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**Business Plan Data Template Commentary**

# Instructions and Guidance

## Background

1.1. This document – The Business Plan Data Table Commentary Template (BPDTC template) - is a template for National Gird Gas Transmission (NGGT) to provide additional information, alongside the Business Plan Data Template, to help:

- Identify, explain, and justify the main drivers of forecast expenditure and volume profile across the RIIO-T2 price control period
- Explain and justify scenarios used for justifying the forecast workload volumes and costs across the RIIO-T2 period, and
- assist Ofgem in the process of navigating the data submission and supporting documentation.

1.2. This template should be read alongside the Business Plan data template instructions and guidance for RIIO-GT2[1], the RIIO-2 Business Plan guidance[2] and the RIIO-2 sector specific methodology decision document[3].

## Instructions and guidance

1.3. Alongside the submission of the data template, NGGT must provide a summary explanation of the information provided in each data worksheet through an additional Business Plan Data Table Commentary (BPDTC).

1.4. NGGT must, to the best of its ability, complete the BPTDC form and, where appropriate, answer the following prescribed questions:

- Please compare the current forecast across the T2 period and the latest information on the forecast position across the RIIO-T1 period explain the material differences between

[1] https://www.ofgem.gov.uk/publications-and-updates/riio-2-draft-data-templates-and-associated-instructions-and-guidance
[2] https://www.ofgem.gov.uk/system/files/docs/2019/06/riio-2_business_plans_guidance_june_2019_-_published.pdf
[3] https://www.ofgem.gov.uk/publications-and-updates/riio-2-sector-specific-methodology-decision

them. Please include information in terms of run rates, trends, unit costs etc. and explain the reason for any material step change or difference.

- Please summarise and explain the cost/volume/financial profile of the T2 information.
- Please provide a justification for any unit cost/trend outliers, including any regional and/or site specific factors and where there is material interaction with other areas of the BPDT.
- Please identify and explain the scenario used for planning, the level of sensitivity within the forecasts used and clarify how uncertainty has been considered/tested. Indicate the materiality of these assumptions.
- explain the interactions with wider governmental policy
- Please explain the types of internal and external benchmarking exercise (where applicable) that have been undertaken to support the T2 forecasts (eg. internal tendered framework rates and/or international unit cost comparison)
- Please reference areas of the BPDT submission that can be used to further evidence or substantiate the submission (eg. cells A:B of tab "X" of the BPDT or supporting document "Y"), and
- Highlight any additional information that NGGT deems to be relevant to aid Ofgem's understanding and interpretation of the information.
- Where costs have been apportioned across one or more activities, the basis of apportionment must be provided in the cost commentary document. Please also give an indication of the robustness of those assumptions.

1.5. The BPDTC template is applicable to all worksheets in version 1.5 of the BPDT, except for any cover, contents or summary sheets (specifically: A0.00 – A0.05, 1.02 – 1.03 2.00 & 2.00a and the universal data sheet). Each licensee must use reasonable endeavours to provide a commentary for each of the categories above. Licensees should report "n/a" where questions do not apply to the subject matter of the worksheet and should ignore any tables that do not apply to them.

1.6. The BPDTC must not exceed 3 pages in length for each worksheet. Where visual representations of information (e.g. waterfall diagrams) may aid understanding these should be included and will not contribute to the 3 page limit.

1.7. Where information that is relevant for the BPDTC is located in the main Business Plan submission, other narratives within the BPDTC or supporting files (e.g. engineering justification, CBA etc.);[4] directions and cross references to the relevant information must be

[4] https://www.ofgem.gov.uk/publications-and-updates/riio-2-draft-data-templates-and-associated-instructions-and-guidance

clearly signposted in the BPDTC. Where it is not possible to include all information as prescribed, companies will need to clearly explain the reasons why.

1.8. The appropriateness and materiality of the commentary provided should be at a level that minimises the need for Ofgem to ask supplementary questions.

1.9. Licensees should, to the fullest extent possible, ensure that the BPDTC contains all information relevant to Ofgem's assessment of the plan. This includes providing a proportionate summary of the overall activity level experienced and costs incurred and expected by the licensee. The BPDTC must therefore provide overview information on the level of activity and costs across the RIIO-T1 period and the current BPDT forecasts for the RIIO-T2 period. Where a variance is observed in the transition between price control periods, a succinct explanation of the material differences between them and factors driving the variation is required.

## Definitions

1.10. The definitions set out in the Glossary of the RIIO-GT1 Gas Transmission Price Control Regulatory Instructions and Guidance[5] should be used to complete the template in a consistent way. NGGT must ensure that the definitions are clearly understood and are complied with when entering any data into the BPDT. Where there is doubt or uncertainty, please refer to Ofgem for clarification. This is to ensure consistency and comparability of data entry.

[5] https://www.ofgem.gov.uk/publications-and-updates/notice-proposing-modifications-regulatory-instructions-and-guidance-rigs-riio-gt1-version-61

# Data Table Narratives

## Structure of the Template

1.11. The template has been separated into the following sections:

**A:**
- 1.01_BPFM_Inputs
- 1.04_BP_Disposals_1 & 1.05_BP_Disposals_2

**B:**
- 2.01_Acc_Costs & 2.02_Cash_Contr_Costs
- 2.04_Direct_Opex
- 2.05_Phys_Security_Opex
- 2.06_Quarry_Loss
- 2.07_Bus_Support_Gp & 2.08_Bus_Support_Alloc
- 2.09_IT_&_Telecom_Gp & 2.10_IT_&_Telecom_Alloc
- 2.11_Property_Costs_Gp & 2.12_Property_Costs_Alloc
- 2.13_Insurance_Costs_Gp
- 2.14_Corp_Costs_Alloc
- 2.15_RPEs
- 2.16_Op_Training_(CAI)
- 2.17_Salary_&_FTE
- 2.18_Exc_&_Demin
- 2.19_Provisions
- 2.20_Related_PartyC

**C:**
- 3.01_Project_Listing_1 & Project_Listing_2
- 3.03_Asset_Health & 3.04_Asset_Health_Unit_Costs
- 3.03b_Asset_Health_Projects/3.04a_Asset_Health_Unit_Costs
- 3.05_Phys_Security_Capex
- 3.06a_TO_Cyber_Security_OT & 3.06b_TO_Cyber_Security_IT
- 3.07_Non_Op_Capex
- 3.08_SO_Capex
- 3.09a_SO_Cyber_Security_OT & 3.09b_SO_Cyber_Security_IT

**D:**
- 5.01_System_Characs
- 5.02_Activity_Indicators
- 5.03_Utilisation_&_Performance
- 5.04_Demand_&_Capability
- 5.05_Compressor_Utilisation
- 5.06_Asset_Data
- 5.07_Forecast_Scenarios

**E:**
- 6.01_Bus_Carbon_Footprint
- 6.02_Innovation
- 6.03_EAP

## Data Table Templates

1.12. NGGT must complete all data table templates below:

### Table 1.01 – BPFM Inputs

| **Uncertain Costs:** Provide details and explanation for any forecast uncertain costs associated with proposed uncertainty mechanisms. |
|---|
| We have not input data in the Uncertain Expenditure Inputs section as the RIIO-2 framework around Uncertainty Mechanisms has not yet been finalised. Therefore, all totex is treated as non-variant in the BPFM. Separation of inputs between actual and uncertain expenditure does not impact the calculation of revenues and financeability ratios in the BPFM.<br><br>The following commentary is in response to the request to "Highlight any additional information that NGGT deems to be relevant to aid Ofgem's understanding and interpretation of the information". We do not consider the remaining prescribed questions to be applicable to this table.<br>The purpose of this worksheet is to provide a summary of information from the BPDT, to be used as input values in the Business Plan Financial Model (BPFM).<br><br>**Summary of approach**<br>In this section, we summarise the methodology we have adopted to populate the table:<br>• The first 6 years of RIIO-1 BPFM Actual Expenditure Inputs are sourced from the 2019 Cost and Outputs Regulatory Reporting Pack (RRP). The final 2 years of RIIO-1 have been updated in the BPDT to reflect our latest forecast and, therefore, differ to the RRP submission made to Ofgem on 31 July 2019.<br>• For RIIO-2 values, totex is defined as per the Regulatory Instructions and Guidance (RIGs) as all spend incurred to deliver outputs in RIIO-2 and beyond. It includes projects which could be considered competable using Ofgem's criteria. In line with the RIGs, these values do not include real price effects (RPEs).<br>• We have not input data in the Uncertain Expenditure Inputs section as the RIIO-2 framework around Uncertainty Mechanisms has not yet been finalised. Therefore, all totex is treated as non-variant in the BPFM. Separation of inputs between actual and uncertain expenditure does not impact the calculation of revenues and financeability ratios in the BPFM.<br>• The asset class 1 and asset class 2 data inputs are intended to be populated with totex values where a change is proposed to the asset depreciation profile in RIIO-2. However, the RIGs relating to the BPFM ('RIIO-2 LiMo Guidance – Gas Transmission') state that totex data should be sourced in all instances from the BPFM Actual Expenditure Inputs in Table 1.01. Any data included in the asset class 1 and 2 will therefore not be captured in the BPFM and, as such, we do not populate these cells.<br>• We input nil values for RIIO-2 legacy price control adjustments to allowed revenue & RIIO-2 legacy price control adjustments to RAV. We have adjusted for legacy items in BPFM as per 'RIIO-2 LiMo Guidance – Gas Transmission' issued on 9 November 2019. To enter a value in these cells would double count the impact of legacy adjustments in the BPFM. |

- We have applied the RIIO-1 definition of Non-totex to populate the non-totex section. Costs included in this section are Network Rates, Licence Fees, Security (Armed Guards) and Scottish Independent Undertakings.
- Historic depreciation and amortisation values are included as per the statutory accounts with forecasts based on the existing asset register and planned investment.

**RIGs commentary**

In this section, we summarise any areas where adoption of the RIGs creates inconsistencies elsewhere in the draft submission or we consider our interpretation of the RIGs requires further explanation.

- The RIGs state that data (which includes both RIIO-1 and RIIO-2 values) should not include real price effects (RPEs). However, RIIO-1 cost data includes RPEs as these are not separable from total totex spend. We have followed the RIGs in excluding RPEs from RIIO-2 costs. This therefore creates a discrepancy in approach between the two price control periods. The RPEs are a cost to the business which should be funded and therefore should be reflected in totex costs for RIIO-2.
- RIGs guidance states that pension deficit values (EDE) for 2021/22 to 2025/26 should be equal to the value input in 2020/21. We have completed the table on this basis but note this is not aligned with our best view of these costs which has been incorporated into the cost and outputs tables. We have also amended the value to reference cell U64 for the EDE values in RIIO-2 which is stated incorrectly in the RIGs as sourced from cell U50. As treatment of pension deficit values for GSO (SOEDE) is not defined in the RIGs, we have followed the guidance applied for EDE and reference cell U71 for the SOEDE values in RIIO-2.

**Table commentary**

The BPFM Actual Expenditure Inputs section is populated through linkages to Table 2.00a Summary Data 2. The linkages in the published Table 1.01 result in categorisation of totex which is not consistent with categorisation in the RIIO-1 RRP submissions. We have therefore updated the linkages to Table 2.00a to give the same categorisation of RIIO-1 and RIIO-2 spend between totex categories as per the RRP as submitted to Ofgem on 31 July 2019.

The supporting tables also do not include functionality to include RIIO-1 IAS pensions adjustments. These are therefore included as a manual adjustment to the RIIO-1 totex totals.

The amendments to the data table has been included in the Ofgem change log.

**Table 1.02 Financial Requirements**

| |
|---|
| Narrative not requested in Business Plan Data Narrative Template.<br>Therefore the table narrative is in response to the request to "Highlight any additional information that NGGT deems to be relevant to aid Ofgem's understanding and interpretation of the information". |
| We have fully redacted this table and have therefore also removed the related commentary here. |

**Table 1.02b_Debt**

| |
|---|
| Narrative not requested in Business Plan Data Narrative Template.<br>Therefore the table narrative is in response to the request to "Highlight any additional information that NGGT deems to be relevant to aid Ofgem's understanding and interpretation of the information". |
| We have fully redacted this table and have therefore also removed the related commentary here. |

**Table 1.02c_Interest**

| |
|---|
| Narrative not requested in Business Plan Data Narrative Template.<br>Therefore the table narrative is in response to the request to "Highlight any additional information that NGGT deems to be relevant to aid Ofgem's understanding and interpretation of the information". |
| We have fully redacted this table and have therefore also removed the related commentary here. |

**Table 1.03 Tax Inputs**

| |
|---|
| Narrative not requested in Business Plan Data Narrative Template.<br>Therefore the table narrative is in response to the request to "Highlight any additional information that NGGT deems to be relevant to aid Ofgem's understanding and interpretation of the information". |
| The purpose of this table is to collect information relating to actual and forecast corporation tax information, including capital allowances, tax pool allocations and impact of financing and other factors on actual tax payable compared to notional tax allowance.<br>The values quoted in the table are in 2018/19 price base as requested. We understand that Ofgem may use this data to compare to the Price Control Financial Model tax pools which are quoted in a nominal price base. It is unclear how this process will be carried out, what further price base adjustments will be made to allow direct comparison and how Ofgem intend to engage on any proposed adjustment.<br><br>**Summary of approach**<br>The principles we have adopted are:<br>• [redacted].<br>• [redacted].<br>• [redacted].<br>• The capital allowances pool allocation percentages have been updated for the RIIO-2 period to reflect revised assumptions. Historic capital allowance positions have been reviewed along with analysis of the forecast future spend in RIIO-2 to determine the applicable percentage allocations.<br><br>**RIGs commentary**<br>Given the limited information in the RIGs we have set out the assumptions we have made in the summary of our approach.<br><br>**Table commentary**<br>The following issues have been identified which, in our view, result in incorrect calculation of capital allowances and tax pools in the BPFM:<br>• There is no separate 'pool' for Intangible fixed assets (IFA's) spend. Under the most recent legislation rules, tax will follow the accounting treatment on new IFA spend (i.e. accounts amortisation is an allowable deduction). For consistency an IFA pool is required in Table 1.03 with a rate reflective of the accounts amortisation. As there is no IFA pool within the table, all forecast intangible fixed asset spend has been allocated to the general pool. The allowable deduction of amortisation in reality is still expected to be higher than the 18% deduction via the general pool, but solution is most reflective of the accounting treatment.<br>• There is no provision in the tables to reset the RIIO-2 opening capital allowances pools to reflect the CT600 filed positions in line with the RIIO-1 precedent. We believe an approach to reflect the final RIIO-1 capital allowances pool should be adopted. |

**Table 1.04/1.05 – Business Plan Disposals 1/2**

| **Disposal Costs:** Provide an explanation and justification for any forecast costs and volumes/projects associated with disposal of assets associated with table 1.04 and 1.05 of the BPDT |
|---|
| Our table narrative is in response to the request to "Highlight any additional information that NGGT deems to be relevant to aid Ofgem's understanding and interpretation of the information". We do not consider the remaining prescribed questions to be applicable to this table.<br><br>The purpose of these tables is to collect information relating to fixed asset disposals.<br>**Summary of approach**<br>The principles we have adopted are set out below:<br>• RIIO-1 values are sourced from the RRP submission on 31 July 2019 and so are consistent with the latest RIIO-1 view submitted to Ofgem.<br>• From 2019/20 onwards, as no disposals are forecast at this stage, a nil return is submitted.<br><br>**RIGs commentary**<br>Table note 1 for 1.05 BP Disposals 2 references the need to provide copies of all independent valuations. As there are no disposals forecast for RIIO-2, no supporting documentation is required.<br><br>**Table commentary**<br>We have not identified any issues. |

## Table 2.01/2.02 – Accounting Costs & Cash Controllable Costs

**Accounting Costs:** Provide an explanation and justification for any forecast costs in accordance with the cost break down of the Business Pan Data Template Guidance (eg. By Labour, Pensions, Contractors etc.)
**Cash Controllable Cost:** Provide an explanation and justification for any forecast costs for activities within business support, closely associated indirect and direct costs as well as those items outside of Totex including non- controllable costs to come to the total operating costs

**RIIO-1 to RIIO-2 comparison & RIIO-2 trend**

Table 2.01 & 2.02 show only a portion of our opex costs for RIIO-2, with physical security, crop & quarry and cyber opex shown on tables 2.05, 2.06, 3.06 and 3.09, respectively. For consistency with our opex annex A20.15 we use analysis based on our total controllable operating costs.

Average operating costs for RIIO-1 are £177m per annum. 47% of opex goes on activities that directly impact our assets, such as maintenance activities and asset inspections. The remainder is spent on indirect activities e.g. planning network changes, IT support costs for our asset management systems, the running of the Gas Control Suite, and an allocation of shared support function costs such as HR and finance.

The mix of our operating cost base has changed over time as the result of business decisions and the need to respond to external challenges. We are forecasting to overspend RIIO-1 opex allowances by £93m in total, because this was the efficient level of costs required to support the Gas Transmission business. In particular, we have invested in asset data systems and additional resource, to increase our understanding of the condition of our assets in order to make better informed decisions about asset interventions, and we have had to respond to an escalating cyber threat, and to remain compliant in more complex regulatory and financial control environments. Further details on our RIIO-1 history can be found in A20.15 opex annex.

*Commitment to reducing our cost base by £30m a year*

We have recently reshaped our business in readiness for the changing needs of our customers over the next five years, through the Performance Excellence (PEx) value programme. The resulting re-shaped organisation and cost base make us fit for delivery in the RIIO-2 period. Our pay is comparable with peer companies and savings bring our business support costs in line with or better than benchmarks. By moving to our new operating model in advance of the start of the next price control we can be transparent with our stakeholders about our future operating cost base. These changes will deliver savings of £30m against our projected costs for RIIO-1 by March 2021, which will flow into all years of RIIO-2 making a total consumer benefit of £150m over the next price control period.

*Commitment to £31m productivity improvement*

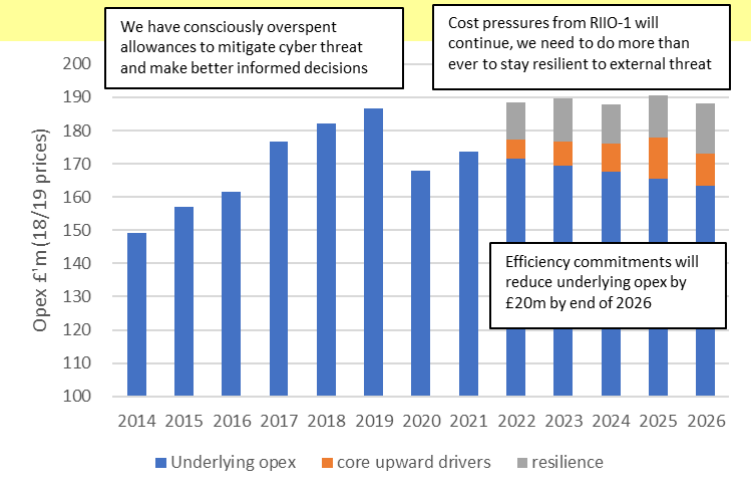
On top of these efficiencies, we are challenging ourselves to deliver more value in RIIO-2. We have embedded 1.1% per annum of productivity into our underlying opex cost base which is nearly three times the current UK trend for productivity. This translates into a saving of £31m across the period. We do not yet know how we will deliver much of this productivity but, in total, this means our underlying opex cost base is forecast to reduce by 11% or £20m between 2019 and the end of RIIO-2. Figure 1 below shows the impacts of these on our underlying cost base, including the forecast for a number of upward cost of pressures (orange bars).

RIIO-2 upward pressures

We are forecasting upward cost pressure from three key areas in RIIO-2:

**IT run costs** – our IT operating costs have increased throughout RIIO-1 as we have invested in IT systems in our businesses and responded to cyber threat and are forecast to reach £29m by the end of RIIO-1. Independent benchmarking experts Gartner have confirmed that our IT operating costs are efficient as we enter RIIO-2. This increase will continue into the first few years of RIIO-2 as we complete our infrastructure modernisation programme and support key business processes. Increased use of hosted IT solutions, rather than traditional built and owned solutions, are also driving up our opex but with an associated decrease in capex and with the benefits of increased flexibility and scalability for the IT solution. However, as the impact of our 1.1% per annum future productivity improvements builds up, operating costs start to fall again. Overall, this results in IT costs that are £8m per year higher, on average, than RIIO-1.

**Figure 1: Efficiency commitments will reduce underlying opex costs by £20m by end of 2026.**




**Workforce renewal** - We have structured our field-based workforce in line with ISO55000 asset management standards and in doing so have the capability to manage changes in asset maintenance policy or the impact of customer behaviour without an increase in resource in RIIO-2. However, our strategic workforce planning process has identified that over 20% of this workforce are due to retire in the period 2020-2030 and we need to act now to recruit and train a new workforce in a well planned and efficient manner to pre-empt the loss of experienced personnel. The additional headcount and training costs will result in an average £3m per year increase in opex over RIIO-2. Our sustainable workforce strategy annex A21.01 provides more detail on these challenges and how we are responding.

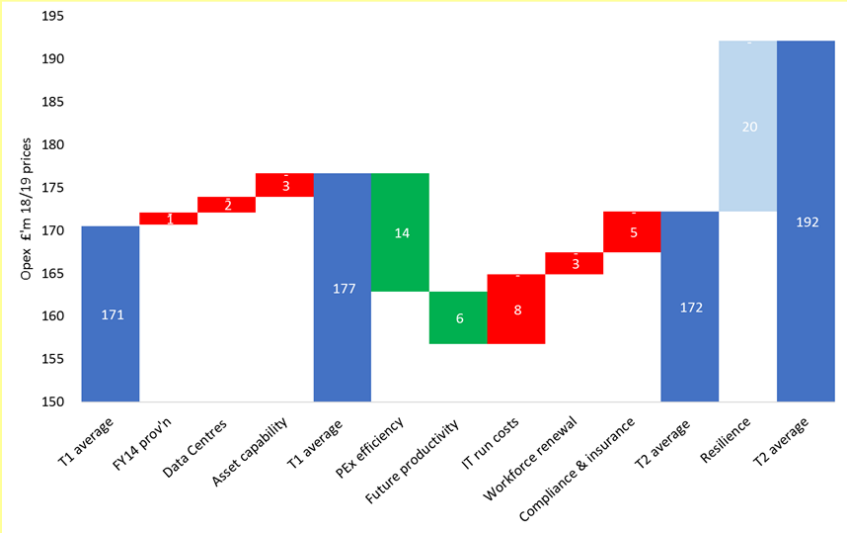
**Compliance and insurance** – We have overspent allowances in meeting regulatory and financial compliance activities through RIIO-1 with the additional requirements and scrutiny that followed the move to a more outputs and incentive based regulatory regime and increased focus on controls from external auditors. These pressures will build into RIIO-2 with more complex mechanisms being introduced which will reduce the potential for windfall gain or loss but add £4m opex per year. In addition, insurance market premiums are increasing due to external pressures. Whilst we are forecasting an additional £1m per annum in respect of these premiums our market testing shows that our captive insurance model still represents best value for consumers, with premiums that are around 23% lower than those available from the commercial insurers.

The waterfall chart below sets out the comparison of total GT opex costs between RIIO-1 and RIIO-2. In line with a request from the RIIO-2 Challenge Group, we compare our RIIO-

2 opex costs to the first six year actual expenditure of RIIO-1. We have adjusted RIIO-1 opex costs to include crop and quarry and physical security spend, which was recovered through a UM in RIIO-1 but forms part of our baseline totex for RIIO-2. We have also adjusted the six year average for a provision movement and for data centre and asset capability spend that was not present in the six year average:

The waterfall chart demonstrates how, even after the impact of the three underlying opex cost drivers are factored into our plan, operating costs will fall by an average of £5m each year thanks to our efficiency commitments.

**Figure 2: Our core operating costs are reducing by £5m per annum in RIIO-2**




In addition to our core operating activities, we are being asked to do more to respond to the emerging threat around deliberate cyber and physical interference with our operational assets. We have invested in cyber resilience during RIIO-1 but there is more to do as we enter RIIO-2. Government bodies are guiding developments in our approach to cyber and this will necessitate both new investment and ongoing operating costs. We have included opex of £20m per year in our RIIO-2 plan for our cyber and physical security activities. For external threats, whether physical or cyber, uncertainty mechanisms allow us to adjust our plans should we be asked by the external competent authorities to do more to ensure we can deliver a highly reliable and resilient service. More information on our cyber resilience plans can be found in annex A20.02.

### Gas System operator costs

GSO opex represents just over a third of total GT opex. Key drivers and trends are consistent with the overall GT opex story but we present GSO opex costs separately here for transparency.

Direct opex for the GSO, comprising chiefly the system operator workforce, decreases from £35m per year in RIIO-1 to £31m per year in RIIO-2, primarily as a function of the efficiency commitments we have made in our plan. There is a further £0.2m per year reduction driven by the reclassification the GSO allocation of shared Xoserve Gemini costs as non-totex. PEx value savings are sustained throughout the RIIO-2 period however there is a modest increase in planned workload from analysing and managing market risk, increasing network access requirements and delivering increased market change.

Closely associated indirect (CAI) costs are primarily the running costs associated with operational IT and telecoms costs. These will show an increasing trend in RIIO-2 as support for more business and shared IT infrastructure investments grows. IT support costs for non-operational systems are the key driver of increases in business support costs, in addition to a higher finance, audit and regulation charge associated with increased compliance activities. Further detail on the GSO RIIO-2 plan can be found in A14.25 GSO annex. Further information on IT and other business support costs is provided in A20.15 opex annex and in the narrative to tables 2.07/2.08-2.11.

### Business support costs

Table 2.07/2.08 provides detailed narrative on business support costs. GT allocated business support costs are consistent with the key cost drivers at group level. In addition, waterfall charts and further information on the allocated GT business support costs can be found in A20.15 opex annex.

**Figure 3: GSO RIIO-2 operating costs show same trends as overall GT**

| £'m (18/19 prices) | RIIO-1 average | 2022 | 2023 | 2024 | 2025 | 2026 | RIIO-2 average |
|---|---|---|---|---|---|---|---|
| Direct | 35.2 | 30.4 | 31.1 | 31.4 | 31.4 | 31.2 | **31.1** |
| CAI | 11.1 | 9.5 | 9.6 | 9.6 | 10.1 | 10.2 | **9.8** |
| Business support | 16.2 | 22.7 | 22.6 | 22.3 | 23.2 | 23.1 | **22.8** |
| Resilience | 0.2 | 3.3 | 3.4 | 3.3 | 3.2 | 3.4 | **3.3** |
| **Total controllable opex** | **62.6** | **65.9** | **66.6** | **66.5** | **68.0** | **68.0** | **67.0** |

Note: CAI RIIO-1 average includes £1.8m p.a. adjustment for data centre opex costs, funded through a RIIO-1 reopener (in 2017/18), and scrutinised by Ofgem as part of that process

### Non-totex costs

The waterfall sets out key drivers of non-totex costs in RIIO-2 for GT.

**Pension deficit costs** - [redacted]. Deficit forecasts will be updated prior to the RIIO-2 Final Proposals, following the conclusion of Ofgem's next triennial PSED review, expected during 2020.

**Xoserve** – a portion of Gemini-related costs have been reclassified from our SO direct opex to non-totex. A compensating decrease can be seen in GSO direct opex (see GSO costs section above).

**Network rates & licence fees** – [redacted]. Forecast costs represent our latest estimates through this process, but costs are ultimately decided by the Valuations Office and subject to change. We have based our RIIO-2 forecast of licence fees on an average of 2019 actual costs and 2020 budget costs.

**Excluded, consented & de minimis work –** forecasts are consistent with our projected costs for 2021. Due to the bespoke nature of this work, and the fact that it is customer driven longer range forecasts are challenging. The increase from RIIO-1 is due to the RIIO-1 average being based on two years of ECD costs.

**Planning scenarios, uncertainty, assumptions**

Our people-related costs are based on our projected cost base after delivering revised ways of working that were identified as part of the PEx value programme. Moving to this structure ahead of the start of the RIIO-2 period means we can be transparent with Ofgem

and our other stakeholders about the cost to run our organisation going forward and supports our commitment to delivering efficiencies of £30m for each year of RIIO-2.

**Figure 4 Waterfall for items outside of Totex**

As part of this programme we aligned the Gas Transmission organisation to become an effective asset management as defined in ISO 55000. The structure consists of Asset Owner, Asset Manager and Asset Steward. To aid transparency we also re-aligned our Asset Owner and Asset Manager activities to the RIGs categories e.g. Engineering Management & Clerical Support, Health, Safety & Environment, Network Design and Engineering and Network Policy. This alignment can be seen in costs from 2020 onwards.

Our workload volume has different drivers across our TO business:

- To Operate our network, we have two shift teams; one each at Bacton and St Fergus
- To Maintain our network, we have policy driven and reactive maintenance drivers
- To Respond to our network we have out of hours standby rotas which have been designed based on geographical footprint of our assets.

Structuring our field force in this way builds a level of resilience into our direct opex costs, as we are able to flex utilisation of resource depending on need, avoiding additional cost.

Within our Asset Steward plan, we have assumed that our policy driven maintenance will be derived from original equipment manufacturer (OEM) recommendations, planning and scheduling will be based on Ellipse and SAP Work Manager. Further detail is provided in table 2.04 narrative.

Through our annual workforce planning process, we have used projected retirement and non-retirement attrition rates to identify the number of new or semi-skilled people we need to bring in to pre-empt the loss of experienced personnel forecast.

In GSO we have assumed a consistent annualised FTE level across RIIO-1 and RIIO-2 to enable transformation to a sustainable energy system across the country and ensure the delivery of reliable and affordable energy for all consumers. The capabilities we have today remain important, but we need to continuously evolve in order to tackle growing challenges and be flexible in an uncertain and ambiguous environment. We will require both breadth and depth in our chosen capabilities (skills, knowledge and experience).

**Internal & external benchmarks**

National Grid are the only company within the UK that operates a gas transmission network and system operator business. This makes it more challenging to benchmark many of our costs, as there are limited comparator information. We have utilised the following information to evidence the cost efficiency of our RIIO-2 business plan:

- Market testing - goods and services we purchase of a value >£20k are competitively tendered. We follow rigorous OJEU (Official Journal of the European Union) procurement guidance, ensuring that we robustly test the market for prices. Around 45% of our direct opex is spent on externally procured goods and services such as specialist plant hire and river crossing surveys to support our direct opex activities. We also use third party providers to support most of our IT activities, across closely associated indirect and business support categories. Considering contract extension periods, around 75% of our IT operating costs are contracted for the RIIO-2 period, giving us a high degree of certainty over these areas of our cost base.

- Independent cost benchmarking – where appropriate, for example where we are able to identify costs or activities common to a number of businesses, we have provided evidence of independent external cost benchmarking. A20.15 opex annex provides more detail, however in summary our total cash remuneration is in line with median pay for comparable industries, and our IT and business support function costs are efficient, that is comparable to median costs of efficient peers for IT, or in line with upper quartile/world class efficiency peers for other support functions, after adjusting for additional regulatory and CNI activities. In total we show 55% of our operating cost base has been externally benchmarked.

- We have participated in broader industry benchmarking exercises, most recently through our membership of the Gas Transmission Benchmarking Initiative (GTBI) and, in 2019 we were asked to take part in the Council of European Energy Regulators (CEER) benchmarking study. Chapter 20 "Our plan is efficient & affordable" and A20.15 opex annex provide more details on our benchmarking activities.

**Unit costs and interaction with other areas of BPDT**
(2.17) GSO FTE manpower is dependent upon capability provided by capex IT investments. The amount of FTE driven capitalisation (2.02) reflects the manpower needed to deliver the IT capex plan.

**Additional information**
Cost recoveries - Forecast assumes nil costs (and therefore nil cost recoveries) for other group and external customers on the basis that:

- Non-regulated group business forecasts of allocated cost consumption are not available to UK regulated businesses (being consolidated at a plc group level)
- Forecast corporate centre costs not recovered through UK Transmission businesses are not available to UK regulated businesses and, typically being project in nature, are of uncertain amount and timing to forecast
- Forecast costs to support US operations are typically small in value and not material to overall shared services operations

Pension deficit costs are based on the latest available pension deficit review performed in 2017. These numbers will be updated prior to the RIIO-2 Final Proposals, following the conclusion of Ofgem's next triennial PSED review, expected during 2020.

The PPF Levy for RIIO-2 onwards currently blank because Pension Scheme Admin and PPF levy has been reported together in one line in Pension Scheme Admin.

**Apportionment of costs across activities**
In table 2.01 our costs have been apportioned based on labour and non-labour costs. Our labour costs are driven by our forecast headcount. Our manpower modelling tool splits our costs between labour and pensions.

Our non-labour costs are driven by historic trends and volumes from our spend, this is informed by our historical spend such as reactive and scheduled policy maintenance, and forecast maintenance scheduled tasks from our Ellipse Asset Management system. Please refer to BPDT narrative table 2.04 for further information.

**Table 2.04 – Direct Opex**

| **Direct Opex:** Provide an explanation and justification for any forecast costs for cash controllable operating costs spent and associated activity volumes on fault repairs, planned inspections and maintenance, and operational property management |
|---|
| **RIIO-1 to RIIO-2 comparison**<br>Forecast total costs between RIIO-1 and RIIO-2 are largely flat.<br>There is an increase from RIIO-1 in planned inspections and maintenance. This is offset by a forecast decrease from RIIO-1 in fault repairs. This reflects our preference to proactively manage our assets.<br>Operational property costs are forecast to stay flat from the forecast RIIO-1 end position. This keeps the RIIO-2 average below the RIIO-1 average. Note that there is a direct link between electricity consumption and compressor running and standby hours, so our forecast costs take into consideration RIIO-1 consumption. Actual costs will be driven by the requirements to run compressors to meet customers' supply and demand patterns, therefore fluctuations in costs are expected<br><br>**RIIO-2 profile**<br>Forecast RIIO-2 profile for planned maintenance and inspections is extracted from our asset management system which we use to schedule those activities based on policy driven intervals.<br>Faults are forecasted using historic fault trend recorded in our asset management database to derive an expected fault rate year on year, which is multiplied with the expected opex cost of maintenance for a fault on that asset.<br><br>**Unit costs**<br>We have used system generated data to populate tables where possible. However, this is subject to known data limitations in consistency and accuracy. Gas Transmission are working on core asset data enhancements and functional system improvements that will improve the quality of opex unit costs based on core system data going forwards. It is planned to utilise these enhancements to support RIIO-2 reporting from April 2022.<br><br>The unit cost of inspection and maintenance activity is based on the historic cost of undertaking the relevant works. Where work is delivered by a contractor current contract rates have been used. For example, aerial surveys use the contract rate.<br><br>Currently, system based data cannot be used consistently to calculate opex unit costs for maintenance activities. This is due to known and understood data limitations relating specifically to standard hours allocation and the count of scheduled tasks; as most work is planned at a system level we cannot access a consistent asset measure.<br>For example:<br>The count of Work Orders has been utilised for the nonlinear site counts as this provided the most consistent repeatable volumetric. There is not a linear relationship between opex costs and number of assets, whereas the relationship between work order count and opex cost was more consistent and reflected the current work management process with greater accuracy.<br><br>Unit Costs vary year on year for metrics where the volumes and costs have different system data sources. Some lines (such as special crossings) have costs coming from our business plan bottom up build and volumes coming from Ellipse, which introduced high variability in the unit costs as the two data sources are not aligned. |

**Planning scenarios, uncertainty**
These opex activities are planed based on the scenario of the assumed investment plan that forms the RIIO-2 business plan. Works has been planned to complement the capital investment in the network.

**Interactions with wider government policy**
PSSR/Stat Inspection not included as this is a capex activity and therefore should not be in this opex report.

**Internal & external benchmarks**
As outlined in our opex annex (A20.15) we undertake periodic pay benchmarking to ensure that our pay remains in line with the market

**Reference areas of the BPDT**
Table 2.02 and other summary tables.

**Additional information**
Opex annex A20.15 includes a direct opex section which outlines how we size our asset steward teams who perform maintenance, repair and operation activities for the network and for external customers. The teams are geographically spread, and they operate and maintain two upper tier Control of Major Accident Hazards (COMAH) terminal sites. They also maintain the compressor stations, above ground installations (AGIs) and high pressure pipelines.

In line with planned progressive data improvements it was agreed that where possible core system data from Ellipse would be used as the basis for the identification and profiling of opex costs. Through detailed analysis carried out in Richmond and the GT Data Team, limitations in the quality and completeness of data were understood from the outset. However, we have continued with this approach since future data and systems enhancements will improve our capability and the accuracy of core system data for future RIIO-2 reporting.

Activity volumes for RIIO-1 are zero, as previously discussed with Ofgem. NG systems do not capture this granularity of historic data.

Where there were no units in the data template our assumption is that figures were not required, hence blank cells. This resulted in "errors" in unit costs part of the data table.

**Apportionment assumptions**
An assumption has been made regarding the breakdowns in table 2.04. The Pipelines, Compressor & Terminals and Other Sites breakdowns roughly translate to Ellipse equipment classes P, C, {Q, A} respectively. This means we can be more confident in the high-level breakdowns as there is far less ambiguity over the groupings.

Where detailed OMGS costs were not available for direct allocation to specific records in Table 2.04, costs have been proportionally allocated based on the total hours recorded. This provides a consistent methodology for the appropriate allocation of spend in the absence of required details from core systems.

Work has been divided into financial year based on the date it was marked as complete in Ellipse. This might mean that the yearly breakdown trend potentially differs from when things were paid/costed, due to work being closed, or marked as complete in the system, at a different time to when it was actually complete.

| |
|---|
| Pension and Contractor data have been included in the Labour line. |

**Table 2.05 – Physical Security Opex**

| **Physical Security Opex:** Provide an explanation and justification for any forecast costs and volumes for opex spend on physical security in relation to BEIS's enhanced physical security upgrade programme (PSUP). |
| --- |
| We have fully redacted this table and have therefore also removed the related commentary here. |

**Table 2.06 – Crop, Quarry and Loss of Development**

| **Crop, Quarry and Loss:** Provide an explanation and justification for any forecast costs and volumes for quarry and other loss of development claims. |
|---|
| **RIIO-1 to RIIO-2 comparison**<br>Our annual costs for Loss of Crop are decreasing from RIIO-1 to RIIO-2. This is due to the full and final settlements agreed with landowners in RIIO-1.<br>We are not anticipating new full and final settlements in RIIO-2 as those interested and where efficient settlement can be reached have already entered into agreements with us, cells have been left blank.<br>Our drainage works are assumed to have a similar cost to RIIO-1 as we follow our established process for landowner claims.<br><br>**RIIO-2 profile**<br>We have forecast RIIO-2 costs using the average actuals from RIIO-1 for predictable costs:<br>• RIIO-2 categories have applied Reopener information for mapping RIIO-1 RRP to BPDT<br>• In the RIIO-2 forecast we have applied the same mapping principles and percentage splits for Loss of Crop.<br>• For drainage we have allocated all costs to Repair as there is no split available<br><br>The potentially volatile area of costs are loss of development and sterilised minerals which are subject to a proposed uncertainty mechanism. For sterilised minerals projected costs are higher in the first three years of RIIO-2 due to an assumption relating to some of our ongoing claims at the time of writing which we anticipate will be settled in RIIO-2. There is an uncertainty around when costs will be incurred, hence they are averaged over the first three years.<br><br>**Unit costs**<br>We have used RIIO-1 reopener information for volumes and costs.<br><br>**Planning scenarios, uncertainty, assumptions**<br>We have based costs in this area on RIIO-1. For loss of development and costs relating to loss of mining of sterilised minerals we propose to retain an uncertainty mechanism in case these breach the base revenue funding requested. This avoids us being subject to a windfall gain or loss because of circumstances that we can't control or predict and which can have significant cost impacts. This uncertainty mechanism proposal is outlined in more detail in annex A3.02<br><br>**Internal & external benchmarks**<br>We have used reopener information for volumes and costs from RIIO-1.<br><br>**Reference areas of the BPDT**<br>Crop and Quarry is forecast as Baseline opex for RIIO-2. This forecast is not part of Direct opex within Table 2.02, but is included within the overall summary table 2.00a(both net and gross).<br><br>Items not accounted for as crop and quarry have been allocated to Direct Opex (2.04) to Pipeline, Inspections & Maintenance and Faults. These include quarry consultancy, land access compensation, rents without access to easement & canal and river crossing trust fees. |

**Additional information**
Quarry and loss can be found in the main BP narrative in chapter 24 "I want to care for the environment and communities".
An additional supporting annex relating to loss of development and sterilised minerals claims from the RIIO-1 reopener can be found in Annex A16.09

Investigation, Loss of development and Sterilised Minerals are not currently captured in National Grid systems, cells are blank on the data table.

**Table 2.07/2.08 – Business Support**

**Business Support:** Provide an explanation and justification for any forecast costs and volumes for business support costs that are charged to the UK regulated network businesses (and to non-regulated entities where appropriate).

NGGT must also provide an explanation and justification of the allocation of Group net and gross cash controllable costs for business support that are charged to the UK regulated network businesses.

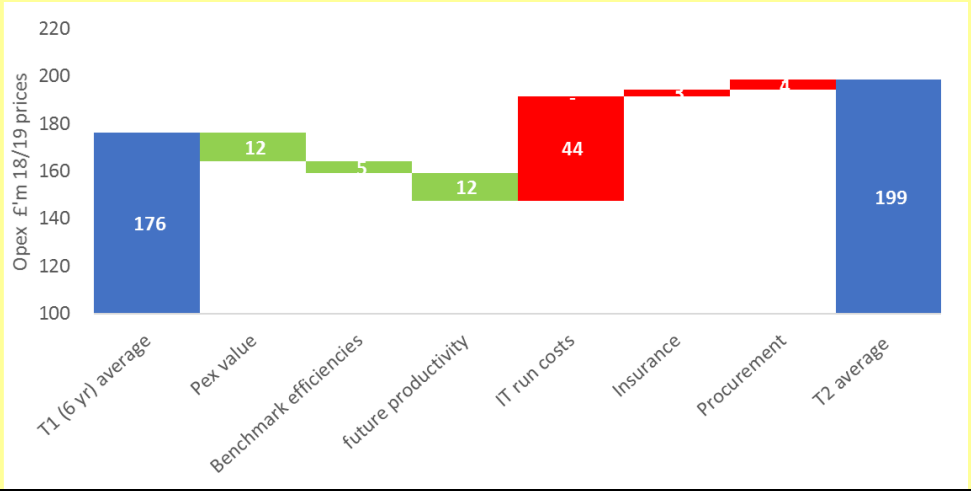
**RIIO-1 to RIIO-2 comparison**

Business support costs are the area of operating costs showing the most significant increase from RIIO-1 to RIIO-2, driven in the most part by increasing IT costs. The costs of supporting our IT systems has grown through RIIO-1 as we have invested more in IT applications to automate and improve our business processes, and had to do more with our infrastructure and hosting provision to ensure they do not become vulnerable to cyber-attack.

Average IT operating costs for the early part of RIIO-1 were £38m per annum (at UK Transmission level and excluding Gas distribution allocation to aid comparison with RIIO-2), however costs are forecast to reach £59m by the end of RIIO-1 as we expand our cyber resilience activities and support investments we are making to make our transactional business support functions more cost efficient. In preparation for our RIIO-2 submission we invited independent benchmarking experts Gartner to examine our IT operating costs and they confirmed that our IT operating costs are at an efficient level as we enter RIIO-2 (see Business Support section of A20.15 opex annex for further detail).

We have set an ambitious productivity growth target of 1.1% per annum across our RIIO-2 operating costs, including our IT costs. Whilst we do not have specific plans around how we will deliver this target we expect that there will be additional opportunities to engineer lower running costs in the future as we rationalise our shared IT infrastructure and systems. This has driven an additional £5m average opex efficiency per annum in our IT and Telecoms costs and helps to offset the incremental opex costs associated with the investments we are making in RIIO-2.

The waterfall chart below sets out the key business support cost drivers from RIIO-1 to RIIO-2. We have calculated RIIO-1 average based on the first six years of Transmission support function costs (ie excluding other group and external customers) and have excluded Gas Distribution allocated costs for comparability with RIIO-2.



**Downward drivers**

PEx value initiatives will drive a saving of £12m per annum (relative to RIIO-1 average opex) through the RIIO-2 plan. Following benchmarking analysis of our post-Pex costs we are proposing to a further reduction of £5m per annum to bring our support functions in line with upper quartile/world class efficiency.

In addition, we have proposed an ambitious productivity growth target of 1.1% per annum which is almost three times the current UK trend, representing a stretching target on top of costs that are already at the efficient frontier at the start of RIIO-2. Whilst we do not know today how we will meet this target, we expect that the proposed rationalisation and modernisation of our shared IT infrastructure and hosting will provide opportunities to engineer a lower running cost in the future, and so we have embedded the business support element of our productivity growth into the IT & telecoms costs, delivering an average £12m per annum cost reduction.

**Upward drivers**

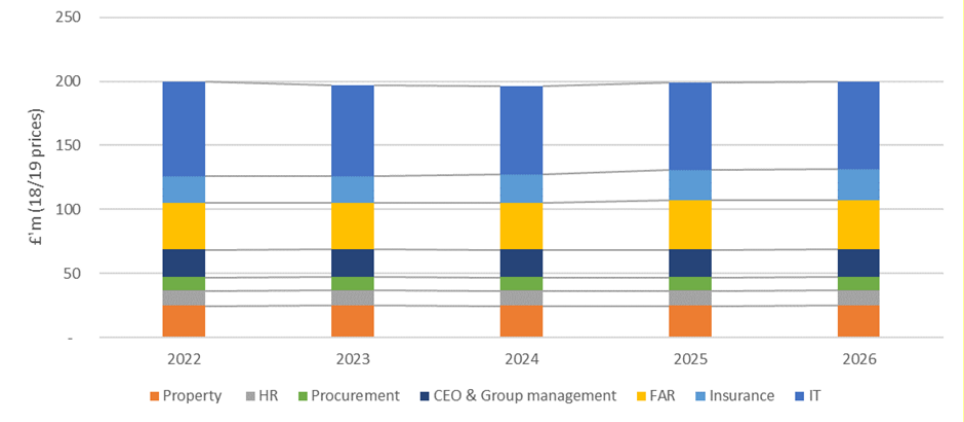
IT costs include the underlying cost of function and the incremental costs of supporting shared and business specific IT applications, including (at the UK Transmission level) the Electricity System Operator systems. It is the latter that is the key driver of increasing IT opex. We are proposing an IT investment portfolio which continues the work we have begun in RIIO-1 to bring our IT infrastructure assets in line with asset health policies, so that our people have the right tools and equipment to work effectively, and we can share data securely and effectively to promote cross-sector working. We also expect to take up more cloud-based IT solutions which add opex costs but reduce capex costs and deliver more scalability and flexibility. Compared with the first six years of RIIO-1 the combined impact of these factors increases opex by £44m per annum, before taking into account embedded productivity savings.

Insurance costs are forecast to increase in RIIO-2 due to external market factors. We insure our businesses through a captive insurer arrangement. A review of our premiums in 2019 shows that this model remains good value, offering a significant discount relative to the commercial market.

As part of our PEx value review we realigned resources which had previously been working on contract management within our capital delivery and asset management functions into procurement. This resulted in an increase in procurement costs, but the net impact of the move was an overall reduction in cost. Relative to RIIO-1 this drives a £4m per annum increase in procurement costs. Benchmarking analysis shows that our procurement costs are in line with upper quartile efficient costs.

**RIIO-2 profile**

The chart below shows the phased Total UK Transmission costs (including ESO) for RIIO-2 by function.



- Following the delivery of PEx value and benchmarking efficiencies, the costs of CEO & group management, procurement, HR and non-operational training, and property management are flat for the RIIO-2 period.
- IT costs show a net reduction from £74m in 2022 to £69m by 2026 as the cumulative impact of future productivity efficiencies offsets the upward pressure from supporting the new IT investments we are proposing.
- The impact of rising premiums can be seen in the insurance cost line.
- There is a small increase in finance, audit and regulation costs of £2m from 2025 as we prepare for the RIIO-3 price control submission.

**Unit costs**
N/A

**Planning scenarios, uncertainty, assumptions**

- Costs are prepared on a net cash basis, at a UK group level (that is inclusive of UK regulated business allocations (including ESO), plus other group companies and external customer amounts. Other group companies chiefly comprise costs allocated to National Grid Ventures group, to US operations and costs not recovered through UK Transmission businesses, typically corporate centre costs.
- Consistent with Ofgem's advice in RRP preparation, amounts are shown net of any costs allocated to Cadent and net of the Transitional Service Agreement income to recover those costs.
- Cost recoveries are equal to the consented and de minimis income for shared services, property and IS services. Cost recoveries include an element of recovery between NGET and NGGT entities.
- Forecast assumes nil costs (and therefore nil cost recoveries) for other group and external customers on the basis that:
- Non-regulated group business forecasts of allocated cost consumption are not available to UK regulated businesses (being consolidated at a plc group level)
- Forecast corporate centre costs not recovered through UK Transmission businesses are not available to UK regulated businesses and, typically being project in nature, are of uncertain amount and timing to forecast
- Forecast costs to support US operations are typically small in value and not material to overall shared services operations

**Internal & external benchmarks**
We invited The Hackett Group, a global business benchmarking organisation, to perform a high-level benchmarking assessment of our combined business support costs for electricity transmission, gas transmission and electricity system operator businesses.
As a result of this analysis we have reduced the costs of our business support functions in our RIIO-2 plan by £5m per annum to align with the upper quartile benchmark. In all other areas, the benchmarking analysis showed that our costs were in-line with upper quartile efficient level after accounting for additional activities to non-regulated businesses (such as regulatory activities, and our obligations as operators of Critical National Infrastructure Sites), or in line with peers (the recommended level for effective operation of IT) for IT function costs. These studies and their findings are presented in more detail in our opex annex A20.15.

**Reference areas of the BPDT**
Further detail on our business support cost story and the cost benchmarking exercises we have performed are summarised in the chapter 20 "Our plan is efficient and affordable", and covered in more detail in A20.15 opex annex.

**Additional information**

- Tables 2.07 and 2.08 both show net cash costs including other group and external customer amounts. For period 2014-2017 table also includes costs allocated to our DNO business. From 1 October 2017, Cadent Gas Ltd started trading and their allocation of shared services costs is disclosed net of cost recovery amounts, consistent with RRP treatment. We have assumed nil other group and external customer costs for the forecast period 2020-2031. Table 2.08 excludes ESO allocated amounts for SOFI compliance reasons.

**Apportionment assumptions**

- 2.07 actual costs have been allocated to expenditure categories in line with our system records, forecast costs have been apportioned based on FY21 costs.
- 2.07 cost recovery income is recorded in RRP at a total business support level. As the largest user of our services is NG Ventures we have used the detail of the FY19 GSA recharges as a basis for apportioning cost recoveries across the individual functions.
- Allocations of forecast support function costs have been performed using a blended average of the detailed, cost centre level allocation drivers used in our annual unified cost allocation methodology (UCAM) allocation process. Forecast allocations are based on an FY21 projection and assume the allocation driver volumes are consistent across the UK regulated entities for the RIIO-2 period.
- IT incremental run the business costs are allocated in line with the investment allocation driver

**Table 2.09/2.10 – IT & Telecoms**

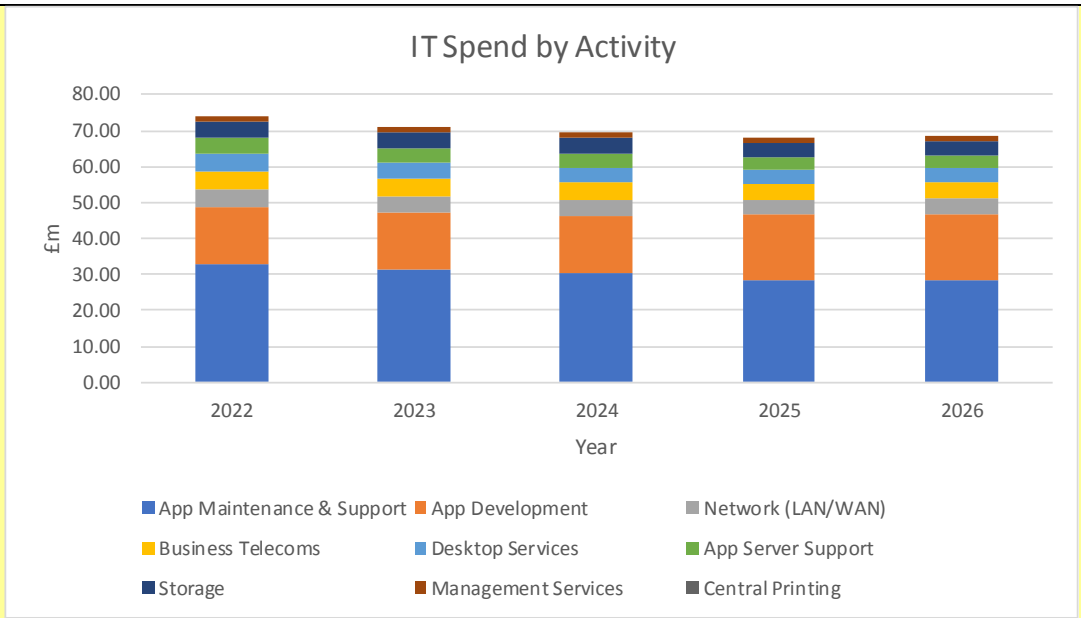
**IT & Telecoms:** Provide an explanation and justification for any forecast costs and volumes for non-operational Information Systems (IS) & Telecoms expenditure and activities

NGGT must also provide an explanation and justification of the allocation of costs to the UK regulated network businesses, excluded services and other non-regulated business if required, split between non-operational and operational costs *(although it is expected the allocation will be 100% to non-operational). A*s well as additional information to understand business support cost drivers in order to facilitate comparison between network sectors and other industries.

**Table 2.09**
**RIIO-1 to RIIO-2 comparison**

- We have prepared table 2.09 with net cash controllable costs to be consistent with 2.07. We can provide gross cash controllable costs presented in the format of table 2.09 if required in addition.
- We compare our RIIO-2 plan with the average costs for the first six years of RIIO-1 UK Transmission costs (ie excluding other group and external customers) and have excluded Gas Distribution allocated costs for comparability with RIIO-2. The RIIO-2 Challenge Group asked us to use the first six years of RIIO-1 as the main comparator for our RIIO-2 costs.
- RIIO-2 IT costs are on average £70m per annum, compared with £38m per annum for the first six years of RIIO-1.
- IT costs include the underlying cost of function and the incremental costs of supporting shared and business specific IT applications. It is the latter that is the key driver of increasing IT opex. We are proposing an IT investment portfolio which continues the work we have begun in RIIO-1 to bring our IT infrastructure assets in line with asset health policies, so that our people have the right tools and equipment to work effectively, and we can share data securely and effectively to promote cross-sector working. We also expect to take up more cloud-based IT solutions which increase opex costs but reduce capex costs and deliver more scalability and flexibility. Compared with the first six years of RIIO-1 the combined impact of these factors increases opex by £44m per annum, before taking into account embedded productivity savings.
- Offsetting this upward trend, we have proposed an ambitious productivity growth target of 1.1% per annum for our RIIO-2 plan which is almost three times the current UK trend, representing a stretching target on top of costs that are already at the efficient frontier at the start of RIIO-2. Whilst we do not know today how we will meet this target, we expect that the proposed rationalisation and modernisation of our shared IT infrastructure and hosting will provide opportunities to engineer a lower running cost in the future, and so we have embedded the business support element of our productivity growth into the IT & telecoms costs, reducing costs on average by £12m per annum

**RIIO-2 profile**
The chart below shows the phased Total UK Transmission costs (including ESO) for RIIO-2 by IT activity category.




- IT costs show a net reduction from £74m in 2022 to £69m by 2026 as the cumulative impact of future productivity efficiencies offsets the upward pressure from supporting the new IT investments we are proposing.
- We have modelled the incremental "run-the-business" costs (RTB) of supporting new investments in RIIO-2 based on our own historic analysis of the cost impacts in RIIO-1. Modelling has been performed on a total incremental impact level and not at the level of individual activities. We have assumed incremental RTB impacts are in equal proportion to our current allocation of activities.

**Unit costs**
N/A

**Planning scenarios & uncertainty**
Please see 2.07/2.08 narrative

**Internal & external benchmarking**

- We engaged Gartner (an industry-recognised specialist in IT benchmarking) to perform benchmarking of our operational and non-operational IT costs, comparing costs for each of key activity (e.g. application support, networks, storage, end-user computing) with those of other companies in their database, adjusting for workload (i.e. number of applications, number of services, number of users). We did this because more simplistic comparisons of total IT costs between companies do not account for factors such as the number and level of availability of business applications supported.
- Gartner's analysis found that, after adjusting for levels of workload, our IT costs were in line with our peers whilst delivering higher levels of system availability. In some areas, such as our WAN network and servers, our costs were best in class efficiency (defined by Gartner as within the 50th and 25th centiles of cost). In other areas, Gartner found we spend more than our peers on maintaining our networks (LAN) and in supporting applications and end users. The proposed IT infrastructure investment plan for RIIO-2 will support us in achieving best in class efficiency across our IT costs, as well as improving cyber security and will bring our IT costs to upper quartile efficiency by the end of RIIO-2. Further details are provided in A20.15 opex annex and we provide the Gartner benchmarking report as a separate annex also.

**Reference areas of the BPDT**

**Additional information**
- This table includes costs that will be allocated to ESO.

**Apportionment assumptions**
We have modelled the incremental "run-the-business" costs (RTB) of supporting new investments in RIIO-2 based on our own historic analysis of the cost impacts in RIIO-1. Modelling has been performed on a total incremental impact level and not at the level of individual activities. We have assumed incremental RTB impacts are in equal proportion to our current allocation of activities.
We have reported historic FTEs in line with RRP. 2014 shows an FTE of 53, compared with an FTE of 471 in 2015. We expect FTEs to be consistent year to year and so note 2014 FTE is an anomaly, but due to limitations in historic data and to maintain consistency with RRP we have not restated this value.

**Table 2.10**
**RIIO-1 to RIIO-2 comparison**
- Table 2.10 repeats the allocations for Business Support disclosed in 2.08
- Introduces the allocations for Operational IT that are disclosed on table 2.02 to give a total view of IT allocations.

**RIIO-2 profile**
The table below shows the phased Total UK Transmission costs (excluding ESO) for RIIO-2.

| £'m 18/19 prices | 2022 | 2023 | 2024 | 2025 | 2026 |
|---|---|---|---|---|---|
| Operational IT & telecoms | 29.5 | 29.9 | 29.7 | 30.3 | 31.5 |
| Non-operational IT & telecoms | 40.3 | 37.3 | 33.3 | 30.5 | 28.6 |
| **Total IT & Telecoms** | **69.8** | **67.2** | **63.0** | **60.8** | **60.0** |

- IT costs show a net reduction from £70m in 2021 to £60m by 2026 as the cumulative impact of future productivity efficiencies offsets the upward pressure from supporting the new IT investments we are proposing.
- We have modelled the incremental "run-the-business" costs (RTB) of supporting new investments in RIIO-2 based on our own historic analysis of the cost impacts in RIIO-1. Modelling has been performed on a total incremental impact level and not at the level of individual activities. We have future IT investments are categorised as operational or non-operational in a consistent proportion with current allocations.

**Unit costs**
N/A

**Planning scenarios, uncertainty**
N/A

**Internal & external benchmarking**
- We engaged Gartner (an industry-recognised specialist in IT benchmarking) to perform benchmarking of our operational and non-operational IT costs, comparing costs for each of key activity (e.g. application support, networks, storage, end-user computing) with those of other companies in their database, adjusting for workload (i.e. number of applications, number of services, number of users). We did this because more simplistic comparisons of total IT costs between companies do not account for factors such as the number and level of availability of business applications supported.

- Gartner's analysis found that, after adjusting for levels of workload, our IT costs were in line with our peers whilst delivering higher levels of system availability. In some areas, such as our WAN network and servers, our costs were best in class efficiency (defined by Gartner as within the 50th and 25th centiles of cost). In other areas, Gartner found we spend more than our peers on maintaining our networks (LAN) and in supporting applications and end users. The proposed IT infrastructure investment plan for RIIO-2 will support us in achieving best in class efficiency across our IT costs, as well as improving cyber security and will bring our IT costs to upper quartile efficiency by the end of the RIIO-2 period. Further details are provided in A20.15 opex annex and we provide the Gartner benchmarking report as a separate annex also.

**Reference areas of the BPDT**

- Incremental IT run the business costs are calculated as a % of the IT investment portfolio, which is presented in table 3.07.
- A20.05 opex annex provides further detail on the IT opex plan

**Additional information**

- Table excludes ESO allocated amounts for SOFI compliance reasons.

**Apportionment**

- Allocations of forecast support function costs have been performed using a blended average of the detailed, cost centre level allocation drivers used in our annual UCAM allocation process. Forecast allocations are based on an FY21 projection and assume the allocation driver volumes are consistent across the UK regulated entities for the RIIO-2 period.
- IT incremental run the business costs are allocated in line with the investment allocation driver

**Table 2.11/2.12 Property Costs**

**RIIO-1 to RIIO-2 comparison**
Table 2.11 has been prepared on a net controllable cash basis, with amounts consistent with those shown in table 2.07. Full details of support function costs are provided in table 2.07 narrative, with additional information only provided here.

Table 2.12 information is consistent with that presented for non-operational property management in table 2.08. Please see narrative for 2.08 for further information.

Property costs in RIIO-2 are on average £3m pa lower than average RIIO-1 costs as efficiencies identified towards the end of RIIO-1 in parallel with our PEX value efficiency programme are embedded into future costs.

**Figure 1 – RIIO-2 non-operational property management costs**

| £'m 18/19 prices | RIIO-1 (6yr) average | 2022 | 2023 | 2024 | 2025 | 2026 |
|---|---|---|---|---|---|---|
| Property costs | 28.7 | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 |

**RIIO-2 profile**

We have right sized the running and management of our non-operational property sites for the RIIO-2 period and do not foresee any additional cost drivers in this area.

Forecast shared costs remain a consistent £25m for the RIIO-2 period and benchmark at an upper quartile efficient level after taking into account the additional activities we must perform to maintain the safety and security of Critical National Infrastructure sites, which incur an additional £[redacted]m each year.

A20.05 opex annex provides further detail on property costs and benchmarking analysis.

**Unit costs**
N/A

**Planning scenarios, uncertainty**
N/A

**Interactions with wider government policy**
N/A

**Internal & external benchmarks**
See table 2.07/2.08 comments on benchmarking activity with Hackett.

**Reference areas of the BPDT**
Further detail on our business support cost story and the cost benchmarking exercises we have performed are included in annex A20.15 opex annex

**Additional information**
Table 2.11 includes shared costs allocated to ESO, ESO costs have not been reported in 2.12 for SOFI compliance reasons
All lease amounts have been showed both historic and future under previous financial treatment and have not been adjusted for new treatment under IAS16.
We have assumed all property disposal are at nil profit/loss on disposal.

**Apportionment assumptions**
Historic property costs have been allocated to site & to cost categories in table 2.11 using current year (2019/20) spend proportions.

Allocations of forecast support function costs have been performed using a blended average of the detailed, cost centre level allocation drivers used in our annual UCAM allocation process. Forecast allocations are based on an FY21 projection and assume the allocation driver volumes are consistent across the UK regulated entities for the RIIO-2 period.

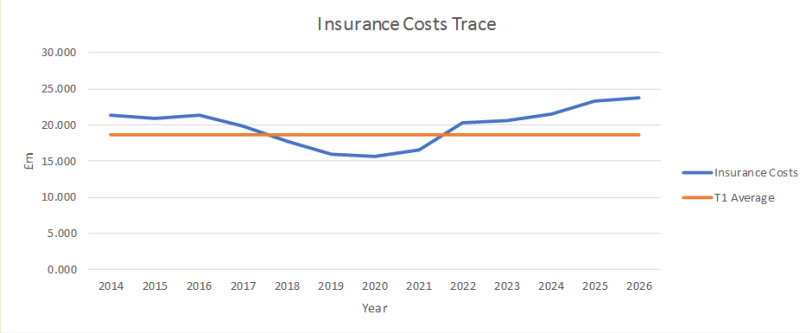
**Table 2.13 Insurance Costs**

**Insurance Costs:** Provide an explanation and justification for any forecast costs associated with cash controllable cost information relating to insurance costs, premiums, policies and cover etc, including the actual costs and cover relating to the transmission and other UK regulated network businesses.

**RIIO-1 to RIIO-2 comparison**
Table 2.13 presents UK Transmission group insurance premium costs and information regarding the Group's captive insurance company who is the main insurer for the Transmission businesses.

**Insurance premiums**
Insurance premiums are forecast to increase through RIIO-2, as shown in figure below.

Figure 1 – insurance cost trace




Note ESO and other group/non reg costs have been removed to ensure trace is comparing like for like.

In the past 12 months or so, we have seen the external global insurance market react to several years of unsustainable losses, particularly in relation to property insurance.

Our Transmission businesses have been largely insulated from these market rate increases as our captive had been locked into a long term [flat] property reinsurance deal. We are however expecting our base rating will increase by 10% in FY21 as our property reinsurers adjust their pricing for National Grid at the first opportunity for several years. Thereafter an average 5% annual increase is expected for this category, based on advices from external consultants.

In addition to this, we have considered an annual 3% growth in our asset reinstatement values, excluding inflation (the metric for insurance is reinstatement value, rather than RAV).

For non-property insurances, an average 5% rate increase year on year has been considered (again, based on consultant's advice and our general market knowledge).

The utilisation of the captive is still the most efficient method of procuring insurance. In the benchmarking section below, we discuss the expected external market costs for procuring such insurance.

Captive insurance costs
It is observed that claims costs in the captive section of the table can move significantly year on year; this is due to the claims costs reported in a single fiscal period includes actual

movements in all claims reserves held plus 'incurred but not reported' (IBNR) movement. Hence in individual years the claims cost can be a positive value if there have been reserve releases, recoveries etc. in that year.

The Captive forecast in RIIO-2 is projected to run at a 5% return.

Captive 2 was put into run off in 2018, and so no further costs are forecast.

**RIIO-2 profile**
Figure 2 shows insurance premiums split by category.

**Figure 2 – insurance premiums extract from table 2.13**

| | 2022 | 2023 | 2024 | 2025 | 2026 |
|---|---|---|---|---|---|
| ***Loss or Damage*** | ***11.49*** | ***12.40*** | ***12.86*** | ***13.34*** | ***14.41*** |
| Property - buildings and contents | 7.81 | 8.52 | 8.86 | 9.21 | 10.04 |
| Crime and theft | 0.07 | 0.07 | 0.08 | 0.08 | 0.08 |
| Business interruption | 1.83 | 2.00 | 2.08 | 2.16 | 2.35 |
| Terrorism and sabotage | 0.40 | 0.42 | 0.44 | 0.46 | 0.47 |
| Aviation | 0.20 | 0.22 | 0.23 | 0.24 | 0.26 |
| Cyber Insurance | 1.16 | 1.17 | 1.18 | 1.19 | 1.20 |
| ***Third Party Legal Liability*** | ***5.80*** | ***6.15*** | ***6.45*** | ***6.76*** | ***7.09*** |
| Employers' liability | 0.68 | 0.72 | 0.75 | 0.78 | 0.82 |
| Public and product liability and professional indemnity | 3.53 | 3.74 | 3.91 | 4.08 | 4.27 |
| Motor vehicle liability | 1.59 | 1.69 | 1.79 | 1.90 | 2.01 |
| ***Employee*** | ***0.77*** | ***0.78*** | ***0.79*** | ***0.80*** | ***0.80*** |
| Personal accident and sickness insurance | 0.48 | 0.48 | 0.49 | 0.49 | 0.50 |
| Travel | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| Directors & officers | 0.26 | 0.27 | 0.27 | 0.27 | 0.27 |
| ***Other*** | ***2.27*** | ***1.30*** | ***1.37*** | ***2.47*** | ***1.51*** |
| Self retained claims costs (below deductable) | 2.27 | 1.30 | 1.37 | 2.47 | 1.51 |
| ***Totals*** | ***20.33*** | ***20.62*** | ***21.46*** | ***23.36*** | ***23.81*** |

In line with commentary above, the main increases are show against the Property category, with a more modest increase in Third Party Legal Liability.

Employee and Other premiums remain broadly comparable across the period.

**Unit costs**
N/A

**Planning scenarios, uncertainty**

- Main insurance covers continue to be procured via Group captive
- (Re)insurance markets perform in line with outlooks advised by the appointed consultants
- Claims performance is in line with forecast
- 3% annual property value growth (new/additional assets), excluding inflation
- IPT remains constant/flat 12%
- 5% attritional claims growth
- 1 x liability claims above self-insured retention for each Transmission business in the RIIO-2 period (losses assumed to occur in FY22 and FY25)

**Interactions with wider government policy**
N/A

**Internal & external benchmarks**
We periodically use external consultants to review the premiums considered achievable in the commercial market for our risks, to compare these against the premiums charged and forecast by the captive. We last did this in 2019, using Aon Global Risk Consulting and RKH Specialty, who estimated the commercial market premiums would be over 23% more than our proposed premiums for RIIO-2 in GT, 30% more in ET. This equates to around £16m of savings to consumers for the RIIO-2 period.

**Reference areas of the BPDT**
Further detail on our business support cost story and the cost benchmarking exercises we have performed are included in annex A20.15 opex annex

**Additional information**
All costs relate to insurance premiums and self-retained claims only.

Captive 3 section of table is blank because we have only operated two captives in the period

Insurance premium forecast costs from 2027 onwards are based on 2026 position. We have not forecast captive costs beyond 2026 due to high level of uncertainties within this timescale.

**Apportionment assumptions**
N/A

**Table 2.14 Corporate Costs**

**Corporate Costs:** Provide an explanation and justification for any forecast costs for CEO and other corporate function costs and the amounts allocated to UK regulated network businesses directly or via a related party.

**RIIO-1 to RIIO-2 comparison**
Table 2.14 is prepared on a net cash controllable basis, costs are consistent with those presented in table 2.08 for UK Transmission total costs and exclude ESO due to SOFI compliance concerns. The narrative for 2.07/2.08 includes these costs and should be considered in conjunction with the additional information we provide here.

We are proposing costs of £18.6m per annum for RIIO-2, a reduction of £6.5m per annum relative to the average costs in the first six years of RIIO-1. Efficiency initiatives in our corporate affairs function, running in parallel with our PEx value programme, will deliver an average £1.6m of cost reduction for each year of RIIO-2.

We have further reduced our RIIO-2 costs by £4m per annum from our forecast 2021 position as a result of benchmarking analysis produced by Hackett, bringing our overall CEO & group management costs in line with upper quartile efficient costs.

**Figure 1 – corporate cost profile**

| £'m 18/19 prices | RIIO-1 (6yr) average | 2022 | 2023 | 2024 | 2025 | 2026 |
|---|---|---|---|---|---|---|
| CEO & group management | 25.1 | 18.6 | 18.6 | 18.6 | 18.6 | 18.6 |

**Unit costs**
N/A

**Planning scenarios, uncertainty**
N/A

**Interactions with wider government policy**
N/A

**Internal & external benchmarks**
See 2.07/2.08

**Reference areas of the BPDT**
Further detail on our business support cost story and the cost benchmarking exercises we have performed are included in annex A20.15 opex annex

**Additional information**
We do not yet know how we will deliver the £4m benchmarking efficiency commitment, for the purpose of presentation in the table we have allocated this reduction against our group strategy and group corporate affairs costs.

We have not allocated any CEO & group management costs to excluded services. Shared service costs do not flex as a result of excluded service activity. We apply a % margin to the direct costs incurred in delivering excluded services in order to recover a proportion of all fixed business overheads.

ESO costs excluded from table for SOFI compliance reasons.

**Apportionment assumptions**
We have mainly used our corporate 4 Point Measure (Combined metric for Assets/Headcount/Operating Profit/Revenue) to allocate costs to the forms of control.

For Corporate Affairs we have used an equal allocation across the forms of control to reflect the nature of corporate affairs work across the organisation.

**Table 2.15 RPEs**

| **RPEs:** Provide an explanation and justification for any forecasts and assumptions relating to Real Price Effects (RPE) and Ongoing Efficiency (OE) |
|---|
| **RIIO-1 to RIIO-2 comparison**<br>Nature of table is such that only RIIO-2 data is included. RIIO-1 RPEs will be embedded as part of the totex covered in other tables. Our RPE and future efficiency annex includes all the justification and detail around the forecasts included on this table. This narrative summarises the justification and explains limitations of the table and assumptions used to populate each of the relevant sections.<br><br>**RIIO-2 profile**<br>**RPE indices:**<br>This section includes our forecast for the RPE uplifts during the period by expenditure category. As explained in annex A22.02, we have forecast the indices based on materials and labour indices used by Ofgem in RIIO-1. These do not map directly to the cost categories – e.g. capex has elements of cost which link to materials and an element relating to labour – so we have used the weightings included in the annex and table to create a blended index to use in this part of the table.<br><br>The expenditure categories are a combination of TO and SO expenditure. We have added a line for closely associated indirect opex into the table section and used the indirect opex line for business support opex. Differences in indices forecast for direct, indirect and Closely Associated Indirect (CAI) opex relate to the proportion of opex which relates to labour costs.<br><br>**RPE weightings:**<br>Weightings across each of the expenditure category have been calculated based on a deep dive of historical costs and input from SMEs. We have assumed a consistent weighting across each of the years as the basis for the forecasts are average figures across history. We have included CAI as the other category as there was no space for this already included.<br><br>**Disaggregated RPE costs (opex and capex)**:<br>Our forecast for RPEs over the 2020 to 2026 period is £174m. This represents the RPEs on the totex plan consistent with the rest of the data tables. In our RPE and future efficiency, we focus on our baseline plan (i.e. excluding potential contestable projects and costs that could be triggered through uncertainty mechanisms in the period). Therefore, in the annex, the RPE forecast is £148m relating just to the RIIO-2 period. The difference of £26m, relates to RPEs on uncertain capex of £21m and RPE for the last two years of RIIO-1 of £5m.<br><br>However, in the data table the RPEs only total £156m over the seven year period, rather than £174m. This is because £18m is missing from the tables due to limitations in categories available for direct opex costs and no available space for CAI in this section (other than for trainees). RPEs of £10m for CAI is missing, as is £8m of RPEs for direct opex as no SO direct opex categories are included on the table, nor can the "other" category of direct TO opex.<br><br>The trainee RPEs included on the table relate to trainees costed in CAI in the HR and non-operational training category.<br><br>**On-going efficiency**<br>The on-going efficiency section includes the assumed savings from future productivity. For the remaining RIIO-1 period, the indices here only relate to our future productivity estimates and not other RIIO-1 efficiencies (e.g. PEx value commitments). These additional efficiencies have been included in the broader Business Plan forecasts but to align to guidance we have only included productivity assumptions here. |

The capex efficiencies are based on the total capex plan and relate to the 4% efficiency on our direct capital investments which we have applied in RIIO-2.

Opex efficiency index applied from activities undertaken in the 2018/19 base year. This incorporates our 1.1% per annum future productivity assumption.

**Unit costs**
N/A

**Planning scenarios, uncertainty**
Justification for forecast for RPEs and efficiency can be found in annex A22.02 RPEs.

**Interactions with wider government policy**
N/A

**Internal & external benchmarks**
N/A

**Reference areas of the BPDT**
Justification for forecast for RPEs and efficiency can be found in annex A22.02 RPEs.

**Additional information**
As explained in the RPEs and future efficiency annex, we have used long term historical data sets to forecast both the RPE and on going efficiencies included in the plan. Shorter term data, across a shorter economic cycle, would have produced higher RPE and lower efficiency assumptions. Given the link between productivity and wage growth in particular it is important to maintain the long term link between the two assumptions.

In addition, we have checked our labour RPE and future productivity forecasts against forecasts from the Office of Budget Responsibility (OBR) and Bank of England.

From a framework perspective, we are proposing that the RPEs for materials is indexed during the period, so our revenue aligns to the outturn of the indices. This reflects our low control around these costs and volatility of cost changes. Labour costs are inherently more controllable for networks and volatility can be managed better so we are proposing a fixed allowance for these RPEs.

**Apportionment assumptions**
N/A

**Table 2.16 Operational Training**

| **Operational Training:** Provide an explanation and justification for any forecast costs and volumes associated with the Operational Training activities. |
|---|
| **RIIO-1 to RIIO-2 comparison**<br>Operational training costs relate to both the price of training as well as the time booked by employees when they complete a course.<br><br>Average annual spend on operational training is £3.5m, versus a RIIO-1 (6 year, actual) average of £2.8m. Our annual strategic workforce planning process has identified over 20% of gas maintenance workers will retire from their roles in the 10 years from 2020. We manage the impact of this attrition on our workforce resilience through a combination of inexperienced and semi-experienced hires, providing apprenticeship training through our Ofsted Excellent Academy facility in Eakring, Nottinghamshire and more on the job training through job shadowing with our existing workforce. We will need to bring new people into our organisation from 2022 to pre-empt the loss of experienced personnel and enable effective knowledge transfer, resulting in an average £2m per annum increase in direct opex and a further £1m per annum increase in operational training costs (which are categorised as closely associated indirect opex).<br><br>**RIIO-2 profile**<br>RIIO-2 Operational training costs are broadly flat across the RIIO-2 period at around £3.5m per annum. This is consistent with our workforce planning work which begins ramping up recruitment of new and semi-experienced hires at the end of RIIO-1 and maintains those levels throughout the RIIO-2 period.<br><br>**Unit costs**<br>N/A<br><br>**Planning scenarios, uncertainty**<br>Training demand has been forecast in line with annual workforce planning cycles. These consider capital plan forecasts and forecast profiles of retirement and other supply side factors.<br><br>**Interactions with wider government policy**<br>N/A<br><br>**Internal & external benchmarks**<br>Operational training is delivered through our training Academy, which has maintained an Ofsted "Excellent" rating.<br><br>The bespoke nature of our training means there are limited comparators for benchmarking of costs. Instead we show a downward trend in operational training costs as we have assessed our training strategy and moved to a more targeted training approach in RIIO-1<br><br>**Reference areas of the BPDT**<br>N/A<br><br>**Additional information**<br>We discuss the reasons for an increase in operational training A20.15 opex annex<br><br>**Apportionment assumptions**<br>Our systems of record do not capture all of the detail required for this table, so we have applied the following assumptions: |

- All new recruit training and FTEs shown against Craftsperson
- All existing training costs shown against operational refresher category and against craftsperson
- Training days calculated from cost of training, using labour rates booked in SAP
- All costs other than those shown in discrete lines on the table have been forecast in "other" for RIIO-2.

**Table 2.17 Salary and FTE**

**Salary & FTE:** Provide an explanation and justification for any forecast costs associated with Gas Transmission and business support gross staff costs and FTEs. This will provide a cost per FTE for comparisons of total transmission employment costs and business support employment costs

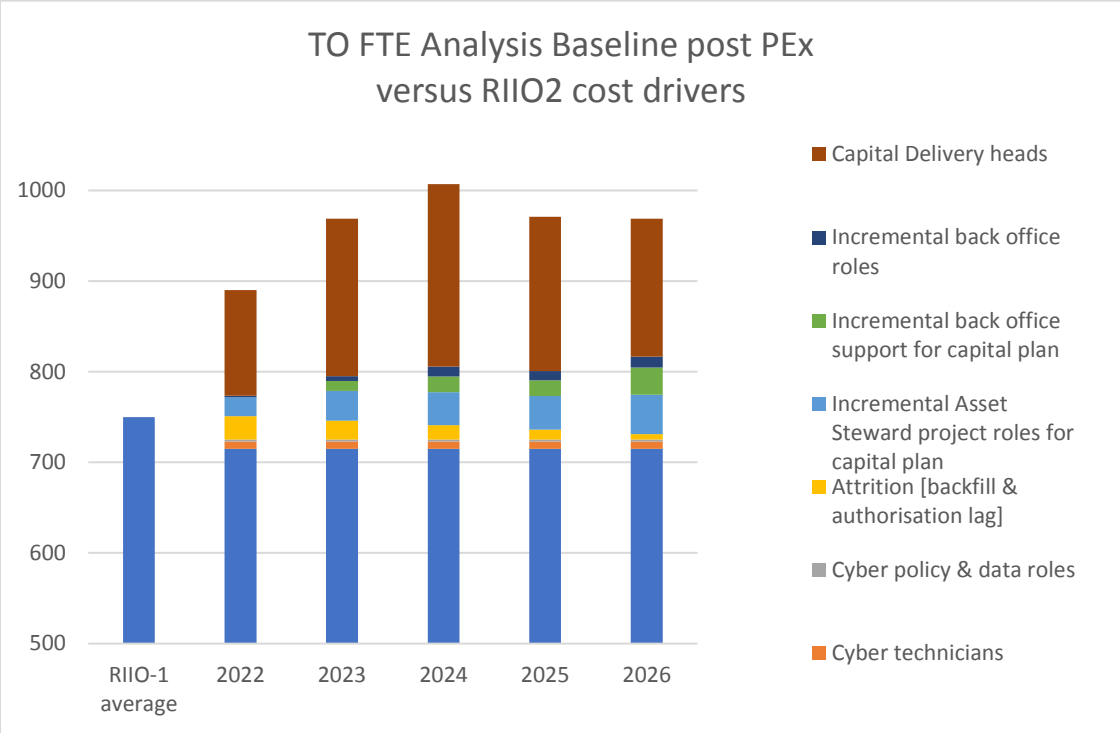
**RIIO-1 to RIIO-2 comparison & RIIO-2 profile**

Table 2.17 shows TO FTE (including the proportion of Capital Delivery FTE allocated to the TO capital plan), SO FTE and UK Transmission level Business Support FTE.

| FTE | RIIO-1 average | 2022 | 2023 | 2024 | 2025 | 2026 |
|---|---|---|---|---|---|---|
| TO | 750 | 890 | 969 | 1007 | 971 | 969 |
| SO | 272 | 255 | 269 | 267 | 271 | 267 |
| Business Support (UK total) | 1861 | 1782 | 1782 | 1782 | 1782 | 1782 |
| **Total** | **2883** | **2927** | **3019** | **3056** | **3024** | **3017** |

- The primary driver for TO FTE movements is within our Capital Delivery function, critical roles within this department fluctuate in line with our strategic workforce planning process which anticipates the resource requirements associated with our capital investment plans. Information about the deliverability of our plan is covered in Chapter 21 "Our plan is deliverable".
- A second driver within the TO FTE is the recruitment of new and semi-experienced hires to offset forecast attrition from retirement over the next 10 years. We will need to bring new people into our organisation from 2022 to pre-empt the loss of experienced personnel and enable effective knowledge transfer and ensure our workforce remains resilient. Annex A21.01 Workforce planning provides more detail on our people strategy, including the workforce planning process.

The figure below shows the phasing of FTE for the TO business




- SO heads show a reduction from RIIO-1 average levels of 272 FTEs per annum, as efficiencies from PEx value initiatives are sustained through RIIO-2. These are partially offset by increased planned workload from analysing and managing market risk, increasing network access requirements and delivering increased market change.

- Business support function FTE is below RIIO-1 average for the duration of RIIO-2 assuming completed delivery of the efficiency initiatives identified as part of our PEx value programme. Whilst IT activities will grow through this period, the flexible third party delivery model employed by IT means that this can be managed with a consistent core FTE profile

- Our RIIO-2 salary forecast remains flat pre-RPEs. We forecast the impact of labour RPES in table 2.15.

**Unit costs**
Salary rates remain constant for the duration of the period. Any increases to salary are forecast through real price effects, for reference see RPE & future efficiency annex for further details.

**Planning scenarios, uncertainty**
FTEs have been forecast in line with annual workforce planning cycles and capital plan forecasts.

**Interactions with wider government policy**
N/A

**Internal & external benchmarks**
There are limited external comparators with which to benchmark our direct TO and SO workforce. We present analysis that shows our direct (that is TO fieldforce and SO

operatives) and closely associated indirect costs for RIIO-2, are lower than RIIO-1 and discuss the PEx value efficiency initiative that reduced costs in A20.15 Opex Annex.

Our salary assumptions have been based on an internal labour forecasting model that considers basic pay, pensions, NI, bonus payments and pay increments.

There is a rate used as an average by grade (staff) or band (manager), this considers basic pay across our gas transmission business, and standard assumptions such as NI and bonus. Pension rates are specific to Gas Transmission.

Our pay and remuneration packages are reviewed regularly, through our staff pay deal negotiations and benchmarking. Our latest benchmarking review was completed in 2018 with Korn Ferry (people and organisational consultancy)

Our pay frameworks are adopted across our transmission businesses, and our current total cash remuneration was in line with median pay across a comparator of 130 companies across utilities, oil, gas and chemical sectors.

**Reference areas of the BPDT**
Please refer to workforce planning annex A21.01, this provides further details on our people strategy.

**Additional information**
Due to the nature of how GT have built our submission, we have not completed both opening and closing FTE's within the TO and SO segments of the BPDT. We applied a yearly average over a 12-month period and assumed this to be the average staff numbers (FTE) and therefore have nil valued those cells.

The FY14-FY19 years are actuals which have been reported in our RRP19 submission. For Business Support FTEs, 2014 RRP actuals were reported on an allocated FTE basis only rather than total Business Support FTEs (as reported in 2015 onwards). We have reported 2014 FTEs in line with RRP and therefore these totals will look lower than subsequent years.

**Apportionment assumptions**
N/A

**Table 2.18 Excluded, Consented and De minimis Services**

| **Excluded, Consented and De minimis Services**: Provide an explanation and justification for any forecast costs associated with Excluded, Consented, and De Minimis services |
|---|
| As per RIGs requirement NGGT only need to report RIIO-1 actuals and the respective narrative is part of the relevant RRP |

**Table 2.19 Provisions**

| **Provisions:** Provide an explanation and justification for any forecast costs associated with details of the provisions that have affected the results so that Ofgem can understand any significant events happening in the year. |
|---|
| As per RIGs requirement NGGT only need to report RIIO-1 actuals and the respective narrative is part of the relevant RRP |

**Table 2.20 Related Party Transactions**

| **Related Party Transactions:** Provide an explanation of the analysis of the nature and size of services provided to the transmission business and other GB regulated network businesses by each related party |
|---|
| We have fully redacted this table and have therefore also removed the related commentary here. |

**Table 3.01/ 3.02 Project Listing 1 & 2**

| **Projects:** Provide an explanation and justification for any forecast costs and volumes associated the list of all projects to install, relocate or remove assets on the NTS system. Where appropriate, NGGT must also provide an explanation and justification of costs and volumes by asset class. |
|---|
| **RIIO-1 to RIIO-2 comparison**<br>**Load related - Baseline**<br>Costs relating to offtakes and diversions spanning RIIO-1 and RIIO-2 are netted off within the table as they are customer funded.<br>Entry – no expenditure forecast in RIIO-2 for this category. All RIIO-1 reported projects will be complete.<br>Network Capability – 2 x multi junctions are main cost contribution to RIIO-1 cost. These projects will have completed by end of RIIO-1 period. There are 2 small projects planned for RIIO-2.<br><br>**Non-load related - Compressor Emissions**<br>Changes in costs between RIIO-1 (£271.2m) to RIIO-2 (£156.9m) driven by our compliance plans for LCPD and MCPD. Further MCPD costs are subject to uncertainty (see below).<br>**Non-load related - Decommissioning**<br>Our decommissioning spend is increasing from £15.2m (total spend) in RIIO-1 to £82.6m (total spend) in RIIO-2. Increase is a result of changing customer needs and aging asset base meaning asset replacement isn't always necessary. We have stakeholder feedback about importance of addressing now.<br><br>**RIIO-2 profile**<br>**Load related - Baseline**<br>Main RIIO-2 investment is [redacted] (North West Strategic Reinforcement), with investment occurring predominantly in 2023 and 2024. This investment will provide network resilience for over 2 million consumers.<br>**Load related - Uncertainty Mechanism**<br>We have received a planning and advanced reservation of capacity agreement (PARCA) application in South Wales at Milford Haven aggregated system entry point. If this scheme proceeds, we expect physical reinforcement of the network will be necessary. Funding for this would be outside our base revenue and covered by an uncertainty mechanism currently projected [redacted] in RIIO-2.<br>**Non-load related - Compressor Emissions & other non-load**<br>In baseline costs we propose replacing 2 compressors in RIIO-2 at Wormington and progressing to FEED at Peterborough, King's Lynn sites relating to emissions compliance. The RIIO-2 investment is the minimum to still meet 2030 emissions legislation. St Fergus FEED also addresses asset health works at the site. The spend profile is not linear as the spend relates to large capital investments. Post-FEED work is included in the uncertainty mechanism lines and is not included in base revenues (projected [redacted] for Peterborough and King's Lynn, [redacted] at St Fergus).<br>RIIO-2 baseline figure also includes [redacted] relating to installing real-time methane monitoring equipment at compressor stations (total RIIO-2 cost [redacted]), and purchase of innovative recompression equipment that will reduce gas venting associated with maintenance and investment works (total RIIO-2 cost [redacted]).<br>For RIIO-3 we have assumed a mix of decommission and derogate for MCPD but these will be subject to review during RIIO-2.<br>**Non-load related – Uncertainty Mechanism**<br>**King's Lynn Subsidence (asset health PCD)**<br>We are proposing to address subsidence at part of the King's Lynn above ground installation. Proposed uncertain costs of [redacted] are contained in Cells AI231 to AL231. The phasing of |

costs is based on our proposed project phasing (Table 1 in A14.04). The FEED costs for this project are in the asset health table 3.03/3.03a.

**Bacton Redevelopment (asset health PCD)**

We are proposing to redevelop the Bacton terminal to meet future customer needs and address issues at the site (including asset health, redundant assets and obsolescence). Proposed uncertain costs £134.6m (RIIO-2) are contained in Cells AI230 to AM230. The FEED costs for this project are in the asset health table 3.03/3.03a.

**Unit costs**

**Non-load related - Compressor Emissions**

Interaction with other areas of the business plan are asset health and cyber control systems costs. Should scope change in the compressor plan there may be consequential impacts on these tables. UMs may cover a range of cost areas eg St Fergus emissions (asset health & compressor UM).

**Non load related – Other Non-Load**

Contributing to our 4% capital efficiency commitment we have overlaid an efficiency ambition on our emissions and redundant assets spend. This amounts to £5.5m. We will look to make these efficiency saving across the projects for the RIIO-2 period

**Planning scenarios, uncertainty**

**[redacted], Compressor Emissions, Bacton, King's Lynn subsidence**

Cost Benefit Analyses have been conducted to select the options for the proposals. These have been tested against all the FES scenarios 2018 and the ENA common scenario assumptions. For sites with UMs more than one option may be progressed in the FEED study to ensure we select the optimum option, although only one option is shown in the data tables.

**Non-load related – Uncertainty Mechanism**

We are proposing an uncertainty mechanism for King's Lynn subsidence and Bacton to adjust the baseline post-FEED. There is no baseline funding assumed for Peterborough, King's Lynn and St Fergus site, apart from for FEED. For these projects, baseline allowances will be confirmed following the reopener. Please see annex A2.02 for more information.

**Interactions with wider government policy**

**Non-load related - Compressor Emissions**

These costs relate to our compliance with government emissions legislation LCP and MCP directives (MCPD).

**Internal & external benchmarks**

**Load related - Baseline**

Our proposed costs for Blackrod (Cells AI45 to AM45 in Table 3.01_Project_Listing_1) are based on similar pipeline and AGI projects we have completed.

**Non-load related - Compressor Emissions**

Costs have been based on best available information, a combination of available tenders and experience in RIIO-1. Sources of costs are set out in the CECS A24.05 and the relevant investment decision packs (IDPs).

**Non-load related - Decommissioning**

Costs are based on forecast based on RIIO-1 actuals where available. Some costs have been gathered from external companies based on competitive tendering exercises

**Non-load related – Uncertainty Mechanism**

**Bacton Redevelopment**

Our proposals have been developed with support from an external agency (Premtech), who have helped with a preliminary design, delivery plan, cost schedule and civils/construction strategy.

**Reference areas of the BPDT**
Price control deliverable information set out in Annex A3.01 and associated uncertainty mechanisms in Annex A3.02
**Load related - Baseline**
The justification paper for Blackrod this can be found in Annex A14.06 and CBA Annex A14.07.
**Non-load related - Compressor Emissions**
Annex A16.05, the Compressor Emissions Compliance Strategy, sets out our approach to meeting this legislation. Annexes A16.10-A16.19 constitute the justification papers and CBAs for the compressors we are proposing in RIIO-2.
**Non-load related - Decommissioning**
Annex A16.08 is the justification paper relating to these proposals
Our stakeholder engagement log for this can be found in Annex A24.07

**Non-load related – Uncertainty Mechanism**
The justification paper for King's Lynn subsidence is A14.04 and the CBA at A14.05.
The justification paper for Bacton redevelopment is A14.02 and the CBA at A14.03.

**Additional information**
Data for the following columns: AZ to BM, BO and BY to CB is blank because there are no additions or removals for those projects
Project Status has been left blank for projects that do not start in RIIO-2 or RIIO-3. Also the Cost Confidence has only been provided when a project has been sanctioned, otherwise has been left blank.
Project type will be populated when each projects has been fully scoped, otherwise has been left blank
Output References columns – in line with the RIG's these columns are for ongoing reporting

**Apportionment assumptions**
**Assumptions 3.01**
1. Start and end years have only been populated for RIIO-2 & RIIO-3 projects
2. NDP phase has only been populated for sanctioned RIIO-2 projects and where a project is pre ND500 NDP has been left blank.
3. Unless otherwise stated figures show the additions/removals for projects that spill over from RIIO-1 into RIIO-2, all projects in RIIO-2 and projects that run into RIIO-3.
In asset additions/removals where a project has more than one pipeline change we have used the max pressure to represent these - this relates solely to South Hook investment all other investments are single pipelines.
4. In asset additions/removals where a project has more than one pipeline change we have add the individual lengths together to show total pipeline length - this relates solely to South Hook investment all other investments are single pipelines.
5. In asset additions/removals where a project has more than one compressor unit change we have added the individual MW's together to show total MW's - this relates solely to South Hook investment, all MCP emissions are single compressor unit per relevant line of investment.
6. The percentage split is as follows for all Baseline projects:

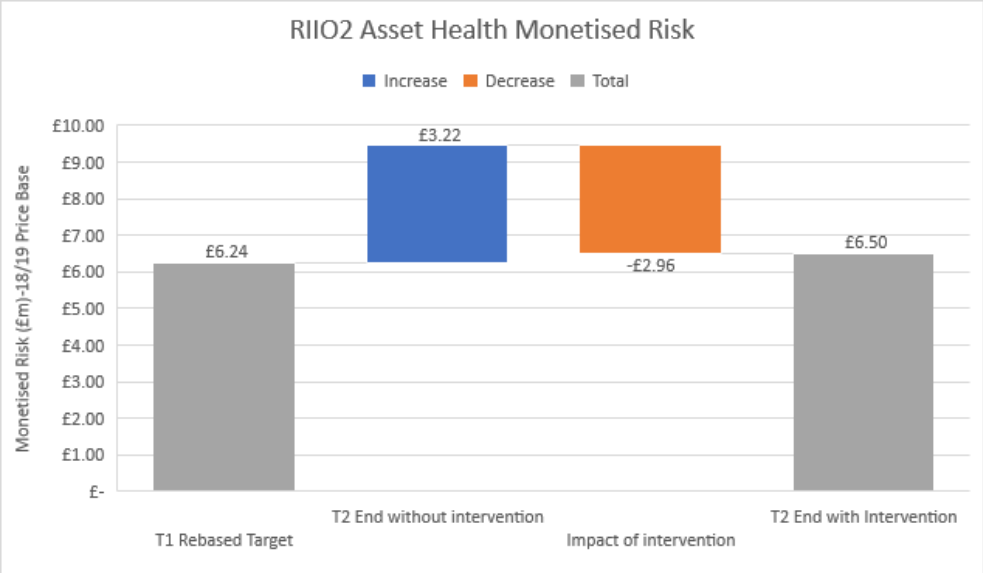
**Direct** - 15% Labour, 24% Contractor, 36.4% Materials, 14.6% Other Direct
**Indirect** - 9.3% Project Management, 0.8% Other Indirect.
For South Hook and UM projects we have assumed 100% of costs are Direct in nature (indirect is the cost of function but there would be no need to resource up for those projects at this stage). Therefore % splits are 16.6% Labour, 26.7% Contractors, 40.5% Materials, 16.2% Other Direct.

We have excluded 'Efficiency Ambition', 'Customer Contributions' and 'Offtakes' from the Indirect and Direct split as detailed in assumption 7.
7. We have applied the percentage splits in Direct and indirect cost for RIIO-2 and RIIO-3 forecast only (including any RIIO-2 spend on investments started in RIIO-1) with the exception of 'efficiency ambition' (as it isn't know where these saving will be made), all 'customer contributions' and 'offtakes' (which are fully offset by customer contributions).
In addition to these project assumptions, several assumptions are set out in our Compressor Emissions Compliance Strategy (CECS) in section 5 relating to our compressor investment proposals. These assumptions include but are not limited to those made around future network flows, supply and demand scenarios, availability and reliability, values within the CBA.

**Assumptions 3.02**
1. Total project costs have been included for the 10 year period of RIIO-2 and RIIO-3.
2. Where it's a compressor or Emissions directive driven project, the whole cost is included in Rotating.
3. Where it is a Decommissioning project, the whole cost has been included in Civils.
4. Where it is a pipeline project, the whole cost has been included in Mechanicals.
5. Where it is a metering project, the whole cost has been included in safety controls.
6. South Hook has been split out based on the indicative option from the PARCA process.
7. Project spend for RIIO-1 has not been split by equipment categories as required by the RIIO-2 BPDT as our current systems do not hold this information. If required for ongoing RIIO-2 RRP then system updates will be required.

**Table 3.03/ 3.04 Asset Health & Asset Health Unit Costs**

| |
|---|
| **Asset Health:** Provide an explanation and justification for any forecast costs and volumes associated with asset health works on the NTS and provide an explanation and justification of unit costs for Asset Health work. |
| **Introduction**<br>Our asset health plan for RIIO-2 has been developed around three key principles:<br>1. Ensuring we only deliver the network capability our stakeholders require, whilst maintaining optionality for future customers.<br>2. In response to RIIO-1 challenges, we have undertaken an asset heath prioritisation exercise and planned surveys at the end of the current price control in preparation for RIIO-2. This work is a reactive approach to maintaining network reliability and safety based on known issues.<br>3. Based on our learnings from RIIO-1 and the evidence from our cost benefit analysis and network asset risk metrics (NARM) outputs, we have planned preventive interventions in RIIO-2 to reduce long -term risk and cost.<br><br>Annual spend rises from £70.2m in RIIO-1(6-year actual) to £114.4m in RIIO-2. This compares secondary asset classes were there is like for like reporting on this table. This excludes assets now considered as Cyber OT which are reported on this table for RIIO-1 only with RIIO-2 forecasts on 3.06a. Both numbers exclude the "GTO other" category not related to a secondary asset class.<br><br>Increased intervention volumes have driven this increase and not a rise in unit costs. RIIO-2 unit costs are taken from RIIO-1 actuals, supplemented by supplier quotations, with further efficiencies applied.<br><br>We are seeing increased asset condition deterioration and a need to intervene as our network ages. As a responsible asset manager, we must apply relevant, timely interventions to ensure the levels of service our stakeholders expect are delivered. Our proposals therefore strive to maintain current levels of reliability, environmental and safety risk.<br><br>We are seeing an increase in investment to mitigate obsolescence issues where Original Equipment Manufacturer (OEM) support and/or spares are no longer available to ensure asset availability and performance. Where there is opportunity, we have collected spares on obsolete equipment as we replace them. However, there are reducing opportunities to continue this going forward.<br><br>Our proposed investment plan results in a small increase in monetised risk over the RIIO-2 period (see below), but we have modelled that NTS reliability, safety and environment performance are sustained at the proposed level of investment. |




**Monetised risk change over RIIO-2**

76% of our proposed RIIO-2 asset health submission delivers NARMs outputs, we propose that it is appropriate to treat certain projects or activities separately from the NARM mechanism even if they contribute monetised risk benefits, as there is more refinement needed to the NARMs methodology which we will develop in RIIO-2.

For such projects and activities, we propose ring-fencing with separate funding, and discount the monetised risk benefit they deliver from any NARM output delivery.
By introducing PCDs, we are building on the lessons learned from the RIIO-1 Mid Period Review processes, where we identified several projects for which conditions around funding and delivery were not clearly identified up-front.

Broadly risk is maintained in RIIO-2 (see Figure 3). This does include cyber control systems which overall contributes to a 2-3% reduction across the service risk categories, however we are excluding this from the NARMs output, and propose a specific PCD and driven by legislation. As such, RIIO-2 will deliver slightly less risk reduction and we will achieve stable risk over a 10-year period.

Our CBAs and NARMs both use the same monetised service risk benefits. The changes in service risk delivered by our final plan and alternative options are set out below. Service risk represents changes in level of service received (e.g. increased risk of an outage), and changes in monetised risk values are calculated through NARMs.
Row one "Do Nothing", is RIIO-2 end state risk levels in comparison to the end of RIIO-1 period with no investment
Row two shows the risk levels if we maintained the same level of spend in RIIO-2, comparatively, from the RIIO-1 period
Row three shows the levels of risk if the interventions proposed for asset health investment were realised at the end of the RIIO-2 period.

| | Fatalities & injuries risk *(% risk increase)* | Transport disruption risk *(% risk increase)* | Outage risk *(% risk increase)* | Volume of gas emitted *(% risk increase)* |
|---|---|---|---|---|
| *Do nothing* | 10% | 231% | 849% | 212% |
| *Spend same as RIIO-1* | 8% | 5% | 365% | 38% |
| *RIIO-2 plan* | -1% | -21% | 1% | -1% |

**Figure 3 – Changes in service risk**

**Asset Health Programme Delivery**

The availability of outage windows to undertake disruptive works is limited to ensure the risk of disrupting customer supplies is managed. From an investment cost and NTS risk perspective, it is most efficient to bundle investments on different asset types within the same outage period. Our 10-year investment plan ensures the proposed works can be realistically delivered within the agreed outage windows, high criticality asset interventions prioritised and any service disruption risks for directly connected customers mitigated.

During RIIO-1 we implemented a new corrosion management process to increase our understanding of the condition and deterioration rates of our assets, producing more detailed assessments of corrosion defects on our Above Ground Installations (AGIs). This enhanced data collection process has highlighted that widespread corrosion issues exist that require resolution. This requirement has increased investment during RIIO-2 (Refer to Plant & Equipment, A22.12), ensuring that safety and environmental consequences do not arise.

Improved information is also now available on the condition and effectiveness of our cathodic protection (CP) assets at AGIs. This information has shown that many ineffective CP systems are present which is contributing towards the observed corrosion condition issues. This will result in significantly higher costs to replace these assets wholesale in the future if they deteriorate beyond a point that they can be maintained operationally.

Our RIIO-2 strategy brings greater volumes of the Close Interval Potential survey (CIPs) defects (an area we are spending over forecasts in RIIO-1) into the plans. This increases the overall cost of our Pipelines theme (Refer to Pipelines, A22.16 for further details), to dig and remediate potential end of life pipeline coating issues. These issues degrade our Cathodic Protection system effectiveness, failure to act in the nearer term will result in significant pipeline failure risk and/or whole life cost issues.

To preserve the long-term integrity of the pipeline, we must remediate our CP systems and adopt a risk-based level of CIPS investigation / remediation targeting pipelines with the highest risk of defects. This ensures that we do not pass the point where corrosion becomes unmanaged/unrecoverable and allows us to maintain a continued service to our customers with low levels of safety and environmental risk.

Our proposals are inclusive of no-regrets asset health work at both the St Fergus and Bacton Terminals and are essential to keep the sites safe and operational while preparing for uncertainty mechanism submission and mobilising delivery teams.

**Unit Costs**
Our asset health work involves a wide range of activities, from repeatable, standard jobs with low levels of differentiating factors, through to those that are more bespoke, which are therefore, more difficult to apply standard costing. We have however, employed an approach that considers historical outturn information as the strongest indicator of future unit costs, with over 70% of our plan using unit costs calculated in this way. Only where this level of information is not available have we turned to either supplier quotations (which underpins 15% of our plan), or other estimation techniques (upon which the remaining 15% of our plan is built).

We have also included a further 4% efficiency commitment to our asset health plan. This is shown as Richmond Efficiency Overlay near the bottom of both table 3.03 and 3.03a.

Our methodology therefore uses the best available information for each unit cost, including (in preferential order):
- historical outturn cost information, where we can match like for like units against delivered programmes;
- supplier quoted costs, matching like for like units against a tendered but not delivered programme of work;
- extrapolation to similar types of work or sub-components of work; and
- review of industry wide benchmarking or internal cost data.

A unit cost is listed for each unique asset and intervention type within the plan. Where unit costs for similar interventions are different these are listed as separate unit costs. Differences in unit costs are generally limited to St Fergus, where there are delivery challenges to location and complexity. Further information about our unit cost methodology can be found in A20.17, Unit Cost Process and Assessment.

Key points relating to our unit costs stated in BPDT 3.04 are listed below:
- There is an increased uplift in some costs associated to St Fergus, due to the complexity of project delivery (e.g. permits to work) and increased contract costs due to the remote location
- Some unit costs appear to be identical for apparently very different activities. Initially unit costs were defined in a 2017/18 Price Base Date (PBD), which was then converted to 2018/19 PBD. As such, unit costs that were rounded in 2017/18 PBD (e.g. £100k) are presented as unit costs with an apparent high degree of precision in 2018/19 PBD.
- Stopples (a method to isolate pipelines without disrupting customers) are included on a separate line in the plan, as they are specific to the location of the work and not part of a base unit cost for pipelines activity.
- Where a unit of measure of "per-Site" is stated, this may equate to a "per-Unit" or "per-System" unit of measure on larger sites, such as Compressor Stations and Terminals.

**Planning Scenarios, Uncertainty**
Aligned to Network Capability & Fleet Strategy, our asset health plan focuses on making the right investments at the right time. We're safeguarding reliability and affordability for customers, whilst retaining optionality for the future, ensuring investment proposals are directly aligned to the customer needs of our network today and in to the future. planning for our RIIO-2, we used the FES steady progression scenario that was published in July 2018. We have tested six alternative supply and demand scenarios and have identified that the plan is insensitive to the chosen scenario6. We also considered the 1 in 20 and 2021 peak demand scenarios and tested the sensitivity against both 2021 and 2026 projections.

**Interaction with Wider Government Policy**

All our Asset Health works are required due to one of the following drivers:

1. Driver A: NARMs, legislation & safety case
   Interventions that contribute to the NARM and are required to ensure compliance with relevant legislation and/or safety cases, such as industry standards or original equipment manufacturer (OEM) compressor overhaul guidance to mitigate risk to individuals and environment.
2. Driver B: NARMs
   The asset contributes to monetised risk through the NARM process and maintains reliability, but intervention is not directed through legislation or safety case explicitly.
3. Driver C: Maintain reliability on non--lead assets
   The asset investment either supports the lead assets covered through NARMs, is required to meet legislation or is driven by obsolescence. This covers a broad range of assets but predominantly structural integrity and electrical assets. The reliability of these assets reduces with age and duty, and failure of these assets (e.g. pipe supports) can have a significant impact on the primary NTS assets (e.g. above ground pipework).

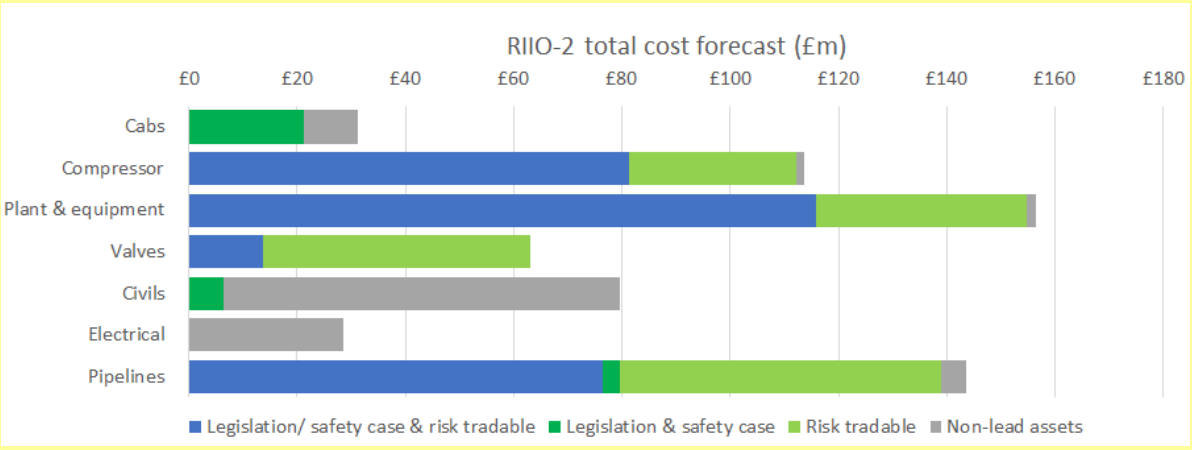



**Figure 4 – Asset Health Investment by PCD**

The NOMs/NARMs Methodology uses BEIS forecasts for the future value of carbon dioxide emissions to society. This imparts a double-inflationary effect upon Environment risk, combining deterioration of asset condition (i.e. greater future volumes of gas emissions) with increasing future carbon costs. This results in asset health investments that best deliver our future environmental targets to be prioritised.

**Internal and External Benchmarks**

We have incorporated increasing efficiencies in the forecast cost to deliver the required asset health programme due to both known innovation (that was not available at the time historical works were completed) and changes to policy we are already making in the pursuit of greater levels of whole life cost efficiency. Furthermore, we have set a challenging 4% costs efficiency on our direct capital investment plan.

We have continued attempts to benchmark our costs externally, through the Gas Transmission Benchmarking Initiative (GTBI), Arcadis and comparisons to US entities; however, due to the complexity of data architecture, commercial sensitivities and challenges in achieving true like for like comparisons, we, and the externally appointed third parties

[6] This is due to the relatively low contribution of Availability & Reliability Risk to overall NTS risk in our NOMs Methodology

have not achieved a comprehensive way to benchmark our Unit Costs. Please refer to the unit cost annex A14.17 for further detail on our unit cost methodology and confidence.

**Reference Areas of the BPDT**

- Although the FEED costs for Bacton and Kings Lynn are shown in tables 3.03 and 3.03a, the UM costs are in 3.01 and 3.02 as agreed with Ofgem.
- Network capability has informed the future network required and thus the asset health plan (Network capability chapter 12 and annexes A12.02 – A12.05)
- Asset Health IDPs (A14.08 – A14.21)
- Gas on and off chapter 14
- Unit cost process & assessment (A20.17)

**Additional Information**

*Tables 3.03, 3.03a, 3.04*

The listed Interventions are not actual projects that will be delivered but can be better described as funding "pots". These interventions are unique combinations of asset and intervention type (e.g. replace/refurbish) that will allow investment appraisals and benefits assessments to be carried out on a consistent basis and allow progress reporting to Ofgem through RRP. Actual projects will be created once assets are physically surveyed. At this stage the best mixture of asset and intervention type will be identified and used to track costs, volumes and NARMs delivery.

*Table 3.03a*

We have used the 'Project' column to describe the Investment Theme. There is a Justification Report for every Theme. We have used the 'Primary Asset' column to describe the Investment Sub Theme. There are one or more Sub Themes for every Theme. Optioneering and CBA analysis has been carried out at Sub Theme level. The Primary Asset Class (PAC) descriptor used in RIIO-1 is not relevant for our RIIO-2 plan as almost every intervention type can be carried out across all PACs (e.g. Exit, Entry, Multijunction, Compressor, Pipeline). The differences in risk at these PACs is represented at individual asset level within NARMs analysis and therefore a generic differentiator is no longer necessary.

*Table 3.03*

Investment Themes are analogous to, but not identical, to the Campaigns reported through RRP Table 4.2a in RIIO-1. RIIO-1 Investment Theme costs have been produced by mapping Secondary Asset Class (SAC) to Theme, for comparison with RIIO-2 Theme costs. These Theme-SAC mappings are analogous to the SAC-Campaign mappings used in Table 4.2a.

**St Fergus Subsidence** – Investment ensures the long-term availability, safety and performance of the site is not adversely impacted by localised subsidence. Localised ground movement has resulted in damage to civil structures e.g. pipe supports/pits which may impact our gas conveying assets. Where ground movement is significant, some of these assets have become completely unsupported, or in an extreme case, are providing the structural support, therefore increasing risk of localised damage and/or integrity issues amongst the gas conveying assets they support (Refer to Structural Integrity, A22.18 for further detail).

Buried pipework that is subjected to increased stress caused by ground movements heightens the potential for a loss of containment. Proactive investment is therefore essential to ensure impacted assets continue to satisfy their primary purpose and that we remain compliant with our PSR obligations.

**Bacton "FEED"** – These are baseline design (FEED) costs for a new Bacton site. They are included as separate lines in these tables as no asset health outputs will be delivered in RIIO-2 (subject to an uncertainty mechanism).

**Kings Lynn "FEED"** - These are baseline design (FEED) costs for a resolution of subsidence issues at Kings Lynn Compressor Station bi-directional area. They are included as a separate line in these tables as no asset health outputs will be delivered in RIIO-2 (subject to an uncertainty mechanism).

**Stopples** - A small number of locations on the network require an alternative solution to the usual outage approach to mitigate the risk of disruption to customer supply. This could be for example due to customers on single network spurs. While it may be possible in some cases to negotiate commercial solutions to this, costs per day are expected to be significant and it is likely that an alternative asset solution will be required in the form of stopples (bypasses). We will seek to identify alternative more efficient solutions with our delivery units and suppliers as the nature of the interventions on each site becomes clearer through our survey work. This amounts to 20 stopples in RIIO-2 at £0.5m each.

**Richmond Efficiency Overlay** – The unit cost of doing work is forecast to decrease as a result of efficiencies driven by our Richmond change programme, which delivers improved asset data, a focus on unit costs and enhanced planning tools, which help to bundle work more efficiently.

**Project GRAID -** These are enabling works costs (e.g. installation of access points) for the rollout the Gas Robotic Agile Inspection Device (GRAID) which was built to provide a method of internal inspection of the 'unpiggable' sections of the network while the network is still pressurised.

As communicated, discussed and understood at a number of bilateral engagements (Ofgem/National Grid Gas), namely 05/09, 20/09 & 24/10, with the ask to articulate the challenge and mitigation within the submission as a solution; National Grid Gas fully adopted the approved regulatory reporting methodology for the RIIO-1 period, Network Output Measures ("NOMs"), all NGGT RIIO-1 volume reporting, systems and data capture aligned to this methodology.

During RIIO-1, in line with RRP table 6.6 reporting requirements, we have reported at a whole SAC level and our delivery teams have only provided outputs information at whole SAC level. We have attempted to retrospectively estimate the outputs from RIIO-1 work based on the RIIO-2 level of granularity and concluded that, even with significant time available to complete this analysis, the outputs would not be deemed accurate or even indicative.

After numerous attempts to achieve comprehensive and complete RIIO-1 volume information unsuccessfully, to avoid misrepresentation National Grid Gas proposed initially at 5th September 2019 bilateral engagement a potential alternative, which would give equivalent, or more beneficial outcomes. As an improved proposal we have shared our Unit Cost inner workings for the Asset Health proportion of the RIIO-2 submission pre submission in the form of 26 deep dive documents; all investments totaling £10m or greater across both RIIO-2 and RIIO-3, these investments represent 68% of the Asset Health expenditure. These costs are driven by outturn data, RIIO-1 works which we support the creation of the RIIO-2 proposed values, we include in these deep dive methods the sum volume of outturn data points (number of works from RIIO-1) and all calculation methods 85% of the top investments within RIIO-2 are based on outturn costs, 10% on Supplier quotations and 5%

estimated. Overall, our RIIO-2 plan is built upon 70% of the value using outturn costs, 15% on Supplier quotations and 15% on other estimation techniques.

A number of line items within table 3.03 and 3.3a refer to projects or early stage programmes of work which cannot be attributed to the standard form of Equipment Types, including a number of activities where the full works are proposed as Uncertainty Mechanisms ("UM") within the RIIO-2 period. Noting no applicability to equipment types, or/and, as a result of works not being fully described at equipment types level as currently proposed as a UM the volume cells (#) associated to these values (£) have been left blank"

**Table 3.03b Asset Health Projects**

| **Asset Health Projects:** Provide an explanation and justification for any forecast costs and volumes associated with asset health projects on the NTS and provide an explanation and justification of unit costs for Asset Health Projects. |
|---|
| Addressed by 3.03 narrative above. |

**Table 3.05 Physical Security**

| **Physical Security Capex:** Provide an explanation and justification for any forecast costs and volumes associated capex spend on physical security in relation to BEIS's enhanced physical security upgrade programme (PSUP). |
| --- |
| We have fully redacted this table and have therefore also removed the related commentary here. |

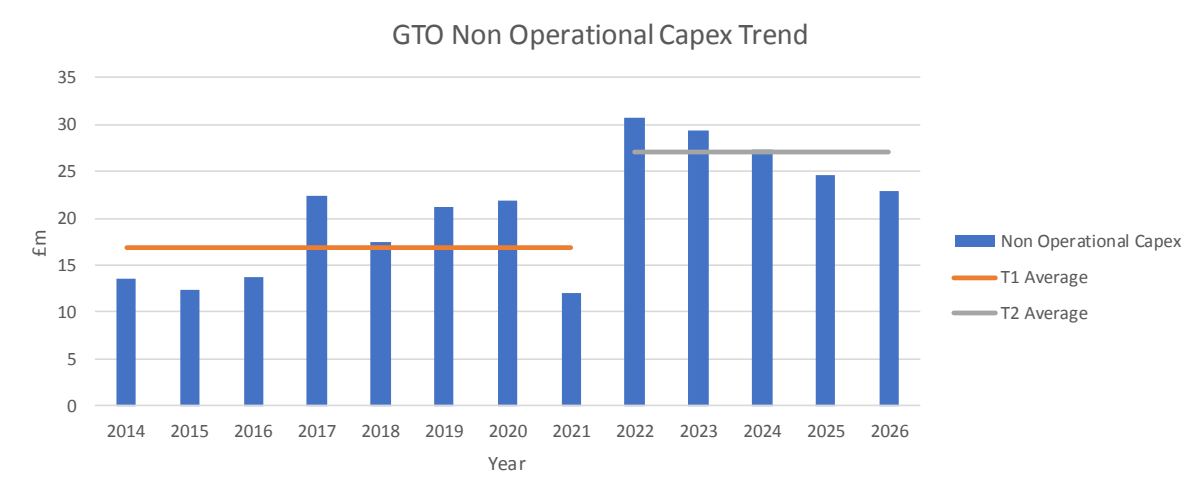
**Table 3.06a/3.06b TO Cyber Security Resillience IT and OT**

| **Cyber Resilience:** Provide an explanation and justification for any forecast costs and volumes associated Cyber Resilence as directed withn the guidance by Ofgem's Cyber Resilience Team. |
| --- |
| We have fully redacted this table and have therefore also removed the related commentary here. |

**Table 3.07 Non-operational Capex**

**Non-Op Capex:** Provide an explanation and justification for any forecast costs and volumes associated with TO non-operational capex

**RIIO-1 to RIIO-2 comparison**




Average annual expenditure on non-operational capex is £27m per annum for RIIO-2 compared with an average £17m in RIIO-1.

Two thirds of non-operational capex relates to the IT investments driven by the TO business to support its operations, or by IT on behalf of the businesses to develop and maintain the shared IT infrastructure or implement shared services systems.

At the start of the RIIO-1 period, we responded to the efficiency challenge by extending the technical lives of our IT infrastructure assets, accepting higher levels of risk whilst maintaining levels of availability. However, as we continued through RIIO-1, our employees fed back that IT was becoming a significant blocker to their effectiveness at work. Over the same period, the increasing rate of change of technology and the escalating threat of cyber-attack on our IT systems meant that we had to look again at how we managed our infrastructure so that we could proactively monitor and remediate cyber threats. Considering this, we have revised our IT asset health policies, which have been reviewed by independent IT experts Gartner who confirmed that they are in line with industry practice.

We have recently implemented a series of investments in new systems to support our HR, purchasing and financial transactional processes in response to analysis that showed that we had more manual process steps than "world class" functions. These investments will support better controls and lower costs of function as we start the RIIO-2 period.

Our strategy for RIIO-2 will cater for exponential growth in data volumes and transaction frequencies. It will enable IT to deliver in the most cost-efficient manner whilst being able to scale the organisation and technology to respond to increases and decreases in demand and support innovation and demand for new business models. This IT strategy underpins our ability as a business to continue to meet the needs of current and future stakeholders, against a particularly challenging backdrop of an uncertain energy future.

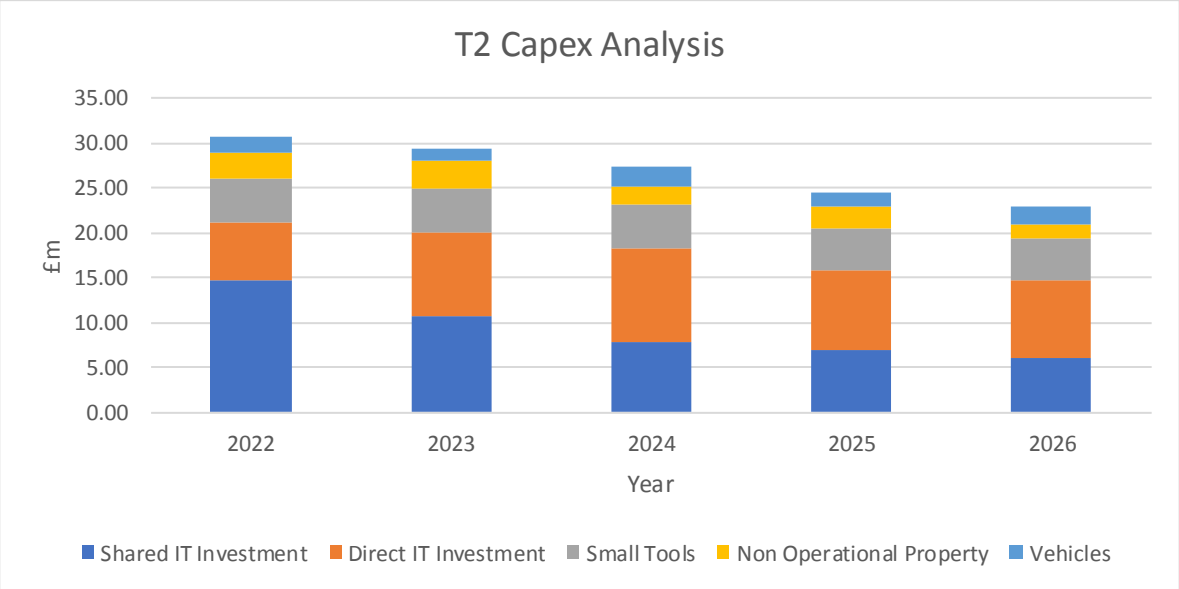
Delivering this strategy results in an additional £7m per annum of IT investment costs, being GTO's share of the shared IT investments. Offsetting this is a reduction of £1m per annum

in the GTO-specific IT investment portfolio, as we continue to leverage the investments made in RIIO-1 around asset data management.

The remaining third of costs relate to replacing our vehicle fleet, investments in our non-operational properties to keep them safe and to meet Critical National Infrastructure requirements, and expenditure on small tools.

In line with our commitment to reduce carbon emissions we are proposing to replace 30% of our commercial vehicles with low-carbon fuelled alternatives by 2026, equating to 80 vehicles and an associated 45 charging points. This is driving an increase in vehicle and non-operational property capex through RIIO-2. Further detail on our plans can be found in annex A16.18.

**RIIO-2 profile**




The RIIO-2 profile is largely driven by the phasing of IT investments. We show IT investments split by direct (ie GTO driven) and shared investments.

- Shared investments are highest in 2022 as work to upgrade our hosting and LAN/WAN networks begins.

Investments in the TO enterprise asset health system in 2023 and 2024 drive an increase from 2022.

**Unit costs**
N/A

**Planning scenarios, uncertainty**
N/A

**Interactions with wider government policy**
N/A

**Internal & external benchmarks**
We have submitted our IT investment plans, direct and indirect, for independent review by Gartner – a recognised IT benchmarking organisation. This output of this work is that the

mix of investment areas, the individual project costs and our project rate cards were all in line with their expectations, formed from their knowledge of IT investments made by other utility companies. We have included the Gartner report within our submission annexes.

**Reference areas of the BPDT**
Chapter 20 "our plan is efficient & affordable" summarises our RIIO-1 investment performance and the key drivers of GTO and shared IT investments in RIIO02.

Annex A20.04 presents further details on our IT investments.

We include the Gartner IT benchmarking report in annex A20.19

**Additional information**
During preparation of the December submissions, the Electricity System Operator made us aware that they were adjusting their allocation of shared IT investment capex to account for forecast future headcount increases within their business. This resulted in the inclusion of an additional £7m of capex (over the five-year period from 2022) within the ESO submission that had been allocated to NGET and NGGT.

The GTO portion of shared IT investments was kept consistent with 2018/19 allocation driver volumes. This has resulted in £1.5m of shared IT investment costs being included in both the ESO and GTO submissions.

**Apportionment assumptions**
IT Investments are allocated to entities based on the drivers used in our annual UCAM process, on a project by project basis. We have applied 2018/19 allocation driver volumes to the forecast plan.

Allocation methods available are as follow:

- Headcount
- UK CNI
- Direct Allocation
- CNI Data Centre
- 4 Point Measure (Combined metric for Assets/Headcount/Operating Profit/Turnover)
- Infrastructure Profile.

**Table 3.08 System Operator Capex**

| **SO Capex:** Provide an explanation and justification for any forecast costs and volumes associated with SO capex including Xoserve costs |
| --- |
| We have fully redacted this table and have therefore also removed the related commentary here. |

**Table 3.09a/3.09b SO Cyber Security Resillience IT and OT**

| |
|---|
| **SO Cyber Resilience:** Provide an explanation and justification for any forecast costs and volumes associated SO Cyber Resilence as directed withn the guidance by Ofgem's Cyber Resilience Team. |
| We have fully redacted this table and have therefore also removed the related commentary here. |

**Table 5.01 System Characteristics**

| **System Characteristics:** Provide an explanation of the high-level information relating to physical characteristics of the transmission network, explaining the changes year on year. |
|---|
| **RIIO-1 to RIIO-2 comparison**<br>There is an increase in disposals during RIIO-2 compared to RIIO-1. This reflects our decision to actively decommission some assets during RIIO-2 as a result of changing customer behaviour and our aging asset base.<br><br>**RIIO-2 profile**<br>Additions and disposals forecast on this table are as a result of projects reported on table 3.01 and 3.02.<br><br>The 5km of pipeline additions in 2023 are from the Feeder 9 investment.<br><br>The disposals across the period result from our decommissioning projects.<br><br>**Unit costs**<br>N/A<br><br>**Planning scenarios, uncertainty**<br>Where relevant we have tested against all of the FES scenarios 2018 and the ENA common scenario assumptions.<br><br>**Interactions with wider government policy**<br>Compressor additions and disposals relate to our compliance with government emissions legislation LCP and MCP directives (MCPD).<br><br>**Internal & external benchmarks**<br>N/A<br><br>**Reference areas of the BPDT**<br>Additions and disposals forecast on this table are as a result of projects reported on table 3.01 and 3.02.<br><br>**Additional information**<br>FY14-FY19 RIIO-1 RIGs define a disconnection of a compressor unit as a removal. For the purpose of the RIIO-2 BPDT only a full decommissioning will be classified as a removal.<br><br>There is a misalignment between 2018 and 2019 reporting due to this change in methodology. The number of gas turbines goes from 61 to 66. This is because the 5 units that have previously been disconnected and counted as Removals have now been added back in until they are fully decommissioned. The Electric drives have increased from 8 to 9 because historically Felindre A has not been included due to not being fully commissioned. We have included it going forward as it is a unit that is physically on the network.<br><br>**Apportionment assumptions**<br>Previous RRP submissions have been used to populate 2014-2019.<br>Where Assets are added or removed it is reflected in the following year e.g. Pipeline added in 2025/26 would show from 2027. |

**Table 5.02 Activity Indicators**

| **Activity Indicator:** Provide an explanation of the key indicators of the overall level of transmission activity, explaining the changes year on year. |
|---|
| **RIIO-1 to RIIO-2 comparison**<br>The data has been based on the future energy scenarios which get updated each year. The general trend going into RIIO-1 compared to RIIO-2 is a slight decline in demand. However, the use of the NTS is largely driven by stakeholder needs and requirements. Our RIIO-2 plan has been based around the requirements of our stakeholders and the network capability they require. We are have engaged with stakeholders to understand how we could have an annual network capability review process to ensure our plan continues to meet stakeholder needs.<br><br>**RIIO-2 profile**<br>The data used in this table has come from the future energy scenarios (FES) 2018 Steady Progression scenario[7], which is within the range of the Energy Network Association's (ENA's) Common RIIO-2 Scenario. We use the full FES scenario as it gives us the required detail for this table.<br><br>**Unit costs**<br>N/A<br><br>**Planning, scenarios, uncertainty, assumptions**<br>We have used the Energy Network Association's (ENA's) Common RIIO-2 Scenario[8] to inform our business plan.<br><br>**Interactions with wider government policy**<br>We are conscious of the governments decision to mandate a target of net zero emissions by 2050 and how this may affect the future supply and demand of natural gas. As such have taken decision within our plan to move certain investments into uncertainty mechanisms to allow for flexibility and optionality to deliver the right investments for consumers to meet these targets.<br><br>**Internal & external benchmarks**<br>N/A<br><br>**Reference areas of the BPDT**<br>N/A<br><br>**Additional information**<br>N/A<br><br>**Apportionment assumptions**<br>N/A |

[7] http://www.energynetworks.org/news/publications/reports/

[8] http://www.energynetworks.org/news/publications/reports/

**Table 5.03 Transmission System Utilisation & Performance**

| **System Utilisation:** Provide an explanation of overall size and quality of transmission service delivered, explaining the changes year on year. |
|---|
| **RIIO-1 to RIIO-2 comparison**<br>The data has been based on the future energy scenarios which get updated each year. The general trend going into RIIO-1 compared to RIIO-2 is a slight decline in demand. However, the use of the NTS is largely driven by stakeholder needs and requirements. Our RIIO-2 plan has been based around the requirements of our stakeholders and the network capability they require. We are have engaged with stakeholders to understand how we could have an annual network capability review process to ensure our plan continues to meet stakeholder needs.<br><br>**RIIO-2 profile**<br>The data used in this table has come from the future energy scenarios 2018 steady progression scenario, which is within the range of the Energy Network Association's (ENA's) Common RIIO-2 Scenario[9]. We use the full FES scenario as it gives us the required detail for this table.<br><br>**Unit costs**<br>N/A<br><br>**Planning, scenarios, uncertainty, assumptions**<br>We have used the Energy Network Association's (ENA's) Common RIIO-2 Scenario[10] to inform our business plan.<br><br>The use of the NTS is largely driven by stakeholder needs and requirements. Our RIIO-2 plan has been based around the requirements of our stakeholders and the network capability they require. We are have engaged with stakeholders to understand how we could have an annual network capability review process to ensure our plan continues to meet stakeholder needs.<br><br>**Interactions with wider government policy**<br>We are conscious of the governments decision to mandate a target of net zero emissions by 2050 and how this may affect the future supply and demand of natural gas. As such have taken decision within our plan to move certain investments into uncertainty mechanisms to allow for flexibility and optionality to deliver the right investments for consumers to meet these targets.<br><br>**Internal & external benchmarks**<br>N/A<br><br>**Reference areas of the BPDT**<br>N/A<br><br>**Additional information**<br>N/A |

[9] http://www.energynetworks.org/news/publications/reports/

[10] http://www.energynetworks.org/news/publications/reports/

**Apportionment assumptions**
1. 2014-2018 has been calculated using reported unavailability
2. 2019-2031 forecast demand is based on a 5-year rolling average of the proportional contribution of each Local Demand Zone (LDZ) applied to the historical maximum daily total LDZ demand.
-As for annual demand, in this scenario heating demand would be predominantly met by gas by 2031. However improvements in energy efficiency (building and appliance) will lead to a gradual decline in overall demand on peak day
- NTS demand on a peak is mainly driven by LDZ demand. For gas for power demand, peak demand would be similar to today even though annual demand falls significantly because gas fired generation would increasingly be used to provide flexibility
Our Highest daily total demand shown for RIIO-1 actuals is actual maximum demand, and for future years is the forecast demand under 1 in 20 conditions. The demand in the LDZ is based on the "highest daily total demand day" not the highest demand in the LDZ.

**Table 5.04 System Demand and Capability**

| **System demand and capability:** Provide an explanation of the maximum levels of actual demand, explaining the changes year on year. |
|---|
| This table is returned blank as agreed with Ofgem before the July submission as the data requirement is the same as table 5.7 |

**Table 5.05 Compressor Utilisation**

| **Compression Utilisation:** Provide an explanation of overall compressor utilisation and year on year comparisons to inform us about changing patterns of supply and demand. |
|---|
| **RIIO-1 to RIIO-2 comparison**<br>The largest variations in historic compressor running hours have been driven by external factors such as weather, global markets and the resulting supply patterns. Even when predicting within RIIO-1 our predictions have often been subject to change. Due to these uncertainties, when predicting out over longer term timescales, it would be impossible to forecast the compressor running hours up until 2031 to a high level of accuracy. As these external factors drive more significant annual changes than the supply variations in our future energy scenarios over this period; this forecast extends from the end of RIIO-1 at a flat rate. This forecast does include the limitations that we expect will be put on some of our compressor units into the future, largely due to emissions legislation. All of this is subject to final agreement with Ofgem as part of RIIO-2 arrangements.<br><br>In accordance with the updated RIGS for RIIO-2, units which have previously been disconnected but not decommissioned have been included though they do not have any forecast running hours.<br><br>**RIIO-2 profile**<br>The use of the NTS is largely driven by stakeholder needs and requirements. Our RIIO-2 plan has been based around the requirements of our stakeholders and the network capability they require. We are currently engaging with stakeholders to understand how we could have an annual network capability review process to ensure our plan continues to meet stakeholder needs.<br><br>In building our plan we have used the Energy Network Association's (ENA's) Common RIIO-2 Scenario[11]. The purpose of the common scenario is to make sure the different network companies' business plans are based on a consistent view of the future. In developing the common scenario, the network companies drew heavily on the Electricity System Operator's (ESO's) Future Energy Scenarios (FES). The FES are developed each year and involve extensive stakeholder engagement across the industry which is then reflected within the data used.<br><br>We are conscious of the government's decision to mandate a target of net zero emissions by 2050 and how this may affect the future supply and demand of natural gas. As such have taken decision within our plan to move certain investments into uncertainty mechanisms to allow for flexibility and optionality to deliver the right investments for consumers to meet these targets.<br><br>**Unit costs**<br>N/A<br><br>**Planning scenarios, uncertainty, assumptions**<br>Assumptions have been made on a Steady Progression forecast which is in the range of the ENA scenario. With outage plans and includes the limitations that we expect will be put on |

[11] http://www.energynetworks.org/news/publications/reports/

some of our compressor units into the future, largely due to industrial emissions legislation (IED).

**Interactions with wider government policy**
IPCC requirements for LCPD and MCPD have been factored into our business plan and the forecast running hours.

**Internal & external benchmarks**
N/A

**Reference areas of the BPDT**
Compressor Emissions Compliance Strategy Annex A16.05

**Additional information**
Operational dates have only been populated for units with known operation dates, blank cells are not operationally accepted and usually not yet built
Disposed or abandon only completed where is applicable
Efficiency cells left blank when assets that are not operationally accepted and usually not yet built
Primary drivers cells blank when assets are not in breach of emission legislation
Replacement unit cells blank when unit not been replaced
Blank running hours limitations because the running hours are not limited by emission legislation

**Apportionment assumptions**
N/A

**Table 5.06 Asset Data**

| **Asset Data:** Provide an explanation and justification of the forecast asset replacement / removal schedules listed in the BPDT |
|---|
| **RIIO-1 to RIIO-2 comparison**<br>N/A<br><br>**RIIO-2 profile**<br>Changes to asset data reflect the additions and disposals forecast of table 5.01 which are a result of projects reported on table 3.01 and 3.02.<br><br>**Unit costs**<br>N/A<br><br>**Planning scenarios, uncertainty**<br>N/A<br><br>**Interactions with wider government policy**<br>Compressor changes relate to our compliance with government emissions legislation LCP and MCP directives (MCPD).<br><br>**Internal & external benchmarks**<br>N/A<br><br>**Reference areas of the BPDT**<br>Additions and disposals forecast on this table are as a result of projects reported on table 3.01 and 3.02.<br><br>**Additional information**<br>Constructed, Abandoned, Decommissioned and Year Ending cells will be populated when detailed scoping for the project have been carried out<br>Pipeline: Pipeline Feeder number - N204:N206. Pipeline Feeder number will be populated following completion of full scoping of the project.<br>Exit Points: Offtake Capacity - K240:K362. Exit Point Offtake Capacity data is aligned to RIIO-1 RRP.<br>Exit Points: Year of construction not populated - P312, this aligns to RIIO-1 RRP.<br>Exit Points: Pipeline Feeder number - N359:N362. Pipeline Feeder Number for exit point will be populated following completion of full scoping of the project.<br>Entry Points: Pipeline Feeder number - N384. Entry points pipeline feeder number will be populated following completion of full scoping of the project.<br>Multijunctions: Pipeline Feeder number -L472:L473. Multijuctions pipeline feeder number will be populated following completion of full scoping of the project.<br>Asset marked as abandoned but year not populated - P588, P647, P706, this aligns to RIIO-1 RRP.<br><br>**Apportionment assumptions**<br>Where Assets are added or removed it is reflected in the following year e.g. Pipeline added in 2025/26 would show from 2027. |

**Table 5.07 Forecast Scenarios**

| **Forecast:** Provide an explanation of gas supply peak projections for each exit point for all forecast scenarios. |
|---|
| **RIIO-1 to RIIO-2 comparison**<br>The data has been based on the future energy scenarios which get updated each year. The general trend going into RIIO-1 compared to RIIO-2 is a slight decline in demand.<br><br>**RIIO-2 profile**<br>The data listed is taken from our four National Grid ESO future energy scenarios 2018. This aligns with the data that has been used to develop the ENA RIIO-2 Common Scenario. For information please see the FES 2018 website and the assumptions behind the forecast data which includes the peak supply/demand.<br><br>The future energy scenarios are developed each year and involve extensive stakeholder engagement across the industry which is then reflected within the data used. As with any forecast it will never be right and hence why for some areas of our plan we use the whole range of all the scenarios in our analysis.<br><br>**Unit costs**<br>N/A<br><br>**Planning, scenarios, uncertainty, assumptions**<br>We have used the Energy Network Association's (ENA's) Common RIIO-2 Scenario to inform our business plan.<br><br>**Interactions with wider government policy**<br>We are conscious of the government's decision to mandate a target of net zero emissions by 2050 and how this may affect the future supply and demand of natural gas. As such have taken decision within our plan to move certain investments into uncertainty mechanisms to allow for flexibility and optionality to deliver the right investments for consumers to meet these targets.<br><br>**Internal & external benchmarks**<br>N/A<br><br>**Reference areas of the BPDT**<br>N/A<br><br>**Additional information**<br>N/A<br><br>**Apportionment assumptions**<br>N/A |

**Table 6.01 Business Carbon Footprint**

| **BCF:** Provide an explanation of Business Carbon Footprint (BCF) forecast patterns in order for us to review the carbon footprint across all the energy networks. |
|---|
| **RIIO-1 to RIIO-2 comparison**<br>Please note the BCF uses a forecast with no National Grid Initiatives, therefore it is what we expect to happen without significant intervention. The EAP table (6.03) and narrative include National Grid initiatives. Overall the BCF is dominated by compressor running hours and is the key driver for the rise in GT emissions – due to fuel combustion, electricity use (for electric drive compressors) and compressor venting. It should be noted that emissions in 2018/19 were relatively low due to supply and demand patterns. Operational transport assumes no change as the fleet composition is assumed constant throughout RIIO-2 in the BCF, and the small decrease in business transport is driven by FTE forecasts.<br><br>**RIIO-2 profile**<br>We have made forecasts based on the assumptions listed below. Note that emissions in Gas Transmission are strongly correlated with seasonal variations in weather, supply location and demand levels. This means there is year on year volatility that is difficult to forecast. Based on the BCF forecasts we would expect a small decrease in BCF emissions, driven by compressor running hours for the most part and a small decrease in FTE count resulting in a decrease in transport emissions. As above, this is highly dependent on demand.<br><br>**Unit costs**<br>N/A<br><br>**Planning scenarios, uncertainty, assumptions**<br>The BCF includes historic data where this is available.<br><br>From 2018, updated Global Warming Potential (GWP) figures have been used to calculate CO2 equivalent figures. This is consistent with the reporting methodologies of the time.<br><br>The conversion factors are from BEIS unless otherwise stated within the assumptions. In some cases, we use our own factors, and in others it is a combination of BEIS factors – which have been simplified for this table. Due to the mechanics of this table, some granularity is lacking for us to show clearly our original source data.<br>• In the BCF, forecasts have been made assuming BAU, meaning we are mostly affected by external factors. In many cases this means these forecasts are flat. The EAP contains initiatives intended on reducing emissions and includes ranges for many of these.<br>• Fugitive emissions and fuel combustion have forecasts past 2026.<br>• Unless otherwise stated BEIS conversion factors have been used.<br>• The fugitive emission conversion factor is an internal factor calculated from natural gas composition.<br>• Property energy use has been allocated based on £m spend.<br>• There is a small amount of our business fleet that uses petrol not diesel, this information is unavailable before 2016 and has therefore been listed as diesel before that date.<br>• Similarly, for our business fleet, the information isn't available before 2017. Hire car data is unavailable before 2015 but has been estimated.<br>• Conversion factors for operational transport are the same as those for business transport.<br>• All flights before 2019 have been listed as domestic flights because we have not collected historical data that splits flights between domestic and international. We will provide this going forwards. |

- We have no sea transport for business transport therefore have not provided conversion factors as we do not have this within our greenhouse gas reporting
- We cannot provide contractor specific emissions as we have not previously collected this data. The data we collect is for the embodied carbon related to our construction projects. This has been included in the EAP
- For some of the transport data e.g. business vehicles, a combination of BEIS conversion factors have been used for our reporting. To align with the format of this table, we have taken an average figure.
- Hire car providers use their own conversion factors – which we have averaged and included here.
- The forecast for buildings energy use is made up of shared office space, electric drive compressors, and other operational supplies. The forecast for the electric drive electricity usage is aligned to electric drive compressor running time. We have used publicly available grid carbon intensity factors from the Community Renewables Future Energy Scenarios (FES). This scenario has been chosen as it's predictions in grid carbon intensity provide a central view. The emissions from shared office electricity use and other operational supplies are aligned to the same scenario.
- Buildings - other fuels have been assumed constant from 2019
- Operational transport (diesel) uses the forecast number of vehicles outlined by the fleet paper (justification paper in annex A16.18), assuming no electric vehicles (EVs) are purchased and that all our vehicles travel 12000km per year.
- Petrol emissions are assumed to be constant.
- The emission factors for operational transport have been amended to align with freighting goods (km travelled).
- Business transport emissions have been forecast directly proportional to the FTE headcount for GT (excluding Capital Delivery).
- Fugitive emissions in the BCF have historically only been venting emissions. We acknowledge there are some gaps in the dataset and are working to improve our data. Since these are emissions related to venting at compressor sites, they have been modelled in line with compressor running hours.
- Natural Gas combustion is consistent with natural gas compressor running hours.
- Blank spaces indicate data gaps, rather than 0 emissions. We are continuously working to improve our data and fill any gaps.

**Interactions with wider government policy**
The BCF does not contain our initiatives – please refer to EAP table 6.03 narrative

**Internal & external benchmarks**
The BCF does not contain our initiatives – please refer to EAP table 6.03 narrative

**Reference areas of the BPDT**
N/A

**Additional information**
We do not currently collect emissions related to our contractors. To ensure we are able to provide this data during RIIO-2 we are in the process of setting out new reporting systems that will enable us to gather this information. We are accessing different options, such as requesting data from our contractors directly.

**Apportionment assumptions**
Electricity consumption and some business transport figures are apportioned by £m spend, rather than headcount as it is a more complete dataset.

**Table 6.02 Innovation**

| **Innovation:** Provide an explanation/ justification for the outlined costs/volumes for the proposed projects / themes for innovation funding |
|---|
| **RIIO-1 to RIIO-2 comparison**<br>Our trend of spend on innovation overall changes each year depending on what innovations are required, but steadily increased during the initial years of RIIO-1. However the level of spend from RIIO-1 into RIIO-2 is similar, with it being based on around 0.75% of revenue, which for RIIO-2 we are forecasting to be about £6.2m a year.<br><br>**RIIO-2 profile**<br>For the NIA forecast RIIO-2 spend, we are forecasting £30.9m over the period split across our three innovation themes. This has been profiled for each year due to how we see the future energy landscape changing. Focusing initially on fit for the future projects with a shift towards the decarbonised energy system theme as we move on the net zero pathway**.**<br>**Unit costs**<br>N/A<br><br>**Planning, scenarios, uncertainty, assumptions**<br>We have based these costs building upon our performance during RIIO-1. A BEIS heat strategy roadmap is due in summer 2020, which could have an impact on the level of funding required and direction of innovation projects required. Therefore the profile and level of spend could change from what is currently forecast. Additionally Ofgem and all networks are in discussion to understand how the NIA funding will work for RIIO-2. Our assumption currently is we will agree the funding for the whole RIIO-2 period.<br><br>**Interactions with wider government policy**<br>The government have stated that we need to achieve net zero emissions by 2050. Our innovation strategy and funding associated with it are aimed at enabling the transition to net zero emissions.<br><br>**Internal & external benchmarks**<br>N/A<br><br>**Reference areas of the BPDT**<br>N/A<br><br>**Additional information**<br>For RIIO-2 we are requesting money to rollout innovation from RIIO-1. This specifically relates to Project GRAID(a NIC project in RIIO-1). These costs are reflected in table 3.03b and so the rows are left blank in this table.<br><br>More information on our innovation strategy and the areas we are looking to innovate in during RIIO-2 can be found in annex A17.03.<br><br>**Apportionment assumptions**<br>N/A |

**Table 6.03 Environmental Action Plan**

| **Innovation:** Provide an explanation/ justification for the outlined costs/volumes associated with NGGT's actions to address those environmental impact areas covered under the Environmental Action Plan |
|---|
| **RIIO-1 to RIIO-2 comparison**<br>This is a new table for RIIO-2. Whilst we have retrospectively included data where this is possible, there are several areas for which data is not available as we do not currently collect this data or have only recently started collecting it.<br><br>**RIIO-2 profile**<br>Forecasts are based on the assumptions listed below. Overall there is an increase in GHG emissions across all scenarios due to the increase in compressor running hours, which dominates the carbon footprint. However, initiatives around fleet, embedded carbon, electricity consumption see significant potential savings across other areas.<br><br>Where RIIO-2 data has not been included either we do not currently collect this data or we have only a limited dataset, meaning we can't provide a forward projection.<br><br>**Unit costs**<br>N/A<br><br>**Planning scenarios, uncertainty, assumptions**<br>The emissions totals in the EAP table include the gas use and electric power for compressor use. This makes up a significant proportion of the total carbon footprint, however a range has not been produced. This is because compressor usage is extremely volatile year on year and is highly dependent on external factors like the weather. Producing a forecast with this level of volatility is difficult and is almost entirely due to factors out of our control. Therefore, it appears the carbon emissions have a narrow range of forecasts, as it is dominated by the emissions from compressors.<br><br>The below points refer to the assumptions and methodology around the upper and lower forecasts with and without initiatives.<br><br>**Buildings energy usage** - All electricity usage emissions is forecast using the Future Energy Scenarios (FES) UK grid carbon factors. The Steady Progression and Two Degree scenarios are used for the upper and lower bounds for the 4 FES scenarios respectively, as these give the broadest range of grid carbon intensity across the different scenarios. The shared office space electricity emissions have been aligned to the FES scenarios. Electric drive compressor and other operational electricity use emissions have been separated based on historic electricity supply. Other operational electricity use emissions have been forecast to be consistent with the FES scenarios only, VSDs have been forecast to be consistent with the FES scenarios and the forecast compressor running hours. These are totalled to produce the forecast for total building energy use.<br><br>The initiative assumes that electricity consumption **excluding electric drive compressors** has a renewable (zero carbon) tariff, with no change to gas consumption assumed.<br><br>**Operational Transport** - BAU assumes no EVs purchased, the upper and lower bounds are +/-10% (of mileage) of this value. The initiative assumes 30% EVs are purchased and run with current grid factors as an upper bound, and a renewable tariff for the lower bound. For more info on the initiative please refer to the justification paper in annex A16.18. |

**Business Transport** - All business transport emissions are consistent with forecast FTE numbers. The BAU lower bound is constant, with the upper bound a (+10%) increase in km travelled and associated emissions. The initiative in the upper bound is constant, with the lower bound a (-10%) decrease in km and associated emissions.

**Embedded Carbon** - The carbon footprint of all projects completed in RIIO-2 will be reported in the final year of RIIO-2 (2026).

We have not carried out an analysis of carbon intensity for scheme types in GT. There were too few schemes in RIIO-1 with measured carbon footprints to produce intensity metrics (the sample would be too small).

For historic data, we have totalled the carbon cost and £m spend and divided over the period to give an average for RIIO-2.

For the forecast we have a high and low case of carbon with a fixed cost. As the commitment for RIIO-2 is for carbon neutral construction on major projects the data for the forecast is only reflective of these major projects.

For reporting in RIIO-2 we will continue to develop our carbon accounting work on projects. We are in the process of including carbon pricing in decision making for large capital projects, which will ensure there is an early carbon assessment done of the impact of the project. We will work with our contractors to support them in delivering carbon efficient projects, to achieve a reduction in carbon intensity across the portfolio.

**Leaks and Pollution** - Whilst there is always work being done in both areas, it is not possible to give an accurate forecast and range to account for this. Local pollution, like compressor fuel use, has been aligned to compressor running hours. We have not produced a range for this due to the volatility of this line item (as explained above)

Number of incidents is any incident related to GT that meets internal reporting criteria for Executive level reporting. the classification of these are those which result in:
Significant environmental harm or damage, or are incidents which are significant to us as a business and drive different decisions and/or behaviours;

- National Grid, or our contractors, receiving formal written notification of enforcement action from a regulatory authority, generally requiring us to change how we operate;
- Our target and ambition is always zero, and we always review events of this magnitude. It is impossible to predict incidents, due to their very nature and so we have not included any specific forecast or initiative for this.

**Waste** - Historic data has been provided. The volume calculation has been calculated using the weight of waste and the WRAP conversion factor (2014). As most waste is construction waste the factor for EWC 170904 has been applied. This is a new data forecast requirement and we are currently unable to provide a forecast of waste between now and 2026 as we do not have a complete dataset – we have only recently started collecting this data.

We are currently developing a baseline to set a waste intensity target during RIIO-2 for construction waste. This will ensure we have a robust data set and reporting process in advance of the RIIO-2 period.

The amount of waste produced varies significantly dependant on project type. Tunnel projects are very waste intensive due to the tunnel arisings produced, while other projects, such as control system works, are comparatively much less waste intensive as there are much less earthworks required and less spoil produced. We will increase our data set of

scheme type waste profiles so will be in a better position to forecast waste from the end of RIIO-2 into RIIO-3. This increased dataset will also enable us to understand what good waste performance is for different types of project and therefore target meaningful reduction in future.

**Biodiversity** For the purposes of this table, we have equated the Biodiversity Improvement Plans (BIPs) with our internal measurement: Sustainability Action Plans (SAPs). A SAP includes improvements made to a site, covering a number of different areas – e.g. social, economic, ecological, carbon.

For number of BIPs for network sites, this will not be used as a basis for reporting or setting targets for RIIO-2 as the focus will be on % coverage.

Land area covered by BIP has been measured to include all the land within a site having an SAP applied, even if the SAP only impacts a small proportion of the site.

Portfolio wide environmental metric is the Natural Capital valuation across our portfolio of sites. Our target refers to a 10% increase across the entire portfolio by 2026.

Portfolio wide net gain is the net gain metric being introduced for RIIO-2. This measure is a % of net gain applied for each project. Our target refers to at least a 10% net gain on every new project until 2026.

**Interactions with wider government policy**
The Environment Action Plan methodology statement in Annex A16.01 sets out interactions with policy for individual initiatives.

**Internal & external benchmarks**
The Environment Action Plan methodology statement in Annex A16.01 and the and benchmarking annex in A16.04 set out external benchmarking information relating to our commitments.

**Reference areas of the BPDT**
N/A

**Additional information**
Most of the data has come from the BCF. Many of the necessary assumptions are stated in the BCF narrative.

Please also refer to the comments/notes within the EAP table (6.03) for additional info.

**Apportionment assumptions**
Electricity consumption and some business transport figures are apportioned by £m spend. This is preferable to headcount as it is more complete.

**Table 6.04 – Bespoke uncertain**

**Bespoke uncertain:** Not requested by Ofgem but provide for completeness

**RIIO-1 to RIIO-2 comparison**
Not applicable.

**RIIO-2 profile**
Bespoke activity - We have no incremental costs or volume / workload associated with the bespoke outputs in our plan. This is because our outputs relate to our baseline expenditure.

Uncertain activity – By their nature uncertain costs are uncertain. Where profiles are given this is currently the best view of profile, however, are subject to the applicable uncertainty mechanism.

**Unit costs**
Not applicable.

**Planning scenarios, uncertainty, assumptions**
Assumptions:
Column W we have assumed that CVP should have only been included if there is a specific CVP attached relating to the snapshot table.

Column AC "Uncertain Costs Excluded from BPDT Baseline Figures?[Y/N]" we have categorised as follows

- "Y" for items that are included in data tables under a specific UM line. Includes both baseline variant and non-baseline UMs
- "N' for Quarry and loss as the baseline figure is separate to the reopener (which is currently an unknown cost)
- "N/A" where there is no projection or related costs in data tables

**Internal & external benchmarks**
Not applicable.

**Reference areas of the BPDT**
In the data table we have referenced the relevant chapters of the 200-page business plan and the annexes for each line item. The main annexes relevant to this table are: A3.01 price control deliverables and A3.02 uncertainty mechanisms. This data table takes most of its information from the Output, UM and CVP snapshot table (annex A3.04).

**Additional information**
Uncertain activity - There are some items without incremental cost or volume / workload because many of the UMs are for unknown amounts relating to re-openers (where the incremental cost and volume will depend on new requirements that we currently don't know) or financial UMs (many of which index prices).

Column F is consistent with descriptions in the Output, UM and CVP snapshot table.