unallocated provision of 30% within the build-up of the Capex estimate. This value is typical of projects at this stage of development. Contingency values included in the Re-opener application and funding request will be determined based on quantified risk assessment at a later project stage, once the Final Preferred Option has been selected by Ofgem. There is no unallocated provision within estimated Asset Health costs as these are treated as total installed costs, and they are based on RIIO-T2 unit cost schedule.

4.12. With regards to the compressor machinery train, we sought additional clarification on how the cost estimate was made. Although it was noted in both the risk register and the option selection engineering report cover note that the market was approached and provided budgetary quotes for the compressor packages, these were not used. While quotes were received from a number of potential suppliers, one of the offers had a much higher technical score that the others, based on its ability to meet the operating enveloped needed for this project. The price quoted for this best technical solution was however questioned by NGGT, based on recent experience of purchasing a very similar unit. It was therefore considered more appropriate to estimate compressor machinery train costs using recent purchases of similar machinery as a benchmark. While this is an acceptable compromise at this stage of the project process, an open market tender to build the machinery costs into the final allowance will be required when it is submitted in 2024. We will continue to engage with NGGT to ensure that we are content with their approach to tendering for these high -cost items.

[23] IPA_Cost_Estimating_Guidance.pdf (publishing.service.gov.uk)

Constraint Management, Compressor Fuel & Carbon Emission Cost Estimates

4.13. Our assessment is that constraint management, compressor fuel and carbon emission cost estimates have been derived using the established probabilistic network capability forecasting methodology that underpins both the Gas Ten Year Statement (GTYS)[24] and Annual Network Capacity Assessment Report (ANCAR). It is outside the scope of this consultation to review this methodology. However, we did challenge certain model input data and outputs delivered.

4.14. The model generates predicted flows of gas through Wormington on an hourly basis using a complex supply and demand model. A set of simple logical rules are then used to determine the yearly run hours for each compressor unit at Wormington. These rules put the majority of run hours on the existing VSD with a gas turbine utilised only when flow exceeds 50 mscm/d. In a situation where one gas turbine is compliant with the Directive and the other not, the non-compliant unit will only be used in situations where the compliant unit is unavailable. The majority of total gas turbine usage is therefore on the compliant unit. Total running hours are therefore determined by the FES being considered, whereas the allocation between compressors is influenced by the shortlisted option.

4.15. In making our assessment we sought further information on running hours under each FES. Table 7 below displays predicted running hours for shortlisted options in which one of The gas turbines is retained under the 500-hour Emergency Use Derogation for each FES.

[24] Gas Ten Year Statement (GTYS) | National Grid Gas

Annual Running Hours		Steady Progression	Consumer Transformation	Leading the Way	System Transformation
VSD + New GT	2030	688	1,006	855	678
	2035	1,208	1,431	1,649	942
	2040	1,595	1,825	1,808	1,812
	2045	2,455	1,811	1,753	3,248
	2050	2,350	1,758	1,743	2,859
500 Hours EUD GT	2030	85	107	68	80
	2035	191	123	134	100
	2040	283	151	142	259
	2045	491	142	126	608
	2050	431	127	123	476
Total	2030	772	1,113	923	758
	2035	1,399	1,554	1,783	1,042
	2040	1,878	1,976	1,950	2,071
	2045	2,946	1,953	1,878	3,856
	2050	2,782	1,885	1,866	3,335

Table 7 – Forecast Running Hours

4.16. The additional data submitted indicates that, up until 2040, the capability and availability of the VSD and one new gas turbine is sufficient to meet the need for compression at most flow levels under all FES, with the second gas turbine running for a limited number of hours. Beyond that, it is only in the high gas scenarios (Steady Progression and System Transformation) that the forecast running hours for the second gas turbine would be close to the 500-hour Emergency Use Derogation limit.

4.17. Table 8 below shows running hours at Wormington Compressor Station over the previous eight years. During this period running hours exceeded 1,00 hours in all but one year. No capacity buy backs occurred in this period with constraints being managed through locational balancing actions.

Individual Unit Running Hours (financial years)				
	Gas Turbines		VSD	
Gas Year	Unit A	Unit B	Unit C	Total
2013/14	27	58	1,048	1,133
2014/15	32	27	1,381	1,440
2015/16	26	67	1,873	1,966
2016/17	145	190	968	1,303
2017/18	12	23	2,121	2,156
2018/19	11	19	788	818
2019/20	418	29	2,631	3,078
2020/21	567	198	2,242	3,007

Table 8- Historical Unit Runtimes

Compressor Availability

4.18. Our assessment is that the approach taken to modelling site availability is appropriate and the models have been through a Quality Assurance procedure and been approved by competent professionals.

4.19. In making our assessment we sought further information as the current availability of the three units currently operating at Wormington and the estimated availability following proposed interventions[25]. Table 9 below sets out the availability assumptions before and after various interventions.

Availability	Current	Post Upgrade
Existing GT	54% & 58%	80%
Existing GT + DLE	54% & 58%	75%
Existing VSD	82%	87%
New GT	-	90%

Table 9 – Compressor Availability Assumptions

4.20. We note that availability of gas turbines at Wormington is materially below that of the fleet as a whole and that the proposed interventions, estimated cost £7m per unit, would result in a stepped improvement in availability. A penalty of 5% has been applied to interventions that include a Dry Low Emissions technology retrofit to account for the

[25] Both Asset Health and Control Systems, the cost of the former is included in the CBA however the latter is excluded as it is associated with an unrelated system wide upgrade.

immaturity of the technology. A reduction to the availability of the unproven technology is fair in the analysis but we believe it would be excessive to apply this penalty for the duration of the assessment period as experience should see it dissipate over time. This availability penalty explains why Avon Dry Low Emissions Retrofit technology performs worse than expected in the CBA in comparison to other retrofit/derogation options.

4.21. The "New Unit" availability figure is based on observed performance of new gas turbine compressors installed at other compressor stations such as Felindre. We believe the availability values used for the new units is appropriate for this analysis.

4.22. The improved VSD availability values used in the analysis is a consequence of interventions not related to compliance with the directive and we also accept that these values are appropriate.

Future Energy Scenarios

4.23. Our assessment is that the appropriate FES have been used in the CBA. However, we do not believe that it is appropriate to characterise System Transformation as the base case scenario. FES are not forecasts but rather a series of potential pathways to a net zero future, no individual scenario is any more probable than another. FES provides a broad envelope of energy backgrounds, against which the merit of alternative investments may be appraised.

Our Assessment of Sensitivity Analysis & Real Option Analysis

4.24. Our assessment is that an appropriate range of sensitivities were analysed. These demonstrated that the order of preference of the shortlisted options is not sensitive to variations to key parameters. We similarly assessed the Real Options Analysis provided.

Our Assessment of Best Available Technology

4.25. Our assessment is that the BAT analysis methodology used by NGGT is appropriate for this stage of the project and a summary of the analysis was provided alongside the FOSR. Two separate assessments for the site were provide, one where the VSD was assumed to be permanently unavailable and one where the VSD was available for use. The FOSR focused on the outcome of the VSD unavailable BAT analysis.

4.26. We do not believe that it was appropriate for the FOSR to focus on the VSD unavailable BAT analysis. We believe that the most relevant scenario for investment planning purposes is one in which the VSD is available because it is planned to have an availability of 87% during the entire assessment period. Table 10 below compares the outputs from the two separate BAT assessments for each of the shortlisted options.

BAT Assessment	VSD Unavailable	VSD Available
1 – Counterfactual	42%	46%
2 - 2 x CSRP	43%	47%
3 - 2 x SCR	58%	63%
4 – 1533 DLE + 500 Hr	40%	66%
5 - 2 x 1533 DLE	55%	66%
6 - 2 x 1535 DLE	59%	75%
7 - New GT + 500	44%	89%
8 - New GT + CSRP	51%	89%
9 - New GT + DLE	67%	89%
10 - 2 x New GT	79%	85%

Table 10 BAT Analysis Comparison

Our Assessment of Project Risk Register[26] and Project Programme[27]

4.27. Our assessment is that an appropriate Risk Register has been established and maintained. The majority of risks are routine for a project of this type with acceptable mitigations proposed. We have however identified two unique and high impact risks:

- Control System Restricted Performance (CSRP) may not be considered by the Environment Agency as complying with BAT requirements, resulting in the necessary environmental permits being withheld.

- Avon Dry Low Emissions (DLE) Retrofit technology effectiveness, cost and availability remains uncertain ahead of the final stages of testing being completed.

[26] Wormington Compressor Emissions FOSR submission in August 2022 - Appendix F – Project Risk Register
[27] Wormington Compressor Emissions FOSR submission in August 2022 - Appendix E – Project Programmes

4.28. Our assessment is that an appropriate project programme has been developed for each of the shortlisted options. The differences in scope, types of construction/operating risk in particular periods of plant outage between new build and retrofit options have been recognised in the project programme.

Discussion

4.29. The two key decision tools described in the FOSR are the CBA and the BAT assessment. They are key tools for decision makers, but they should not be used in isolation. This is particularly the case when there is a high level of uncertainty about significant future costs and benefits, in this case constraint management costs. Both tools are useful in setting out options and focusing attention on the small number of options that are likely to be the best option for consumers. Simply because a particular option has been identified as the lead option by either or both tools does not automatically mean it is the best option for consumers.

4.30. The FOSR lists the Net Present Value for each option relative to the baseline 'do nothing' option. This is not an incorrect representation, but we consider that it is better to report Net Present Value in absolute terms. We prefer this approach as it makes clear that the capital investment being considered is to ensure compliance with an environmental regulation and does not generate value in its own right. The objective is therefore to reduce compliance costs over the lifetime of the investment. In addition, this presentation permits a more appropriate comparison of cost difference between options across the four FES, relative to total project cost. Table 11 below presents the output from the CBA as absolute rather than relative values.

NPV £m (2018/19 prices)	Steady Progression	Consumer Transformation	Leading the Way	System Transformation
1 – Counterfactual	-4,231	-639	-499	-5,960
2 - 2 x CSRP	-1,402	-442	-357	-2,114
3 - 2 x SCR	-1,298	-438	-359	-1,902
4 – 1533 DLE + 500 Hr	-1,429	-458	-362	-2,127
5 - 2 x 1533 DLE	-1,512	-485	-385	-2,179
6 - 2 x 1535 DLE	-1,509	-494	-394	-2,163
7 - New GT + 500	-897	-311	-266	-1,429
8 - New GT + CSRP	-905	-324	-279	-1,399
9 - New GT + 1533 DLE	-944	-335	-288	-1,450
10 - 2 x New GT	-854	-329	-290	-1,320

Table 11 - Absolute Cost Benefit Analysis Results

4.31. As discussed above, we believe that the FOSR should have relied upon the BAT assessment made under the VSD available scenario. Consequently, this discussion will be based on that assessment as summarised in Table 12 below.

BAT Assessment	VSD Available
1 – Counterfactual	46%
2 - 2 x CSRP	47%
3 - 2 x SCR	63%
4 – 1533 DLE + 500 Hr	66%
5 - 2 x 1533 DLE	66%
6 - 2 x 1535 DLE	75%
7 - New GT + 500	89%
8 - New GT + CSRP	89%
9 - New GT + DLE	89%
10 - 2 x New GT	85%

Table 12 BAT Analysis VSD Available

4.32. Based on both these decision tools, we accept that, in addition the existing VSD, there should be two gas turbines and that one of these should be a new compliant machine. This is based on the key role that the Wormington Compressor Station plays in security of supply and the need for resilience at such a critical part of the network. Reducing the number of gas turbines would represent an unjustified reduction in network capability. As noted above the only shortlisted option which performed worse than a single gas turbine was the counterfactual, Option 1.

4.33. We believe that, taken together, these decision tools demonstrate that one of the two gas turbines should be a new unit which is compliant with the Directive. The new gas turbine will be both more energy efficient / result in lower carbon emissions and have greater availability than the unit it replaces. This will materially improve the overall performance of the Wormington Compressor station, which results in shortlisted options including a new gas turbine having overall a materially lower Net Present Value than those without.

4.34. This leaves the question of whether the second gas turbine should be a new unit (Option 10), an existing unit retrofitted to make it compliant (Options 8 and 9), or an existing unit maintained under the 500-hour Emergency Use Derogation (Option 7). These are the four shortlisted options, from which the Final Preferred Option will be chosen.

4.35. Option 9 involves retrofitting an existing gas turbine with Dry Low Emissions technology, which has yet to be fully tested and is not currently commercially available. We do not believe it would be appropriate to determine a Final Preferred Option that may turn out

to be undeliverable or cannot deliver the availability expected for a typical gas turbine driven compressor.

4.36. Option 8 involves constraining an existing gas turbine using the control system to meet the emission limits. There is an unknown level of risk that this approach would not receive approval from the Environment Agency. For this project, where the runtime of the machine is not predicted to be breach the 500hr emergency use derogation until 2045, we do not believe that it is necessary to use the CSRP approach at this site and have discounted this option.

4.37. Having discounted Options 8 and 9, Only options 7 and 10 remain for consideration.

4.38. The FOSR identified Option 10 as the lead option. However, our assessment of the evidence does not support this position. Our assessment highlighted a number of key areas where we believe the assumptions underpinning the identification of Option 10 as the lead option were incorrect.

4.39. It was not appropriate that the BAT assessment used to compare the shortlisted options was the one created for the VSD unavailable scenario, given that the CBA assumed a VSD availability of over 80% for the entire project assessment period. Using the assessment created for the VSD available scenario puts Options 7-9 ahead of Option 10.

4.40. The CBA identifies Option 10 as the lead option in the two high gas FES (Steady Progression and System Transformation), with Option 7 leading under the two lower gas scenarios (Leading the Way and Customer Transformation). We do not accept the assumption in the FOSR that System Transition should be treated as the base case. FES are not forecasts but rather a series of potential pathways to a net zero future and no individual scenario is any more probable than another. Consequently, the only conclusion we draw from the CBA presented is that Options 7 to 10 are materially better than the other shortlisted options, but which is best will depend on the long- term future of gas, which is highly uncertain.

4.41. We do not accept the assumed 50:50 split between capacity buy backs and locational balancing actions that underpins the CBA. Previous experience confirms our assumption that the latter is the commercially more attractive alternative and should account for the majority of assumed future constraint management actions. The assumed split results in total capacity buy back costs being eight times greater than for locational balancing actions. We believe that a more realistic set of assumptions would result in constraint management costs at a level similar to the sensitivity reported in the FOSR, where a reduction of 80% in constraint management costs resulted in Option 7 becoming the lead option in all FES.

4.42. The information on running hours indicates that, prior to 2040, the running hours of the second gas turbine are well below the limit of 500 hours placed on a unit operating under an Emergency Use Derogation (Option 7). Post 2040 this is no longer the case under the System Transformation and Steady Progress scenarios. Given the level of uncertainty about future pathways, it would not seem appropriate to invest in a second new gas turbine before there is greater clarity about the post 2040 pathway. This approach aligns with our approach to the Western Gas Network upgrade project.

4.43. One advantage of Option 10 identified in the FOSR was to maximise short- term availability at the Wormington Compressor site as there would be fewer outages during construction or commissioning than would be the case with other options. We do not believe that the difference between Option 10 and Option 7 in this regard has a material impact on our assessment.

Avon DLE Retrofit Technology

4.44. Avon Dry Low Emissions (DLE) retrofit turbines are currently not available commercially. However, the technology is undergoing the final stages of testing and qualification by NGGT/[redacted] and [redacted] in competing parallel programmes. The plan is that testing, and qualification are completed within the next 2 years. The required changes to Avon turbines are limited and focus on the configuration of the burner and associated control systems and tests on the new burner configurations have already been successfully tested by both [redacted] and [redacted]. Given the number of Avons currently in use around the world, it is anticipated that a sufficiently large market exists to provide an attractive opportunity for providers. It therefore seems reasonable to assume that the technology will become commercially available in time to be installed ahead of 1 January 2030.

4.45. The scope of asset health intervention needed to prepare an existing gas turbine for continued operation under the 500-hour Emergency Use Derogation is the same as that required prior to any retrofit with Dry Low Emissions technology. Proceeding with the former does not therefore create an obstacle to future adoption of the later. While the FOSR assumed an availability penalty for gas turbines retrofitted with the technology, we believe that any such penalty would dissipate over time as operators and manufacturers gain experience.

4.46. The FOSR indicates that the additional cost of retrofitting over and above the asset health works associated with the Emergency Use Derogation would be under £[redacted]m. We believe this additional expenditure would be justified as it would remove the limit on running hours and provide extra resilience at the Wormington Compressor site. While performance will not

match that of a new gas turbine, it will be sufficient to materially boost site resilience at a much lower initial cost.

4.47. We expect that, should the Dry Low Emissions technology become commercially available, then retrofitting any gas turbines at Wormington due to operate under the 500-hour Emergency Use Derogation post 1 January 2030 should be considered.

5. Proposed Final Preferred Option

Section summary

In this chapter we set our proposed Final Preferred Option

Questions

Question 5.1: Do respondents agree with our proposed Final Preferred Option?

Question 5.2: Do respondents agree with our proposals with respect to Avon Dry Low Emissions Retrofit technology?

Our Proposal

5.1. Based on our assessment of the evidence included in the FOSR, in accordance with Special Condition 3.11.9, we propose to reject the option identified by NGGT as the Final Preferred Option (Option 10) and approve one of the other shortlisted options (Option 7) as the Final Preferred Option.

5.2. We propose that the Final Preferred Option involve the installation of a new gas turbine compressor unit, approximate size 15MW, to be commissioned by 2028. The new unit would be installed on a greenfield site within the existing National Grid boundary. We further propose that one of the existing gas turbines be maintained under the 500-hour Emergency Use Derogation while the other is decommissioned. There is currently no preference between existing units from an asset health condition, constructability, or cost perspective. We propose that the requirement for decommissioning be reassessed following operational acceptance of both the new and derogated units. To ensure operation mapping alignment across all site compressors, this option also features a VSD re-wheel.

5.3. Separately, should Avon Dry Low Emissions retrofit technology become available then we would expect NGGT to carry out the retrofit of the derogated gas turbine and we would seek to identify and appropriate mechanism for funding the retrofit.

Appendix 1 – Privacy notice on consultations

Personal data

The following explains your rights and gives you the information you are entitled to under the General Data Protection Regulation (GDPR).

Note that this section only refers to your personal data (your name address and anything that could be used to identify you personally) not the content of your response to the consultation.

1. The identity of the controller and contact details of our Data Protection Officer

The Gas and Electricity Markets Authority is the controller, (for ease of reference, "Ofgem"). The Data Protection Officer can be contacted at dpo@ofgem.gov.uk

2. Why we are collecting your personal data

Your personal data is being collected as an essential part of the consultation process, so that we can contact you regarding your response and for statistical purposes. We may also use it to contact you about related matters.

3. Our legal basis for processing your personal data

As a public authority, the GDPR makes provision for Ofgem to process personal data as necessary for the effective performance of a task carried out in the public interest. i.e., a consultation.

3. With whom we will be sharing your personal data

(Include here all organisations outside Ofgem who will be given all or some of the data. There is no need to include organisations that will only receive anonymised data. If different organisations see different set of data, then make this clear. Be a specific as possible.)

4. For how long we will keep your personal data, or criteria used to determine the retention period.

Your personal data will be held for ***(be as clear as possible but allow room for changes to programmes or policy. It is acceptable to give a relative time e.g., 'six months after the project is closed')***

5. Your rights

The data we are collecting is your personal data, and you have considerable say over what happens to it. You have the right to:

- know how we use your personal data
- access your personal data
- have personal data corrected if it is inaccurate or incomplete
- ask us to delete personal data when we no longer need it
- ask us to restrict how we process your data
- get your data from us and re-use it across other services
- object to certain ways we use your data
- be safeguarded against risks where decisions based on your data are taken entirely automatically
- tell us if we can share your information with 3rd parties
- tell us your preferred frequency, content, and format of our communications with you
- to lodge a complaint with the independent Information Commissioner (ICO) if you think we are not handling your data fairly or in accordance with the law. You can contact the ICO at https://ico.org.uk/, or telephone 0303 123 1113.

6. Your personal data will not be sent overseas (Note that this cannot be claimed if using Survey Monkey for the consultation as their servers are in the US. In that case use "the Data you provide directly will be stored by Survey Monkey on their servers in the United States. We have taken all necessary precautions to ensure that your rights in term of data protection will not be compromised by this."

7. Your personal data will not be used for any automated decision making.

8. Your personal data will be stored in a secure government IT system. (If using a third-party system such as Survey Monkey to gather the data, you will need to state clearly at which point the data will be moved from there to our internal systems.)

9. More information For more information on how Ofgem processes your data, click on the link to our "Ofgem privacy promise".