national gas transmission

New Unit Draft EJP Wormington Compressor Emissions Re-opener

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Official-Sensitive Commercial

Contents

Version control

Version/revision number	Date of issue	Notes
0.1	November 25	NGT First Draft (without cost estimates)
1	December-25	Ofgem Submission

1 Executive Summary

This Engineering Justification Paper (EJP) provides a summary of the project progress so far (December 2025), factors driving the project costs, and outcomes of the cost-benefit analysis re-run exercise. This EJP will be re-submitted with final details on scope and cost for the project in March 2026 as agreed with Ofgem. All figures are in 2018/19 prices unless otherwise stated.

[redacted]

1.1.2 Following the submission of the Final Options Selection Report (FOSR), NGT has proceeded with a feasibility study to enable development of early delivery plans, basis of design documents. This will ultimately enable the development of a detailed cost book which gives granular details of the funding request for this scope. At the FOSR stage the cost estimate for the preferred option including new unit and asset health scope was [redacted] This estimate was produced to [redacted] cost certainty using a methodology that was reliant on factored costs and historic cost data. This has since increased to [redacted] This increased cost includes an estimated c[redacted] for the new unit scope (the subject of this EJP) which is undergoing further refinement, challenge and review and will be confirmed to [redacted] cost certainty in an update to this EJP in March 2026 as agreed with Ofgem. The challenge and review process includes a third-party review being undertaken by [redacted] who are also involved in similar reviews for our other Medium Combustion Plant Directive (MCPD) projects at St Fergus and Peterborough.

1.1.3 This paper gives insights to the project progress, key cost drivers, and a re-run of the cost-benefit analysis (CBA), incorporating anticipated total project costs for the final approved option at the FOSR stage alongside comparable alternatives.

1.1.4 Our FOSR was submitted under Special Condition 3.11, Part C of the Licence in August 2022. Ofgem approved Option 7 which entails the installation of one new gas turbine and the retention of an existing Avon operated under the Emergency Use Derogation. The need for decommissioning should be reassessed following operational acceptance of both the new and derogated units.

1.1.5 This EJP specifically focuses on the new unit scope with the asset health scope covered in a separate EJP. This will achieve emissions compliance whilst ensuring robust and capable compression at Wormington Compressor Station and ensuring resilient long-term operation.

1.1.6 Since the FOSR submission and Ofgem's decision on the final preferred option, several geopolitical and market factors have changed, alongside inflationary pressures impacting costs compared to those proposed in the FOSR. To confirm the continued viability of the approved option, NGT has undertaken an updated CBA, as detailed in Section 2.

1.1.7 The valued benefits of the Cost Benefit re-run have shown that both shortlisted options of the CBA have a reduced Net Present Value (NPV) from the original FOSR, as expected when costs increase, but the valued benefits have remained the same.

1.1.8 An independent third-party contractor [redacted] was engaged to assess the reasonableness of the Main Works Contractor's (MWC's) cost proposal. The completion of [redacted] assessment will determine the robustness of MWC's [redacted] cost proposal for submission, with further details of this assessment to be provided in March 2026 as an amendment to this document.

1.1.9 This re-opener submission will be amended to include detailed costs, technical, procurement, delivery strategy and risk management information meeting Licence requirements of the guidance, for Ofgem assessment in March 2026.

2 Cost Benefit Analysis (CBA) - Revalidation of the Preferred Option

This section covers NGT's CBA re-validation for the FOSR preferred option. In the March 2026 submission, the section will cover complete details of the supply and demand scenario and future requirements.

2.1.1 To validate the viability of the approved option, NGT has re-run a CBA with updated projected costs, against a shortlist of options.

2.1.2 Although final costs are still under development, NGT has applied reasonable assumptions (see 2.1.20) to re-run the analysis and present a realistic view of the program's costs.

2.1.3 Internal factors such as change in scope, regulatory standards and external factors such as market conditions and inflationary pressures have driven costs higher than originally estimated in the FOSR submission.

FOSR CBA and Assessment

2.1.4 The CBA analysis and option selection was completed at the FOSR stage and submitted to Ofgem.

2.1.5 The option evaluation process evaluated the CBA outputs alongside factors which are not valued or evaluated in the CBA, primarily the ability to achieve emissions compliance, resilience requirements, and BAT assessment to ensure a balanced decision. A multi-criteria framework was applied, considering:

- The criticality of Wormington to UK Security of Supply
- Legislative obligations under MCPD
- Stakeholder priorities and resilience requirements
- The CBA outcome

2.1.6 The CBA analysis was conducted against each of the four FES 2021 scenarios: Steady Progression, Consumer Transformation, Leading the Way and System Transformation.

Options Evaluation

2.1.7 In the FOSR, the ten shortlisted options considered several abatement innovation technologies, which were used in isolation or in combination with new build units, to reduce NOx emissions. Control System Restricted Performance (CSRP), retrofit Dry Low Emissions (DLE) and Selective Catalytic Reduction (SCR) emission abatement technologies, were investigated through dedicated external studies and performance trials. Several solutions were also discounted, including addition of supplementary Variable Speed Drive (VSD) units and solutions which would reduce site resilience.

2.1.8 The shortlisted options were based on each of the main solutions (derogation, decommissioning, abatement and new build) which were represented across ten key options. These key options and detail on unit status can be seen in **Error! Reference source not found.**. The shortlist also contains consideration for Unit C compressor re-wheeling (replacement of the impeller bundle to better match forecast requirements). To ensure consistency in the CBA, the cost for decommissioning Unit B was included1. However, the decision to decommission will be subject to an assessment on network capability at the time of new unit commissioning.

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

Table 1: Option List for CBA in 2022 FOSR

2.1.9 Across the four scenarios' CBAs there were two options that were favoured. Option 7, 1 New Unit and 1 derogated Avon unit with asset health investment and Option 10, two new Units.

[redacted]

[1] In the 2023 Wormington Compressor Emissions – Final Preferred Option Decision, Ofgem said that the need for decommissioning should be reassessed following operational acceptance of both the new and derogated units.

2.1.10 The output from the FOSR CBA is summarised in **Error! Reference source not found.** as relative NPV to each FES Scenario's Counterfactual Option. Under the FES scenarios of Steady Progression and System Transformation, Option 10 (two new units) was the lead option. For the other two scenarios, Consumer Transformation and Leading the Way, Option 7 (one new unit and one 500 hours Avon) was the lead option.

2.1.11 Without the new units or unrestricted units there was and still is a risk that entry and exit capacity obligations and/or 1-in-20 demand obligations would not be met if the existing electric drive unit is unavailable, which in turn would increase the short-term gas supply costs for consumers when alternative lower-cost sources of gas (Liquefied Natural Gas (LNG)) could be available. The potentially significant longer-term impact of constraints on the gas market price had not been factored into the CBA evaluation.

2.1.12 For the FOSR submission, based on the Wormington compressor station flow requirements, resilience requirements and the CBA analysis, NGT chose Option 10 (two new units) as the preferred final option. Ofgem approved Option 7, with one new gas turbine installed and the retention of an existing Avon operated under the Emergency Use Derogation.

2.1.13 As the costs have changed from the FOSR submission (see Chapter 3 for reasons), the CBAs have been re-assessed in this EJP against this pair of options using estimate MWC and NGT costs as of October 2025. All the other data from the original FOSR submission was retained. The updated CBA, considering other changes and aligning to the latest available FES data will be included in the March 26 submission.

2.1.14 Only three options were considered in this CBA re-run as shall be shown in Table 3.

2.1.15 Due to the market conditions, we would have anticipated those options have also increased but we do not have data to make a meaningful estimate for a CBA to compare to options that have been through FEED and have been scoped more thoroughly.

2.1.16 DLE, SCR and CSRP have been discounted for technical and environmental reasons and therefore do not pass the Best Available Techniques (BAT) assessment at this stage. Separately, Ofgem indicated that should NGT identify a cost-effective solution, that will permit unrestricted operation of all units at Wormington Compressor Station, they expect NGT to implement that solution and seek funding as part of the next price control.

Re-run CBA with updated cost estimates

2.1.17 NGT updated the FOSR CBA for the counterfactual and Options 7 and 10, using revised cost estimates. This is based on project progress made, costs incurred to date as well as forecasted costs, which will change for the March 2026 submission.

2.1.18 The CBA has been conducted only against two FES scenarios, Steady Progression and Leading the Way. This aligns to how NGT have conducted CBA analysis for RIIO-GT3 submission, conducting them primarily against the high gas, Steady Progression Scenario, with a sensitivity to Leading the Way Scenario.

2.1.19 Within the FOSR's original CBA these two scenarios differed in chosen option, with Steady Progression Favouring Option 10 and Leading the Way favouring Option 7.

2.1.20 For this re-run we have taken the previous CBA as submitted and updated the capital costs of the shortlist of options using the October 2025 draft estimate for option 7. We have not updated any other parameters, i.e. Cost of Carbon or changed the depreciation method or weighted average cost of capital (WACC). The updated CBA, taking into account other changes and aligning to the latest available FES data will be finalised in the March 26 submission.

Cost Assumptions for the updated 2025 FOSR CBA

2.1.21 For the updated FOSR CBA, we have assumed that the asset health work for the retained [redacted] (Avon) is [redacted] (aligned to the Estimated Cost at Completion (EAC) for this re-opener submission). We have assumed that building a single new unit has a cost of [redacted] This is based on the best available cost estimate we have at the time, while finalising the new unit submissions to Ofgem.

2.1.22 To cost Option 0 (Counterfactual), we have assumed that the required Asset Health for the retained SGT-A20 would be replicated on the other unit, resulting in a cost of [redacted]

2.1.23 To cost Option 7, we have summed the asset health costs to the new unit costs, giving a total option cost of [redacted]

2.1.24 To cost Option 10, we have taken the incurred new unit costs from previous financial years as they are, [redacted] We have then multiplied all subsequent year's costs for a new unit, [redacted] by two to give [redacted] Summing the cost incurred to date and the double unit rates gives an option cost of [redacted]

2.1.25 We have phased the cost using the phasing as provided in the estimates for each element.

2.1.26 To maintain consistency, we have simply overlaid the new costs into the old (FOSR) CBAs, changing the capitalisation rate to 100%. Therefore, the weighted average cost of capital (WACC) and depreciation rate remain as per the submission.

2.1.27 There were several other costs included here such as Opex and other asset health. We have taken these out to focus on the effect of re-costing the options.

CBA Re-run Conclusion

2.1.28 The results of the CBA re-run are summarised in **Error! Reference source not found.**. Both shortlisted options have a reduced NPV from the original FOSR, as expected when costs increase but the valued benefits have remained the same.

[redacted]

2.1.29 As the new unit costs have increased by a greater proportion than the asset health costs, this has meant that Option 7 has become the most economical option under Steady Progression, as benefits have remained the same. The new unit Option, Option 10 has had a much greater cost increase relative to Option 7 and therefore its cost benefit ratio has lowered enough to make it less favourable.

2.1.30 There is no change in option ranking in the Leading the Way CBA, Option 7 is still the preferred option.

2.1.31 Within this part of the network there is the load based West Import Resilience Project. As this is driven by an expected increase in LNG supply from the Milford Haven terminal, the average flow and the peak flow will increase in the region placing differing demand on Wormington. This is expected to increase the compressor's run hours and means that there is a much greater need to have units at Wormington which are not derogated.

2.1.32 The annual 500 run-hour restriction under the MCPD derogation at Wormington compressor station mean that the counterfactual option of retaining two units with this limit applied does not have the sufficient run hours to provide back up to VSD across credible scenarios. This will result in many run hours, which a pair of derogated SGT-A20 compressors cannot meet all of them without exceeding their legislative requirements.

2.1.33 Our RIIO-GT3 Business Plan proposals, including the WIRP project, are based on the approved final preferred option (option 7). They assume installation of a new unit and asset health work on one of the existing units to meet regulatory obligations and to increase and maintain the site's compressor availability into the future.

2.1.34 Therefore, the final preferred option approved by Ofgem remains the best solution for MCPD compliance and future site requirements at Wormington. It also satisfies the economic measure of the CBA as well as the more qualitative elements such as site resilience.

3 Engineering and Costs Current Status

This section has not yet been finalised since it is largely dependent on the finalisation of the cost estimates, which will be provided in the March 2026 submission as agreed with Ofgem. The final chapter will demonstrate how the final cost estimate was developed including project programme and risks.

Preface to Cost Estimates

3.1.1 At the FOSR stage (in 2022/23) the cost estimate was produced to [redacted] cost certainty using a methodology that was reliant on factored costs and historic cost data. Since then, increases have become evident through the ongoing compilation of a cost estimate with a [redacted] cost certainty due to be provided in an update to this EJP in March 2026 as agreed with Ofgem.

3.1.2 A range of internal and external factors have been identified as drivers of cost escalation and are detailed in the following section. To validate and benchmark these changes, NGT engaged a third-party consultant [redacted] to conduct an independent review of costs, examining the progression from the original FOSR estimate through to the latest contractor submissions. This review leveraged industry knowledge, database information, and market research to assess previous estimates against updated cost bases and trends, including inflationary impacts and market conditions.

Internal Factors

3.1.3 The FOSR estimate included allowances for design development, unallocated provision and risk but there have since been some key developments in the scope which have led to additional cost not covered by these allowances. The most significant updates are summarised below.

3.1.4 **New Compressor Siting**: The FOSR estimate was based on the new compressor being located on land that we own to the south of the existing compressor station with no permanent land acquisition required. However, since the FOSR we revisited the compressor siting studies leading to the decision to select an alternative location to the north of the existing compressor station on third party land. This led to additional cost associated with land acquisition (now complete) as well as additional earth works due to the sloping site. The decision to revisit the siting study was originally driven by anticipated noise conditions in the planning consent and the significant risk to achieving these conditions in the southern location which placed the new unit closer to the nearest noise receptor. However, subsequent design development led to significant increases to the plot area (described below) meaning the southern option would have also required land acquisition for permanent and temporary facilities. The decision to site the compressor on land to the north of the station as opposed to "within the existing boundary of Wormington Compressor Station" per the Final Determination was communicated to Ofgem in March 2025 when it was agreed that this should not be considered a deviation from the final preferred option.

3.1.5 **Additional Equipment Scope**: Through the design development in Conceptual Engineering the sizing and scope of major equipment has been confirmed including:

- A new 2x100% instrument Air package added to scope following confirmation of existing capacity and requirements for additional capacity
- Gas recovery package
- 11kV switchroom, transformer and standby generator
- Additional local equipment room

3.1.6 **Plot Area**: Since the FOSR the plot area for the new permanent facility has increased [redacted] This is driven by several notable additional scope requirements including:

- New Unit Vent stack located in new plot area (previously collocated with existing vent stack). Change driven by confirmation of sterile area requirement in accordance with current technical standards requirements
- Additional equipment packages and buildings with notably including:
    - New building for spares and maintenance
    - New 2x100% instrument air package
    - Larger footprint for compressor equipment housed within Compressor Acoustic Building (CAB)
    - New Electrical equipment (11 kV switchroom and transformer)
    - Landscaping and biodiversity net gain requirements

3.1.7 **Noise Conditions:** Noise from gas compressor sites is subject to the following regulatory mechanisms:

- Environmental Permits, (issued by the Environment Agency in England and SEPA in Scotland) require that BAT ('Best available techniques' - the best techniques for or minimising emissions and impacts on the environment) are employed; and
- Planning conditions, applied by local planning authorities. These conditions include numeric noise limits that must be met during operation. These noise limits typically apply at the closest residential receptors to a compressor site. When defining these noise limits, local planning authority takes various factors into account, including the existing levels of background noise.

3.1.8 Wormington Compressor Station is located in a rural area with low levels of background noise, particularly at night. The combination of inherently noisy equipment and low background noise requires a high level of noise control for the new compressor to operate within planning noise limits.

3.1.9 Since the FOSR with the support of the Contractor and a specialist noise consultant we have defined noise "budgets" for the project based on anticipated planning conditions and incorporating lessons learnt from the Emissions Reduction Phase 3 (ERP3) project. This has driven the requirement for additional noise mitigations including:

- Low noise generating equipment
- Additional noise insulated enclosures around noisy piping and equipment
- Minimised above ground pipework
- A re-designed and much larger Compressor Acoustic Enclosure (CAB) to encapsulate the compressor machinery train and some of the ancillary equipment
- Equipment layout designed to provide shielding between the highest noise emitters and the nearest receptors where possible

3.1.10 The additional requirements increase the cost of material and equipment supply as well as the time and cost associated with construction and commissioning. The changes also impact other aspects of the design which further impacts cost. For example, the larger CAB size has driven additional HVAC capacity which subsequently impacts the electrical design which must power the HVAC equipment.

External Factors

3.1.11 The Wormington MCPD new unit estimated cost has been affected by the enduring impact of global market volatility. The most recent NGT compressor projects, including Emissions Reduction Phase 3 (ERP3)2 and Hatton Large Combustion Plants Directive (LCPD) projects, were initiated before the geopolitical volatility experienced since the 2019.

[2] Commissioning of two T130 units at Peterborough and two T130 units at Huntingdon to replace four non-compliant [redacted] cross both sites.

3.1.12 Events such as COVID-19, Brexit, Russia-Ukraine conflict, and US Tariffs have had global market impacts. This has affected the costs of Hatton and ERP3 to differing extents, and in some instances, prices were protected by our contracting pricing model at the time. These events have impacted supply and demand dynamics in the UK and internationally. This led to effects on time and cost for project delivery also affecting whole markets, including steel, energy and other raw materials. Impacts have included:

- **Inflation** - Since 2019, UK inflation (CPI) has increased by approximately 27–30% cumulatively (2019–2025), driven by pandemic disruptions, energy shocks, and supply chain crises (UK CPIH approximately 25–27% cumulatively).
- **Material Prices** – 37% increase in the price of all types of building materials since January 2020.
- **Steel prices** have experienced significant fluctuations due to global economic shifts (post pandemic recovery and infrastructure spending), supply chain disruptions and high demand.
- **Concrete prices** have steadily increased, driven by rising raw material costs, labour shortages, and strong demand in the construction sector post pandemic.
- **Labour** – due to competition for talent and labour shortages average UK salaries have increased by ca. 35% from 2019 to date (Office of National Statistics, ONS data). Some specialist roles have seen even higher increases (welders, electrical engineers). Construction pay is currently rising faster than almost all other sectors and is growing at its second highest rate since coming out of the pandemic.
- **Logistics** - freight costs increased by nearly 5 times during peak disruption and some rates remain over double pre-pandemic costs.

3.1.13 There has recently been a large amount of major infrastructure investment in the UK including significant investment in the utilities sector which has driven higher prices as projects compete for the same limited pool of suppliers. Between 2018 and 2025 the Building Cost Information Service (BCIS) Indices indicate that the All-in Tender Price Index (TPI) has increased by 38%. While the TPI is only slightly higher than inflationary increases, this figure reflects broad contractor pricing trends and does not account for several key cost drivers specific to Wormington MCPD. The indices do not provide granular visibility into the cost of critical materials, such as high-grade steel, nickel alloys, and instrumentation components, nor do they reflect the logistical and efficiency constraints of brownfield installations. These factors introduce significant variability that high-level indices and benchmarks cannot accurately reflect.

3.1.14 A critical shift in the market since National Gas contracted previous compressor projects (i.e. Hatton LCPD and ERP3) has been supplier and market appetite for risk. Due to the volatility experienced since 2019 and underpinned by the collapse of Carillion in 2018, the market has moved. Main works contractors are now not prepared to accept certain terms, delivery responsibilities or levels of uncertainty or risk without opportunity for change or additional costs being included for. This has seen a move to greater early contractor involvement and a move away from fixed priced contracts. This has been exacerbated by the significant increases in cost of contractors' insurance premiums (part of a contract price) resulting from market hardening that limits risk coverage and introducing greater exclusions. This chapter will be further supplemented for submission in March 2026.