Annex
NGET_A14.17 – Total Opex
December 2019

As a part of the NGET Business Plan Submission

nationalgrid

RIIO-T2

nationalgrid
Electricity Transmission

NGET_A14.17_Total Opex

Value for Money
(December 2019)

Submission annex 2019

Contents

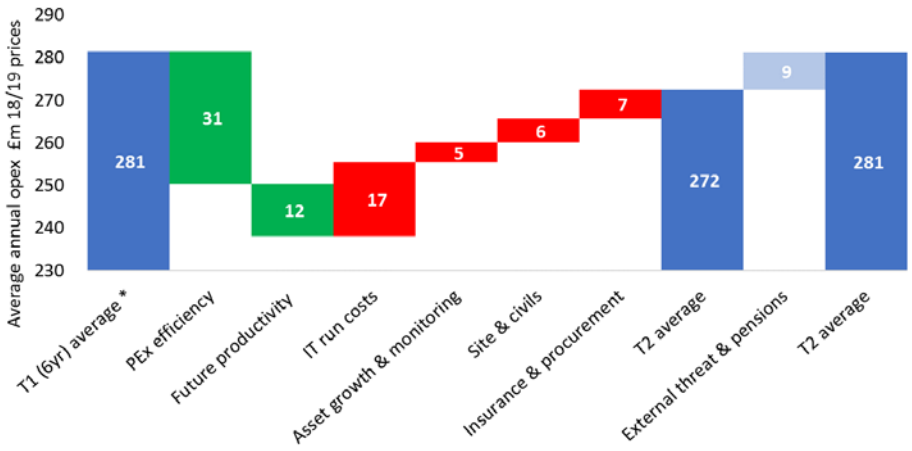
Executive Summary

Our operating costs are the costs we incur on an ongoing basis to run and maintain the network, provide customer service and operate our business. As such, they contribute to all the stakeholder priorities in our T2 plan. Collectively, they make up around 20% of our expenditure for the T2 period and, because they relate to the day to day running of our business and occur year after year, it is particularly important that we can demonstrate these costs are efficient.

On average, our core opex costs for T2 will be £272m per annum, a decrease of £9m per annum from the T1 period. The efficiencies we expect to deliver from our organisational restructure, plus an ambitious 1.1% per annum productivity target on our T2 costs means that our underlying cost base will be £31m per annum lower than in T1 (or £43m lower when looking only at the first six years of actual expenditure in T1). These savings will more than offset higher costs in areas of IT, as we make investments to modernise and protect our IT systems, monitor and maintain our growing asset base, keep our operational sites safe protected, and on insuring our operations and staying compliant as a regulated business.

As an owner and operator of England and Wales' Electricity Transmission network we are being asked by governmental bodies to do more than ever to protect this critical national infrastructure from external threats. Our plan for T2 proposes costs of £7m per annum for enhancements to external threat protection at our operational sites. Whilst we have high confidence in the efficiency of these costs, changes in Government requirements may lead to future scope changes. We anticipate these costs will be covered by a "use it or lose it" uncertainty mechanism, meaning we will only be funded for the work that is needed at the time and so we have shown them separately to our other baseline opex costs. We also show £2m per annum pension levy and admin fee costs in our opex costs, consistent with Ofgem's RIIO-2 Sector Specific Methodology Decision.

Figure A14.17.1 Core operating costs will reduce by £9m per annum in the T2 period[1]



*T1 6-year average outturn based on 2013/14 to 2018/19 actual spend, adjusted for change in tower painting cost treatment in T1

Our operating costs support our ongoing activities

We typically spend around £281m per year on our operating costs. 40% of these costs are spent on the inspections, maintenance, repairs and other activities to ensure a safe and reliable transmission network. The remaining 60% is split equally between so called closely associated indirect activities that support our load and non-load activities, for example, asset policy and training, and business support activities such as procurement, HR, finance etc.

The mix of our operating cost base has changed over time as the result of business decisions to invest in support activities to reduce costs elsewhere and the need to respond to external challenges. Therefore, it is important to consider the total operating cost base as a whole. As we entered the T1 period, we were facing growing maintenance requirements from a more diverse and ageing asset base with coincident challenges in the supply and demand of adequately trained workforce.

In response, we reset our operating model at the start of the T1 period and restructured our business to realign accountabilities, introducing lean continuous improvement capabilities and optimising our support functions for additional operational workload. This allowed us to mitigate some of the upward pressures in workload and reduce our workforce by over 100 roles. As our asset base has grown through the period, we have invested in IT systems to automate the monitoring of our assets and understand more about their condition. This delivered savings in our direct maintenance costs and additionally enabled us to minimise capital requirements in the period.

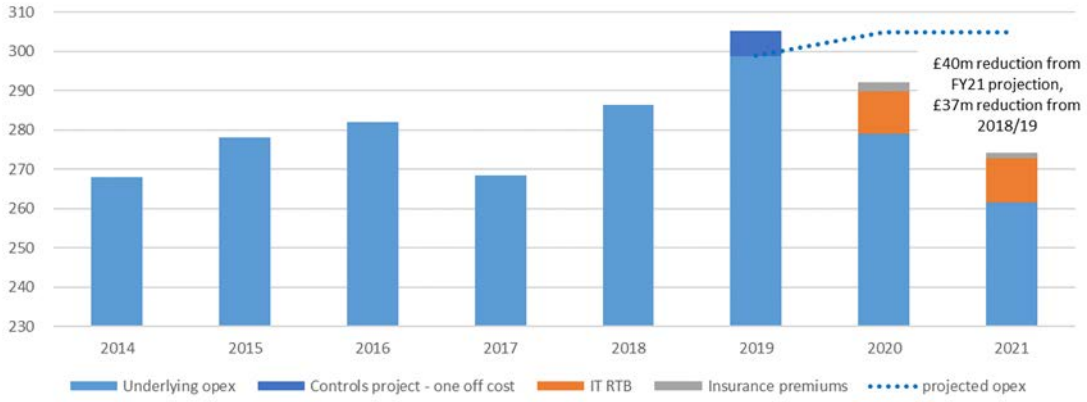
In terms of business support costs, IT costs increased because of the IT systems we invested in to support our asset maintenance and additionally as we developed our capability in identifying and managing the increasing cyber threat to our operations. We also needed to increase the scope of our financial control activities to respond to new and increasing compliance requirements. The benchmarks that set our allowances did not take these increased activities into account and we were not able to contain these costs within our allowances. We take these lessons and others into our T2 business plan.

[1] Note: tower painting cost has been removed from T1 average.

Commitment to reducing our cost base by £40m a year

The resulting re-shaped organisation and cost base will make us fit for delivering new challenges in the T2 period. We are forecasting to deliver annual opex savings of £40m by March 2021 (from a baseline of 2018/19 outturn costs) and we are committing to achieving and sustaining these future efficiencies for the T2 period, making a T2 saving of £200m. Later in this annex we demonstrate that our pay is comparable with peer companies and that savings bring our business support costs in line with or better than benchmarks.

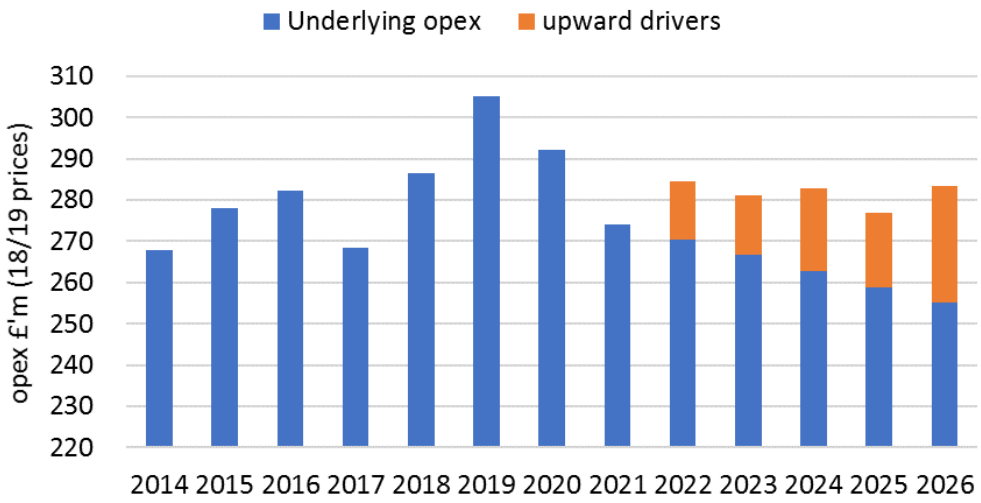
Figure A14.17.2 Our PEx value programme will deliver savings of £40m against projected underlying costs



Commitment to £47m productivity improvement

On top of these savings, we are challenging ourselves to find more efficiencies in the T2 period. We are committing to a stretching productivity improvement of 1.1% per annum through the T2 period. This will be difficult for us to achieve, especially when compared to national metrics such as the forecasts by the Bank of England which forecast productivity of 0.3 to 0.4% over the next few years. We are challenging ourselves to achieve this for consumers anticipating future efficiencies may be driven through our digitisation strategy and embedded business as usual innovation activities. Our T2 opex plan therefore reflects a commitment to re-set the cost base and a commitment on productivity improvement, both which have been embedded. The figure below shows the impacts of these on our underlying cost base. For more information, please see the RPEs and efficiency annex (NGET_A14.14).

Figure A14.17.3: October baseline opex plan[2] is below our ten year average operating costs:



However, we are also forecasting a number of upward cost of pressures (orange bars) as drivers we experienced in T1 continue into the T2 period.

T2 cost drivers will continue into the T2 period

We expect the opex pressures we have experienced in the T1 period to continue into T2, and they will offset the underlying savings we forecast. The key drivers are:

IT run costs +£17m

The costs of supporting our IT systems has grown through T1 as we have made investments in asset data management systems and built our capability to respond to an escalating cyber risk. Average spend for the early part of T1 was £33m per annum, however our IT costs are forecast to reach £49m by the end of T1 as we expand our cyber resilience activities and support investments we are making to make our transactional business support functions more cost efficient. Independent benchmarking experts Gartner have confirmed that our IT operating costs are efficient as we enter the T2 period.

IT operating costs fall throughout the T2 period, as the cumulating impact of our 1.1% per annum future productivity improvements offsets the incremental cost of supporting further investments to support key business processes, deliver our IT cyber plans and modernize shared IT infrastructure and hosting capabilities. Overall, this results in IT operating costs for the T2 period that are on average £17m per year higher than the first six years of T1. We give more detail on the drivers for this transformation in annex NGET_A14.08 IT strategy.

Asset growth and condition monitoring +£5m

We are forecasting cost increases in asset maintenance costs due to the newly-commissioned Western HVDC Link, a forecast 2% growth over the T2 period in the network asset base and an increase in condition monitoring installation. The WHVDC link will minimise total costs to consumers by reducing system constraint costs, and condition monitoring will help us better-target asset interventions.

[2] Note: T1 opex adjusted for tower painting costs, now treated as capital expenditure

Operational site costs and carbon offsetting +£6m

We are anticipating increased costs on our sites including our operational rents and vegetation management. Operational property rents relate to leases for sites such as substation leases which will need to be renegotiated over the T2 period. Whilst we work hard to manage the impact of a general trend in rising market rents we will not be able to offset the full impact of these sites. We have challenged ourselves to retain 50% of the risk of rental increases limiting the impact to an increase of £1m in direct opex by the end of the T2 period. We will also spend £1m per annum more than in the T1 period on maintaining the physical security of our PSUP sites, two more of which will be commissioned in the T2 period.

Vegetation management costs are anticipated to rise by £1m per year in the T2 period due to effects of climate change and land restrictions which affect both volume and cost.

Our stakeholders want us to continue our work from the T1 period on reducing our capital carbon from construction with the ambition to achieve net-zero carbon construction by the last year of the T2 period. A value of £2.5m has been estimated in the final year to offset the residual unavoidable carbon impact of our T2 construction plans, which is represented as an average of £0.5m per annum increase to our indirect opex costs.

Insurance & procurement +£7m

Sustained losses due to events such as natural catastrophes, wildfires, etc, are driving increases in insurance premiums globally. Whilst we insure our businesses via a captive insurer arrangement (where National Grid effectively self-insures), this arrangement can only mitigate some of the external pressures from the commercial insurance market. These pressures will drive an increase in insurance premiums of £3m on average through our T2 plan, compared with the T1 average costs; despite this increase, in the next section we demonstrate that our costs are 30% below market rates.

As part of our PEx efficiency programme, we moved contract management expertise that had previously been spread across the business into our procurement function, reducing overall cost but increasing the procurement function cost by £3m per annum relative to the T1 period.

Despite these upward pressures, the average baseline operating costs for the T2 period will reduce by £9m per annum compared to T1 average outturn to date. The cost of our opex activities today will decrease by £31m by the end of the T2 period.

Other structural changes

In addition to these drivers, we anticipate an average increase of £7m per year in costs relating to enhancements to external threat protection at our operational sites. Whilst we have high confidence in the efficiency of these costs, changes in Government requirements may lead to future scope changes. We anticipate these costs will be covered by a “use it or lose it” uncertainty mechanism, meaning we will only be funded for the work that is needed at the time and so we have shown them separately to our other baseline opex costs. More information on these activities can be found in Chapter 10 We will protect the network from external threats.

In its RIIO-2 Sector Specific Methodology Decision, Ofgem confirmed the reclassification of Pension Protection Fund levy and pension admin costs from pass-through costs to be totex costs for the T2 period. We therefore show an additional £2m per annum of cost because of this reclassification.

Despite these upward pressures, the average baseline operating costs for the T2 period will reduce by £9m per annum compared to T1 average outturn to date (see Figure A14.07.01). The cost of our opex activities today will decrease by £31m by the end of the T2 period.

The rest of this annex describes our operational cost base by the three main categories: Direct, CAI and Business Support. We then separately explain the resilience and pension costs which begin in the T2 period. Each section will give an overview of the costs and activities, how they will change in the T2 period and present evidence to support the high certainty and cost efficiency which we have built into our plans.

Table A14.17.4: How our costs will change between T1 and T2

	Average per annum									
Opex category	RIIO-1	PEx efficiency	Future productivity	IT run costs	Asset & monitoring	Site & civils	Insure & procure	Sub total	Threats and pensions	RIIO-2
Direct opex	£104m	(£6m)	(£3m)	-	£5m	£5m	-	£104m	-	£104m
Closely Associated Indirects	£87m	(£16m)	(£2m)	£2m	-	£1m	-	£72m	-	£72m
Business Support	£91m	(£10m)	(£7m)	£15m	-	-	£7m	£96m	-	£96m
Sub-total	**£281m**	**(£31m)**	**(£12m)**	**£17m**	**£5m**	**£6m**	**£7m**	**£272m**	**-**	**£272m**
Resilience and pensions	-	-	-	-	-	-	-	-	£9m	£9m
Total	**£281m**	**(£31m)**	**(£12m)**	**£17m**	**£5m**	**£6m**	**£7m**	**£272m**	**£9m**	**£281m**

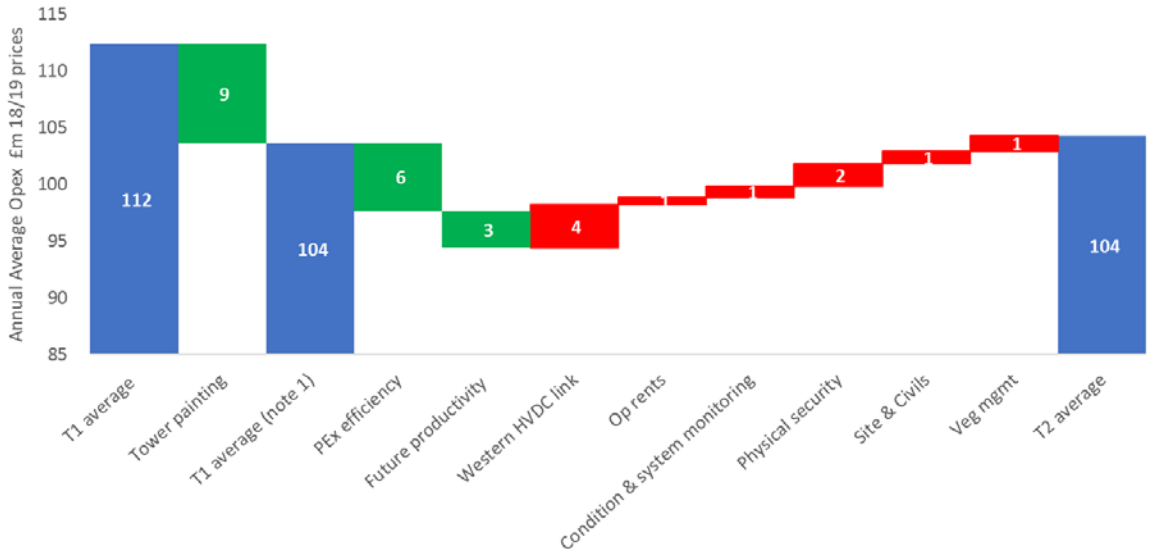
Direct

Our main responsibility as a transmission owner is to ensure a safe and reliable transmission network. Our network needs to be available to our customers when they need it allowing the provision of secure power supplies for their consumers.

To fulfil this role, we need to keep our assets in a healthy condition by continual assessment, intervening at the right time to either undertake policy defined maintenance, refurbishment or replacement of the assets. These activities are covered by our direct opex cost base as described in this section of the annex.

A note on the Business Plan Data Tables (BPDT): The T2 BPDT are specified as totex tables and therefore include appropriate capital spend in these areas. For this annex, the following section relates to opex costs only.

Figure A14.29.3: Average T1 to T2 direct opex remains flat, new activity drivers in the T2 period are offset by delivered and future efficiency[3]



Note: tower painting has been removed from T1 actuals to show costs on a consistent basis

Headlines

1. Our underlying direct opex costs are reducing by 9% from the T1 average resulting from increased productivity driven throughout the remainder of the current price control, and an ongoing efficiency commitment into T2.

2. Embedding our Western Link HVDC subsea cable, building our condition monitoring capability to manage risks to our increasing asset base and external pressures on our operational rents are additional cost drivers in the T2 period.

Overview & T1 Story

Our direct opex activities are underpinned by our asset policy which drives the volumes, frequency and type of work which is carried out on the network. Our current maintenance policy is developed against triggers which include:

a. Intervals of time or duty (for example, number of operations or running hours)
b. Asset condition, including Dissolved Gas Analysis (DGA) for transformers and thermovision surveys.

Current maintenance activities are generally planned on an interval basis to best make use of system access by nesting work in a bay or on a circuit, but increasingly we assess work content using condition data and the criticality of the assets before undertaking work to manage the asset health risk more efficiently.

[3] Note: Numbers reconcile to BPDT C2.20 – C2.24 with capex element removed.

Maintenance policy evolves as processes and practices are reviewed on an ongoing basis using the latest information we have to enable assets to achieve their anticipated asset life and reduce the potential for unplanned disruption.

1) Internal drivers and influences to maintenance policy include:

    a. Developing trends for defects found during maintenance activity
    b. Rectification of unforeseen failure modes
    c. Innovation: for example a research and development project during the TPCR4 period sought to 'engineer out' the need for lubrication renewal with the use of low-friction coatings, hence reducing the need for system access to re-apply lubrication.

2) External drivers and influences include:

    a. Legislative changes: for example, the Work at Heights Regulations 2005, the Confined Spaces Regulations 1997, and the Pressure System Safety Regulations 2000 which have all increased the time it takes to complete tasks, and hence put pressure on costs
    b. Benchmarking comparators: for example, shared learning through the International Transmission Operations and Maintenance Study (ITOMS), including other companies' research and development findings such as the development of our remote condition monitoring of assets.

Over the T1 period, we have seen increases in the volume of inspections and repairs as well as maintenance work that we are delivering in comparison to the start of the T1 period. Alongside this, we have achieved a reduction in the cost of these activities due to increased productivity within our operating teams.

This is evident in our reducing unit cost in our two main categories of activity, repairs & maintenance and inspections, which represent 80% of our cost base over the first six years of T1. During this period, we have increased our productivity whilst ensuring our maintenance compliance is fully compliant to policy.

Figure A14.17.5: Average underlying unit cost of inspections, repair and maintenance over T1 which shows a reduction across T1 which is now embedded within our T2 submission[4]

Since the commencement of the RIIO-T1 period, we have made significant changes to how we work. These have all contributed and enabled us to improve our ability to maintain our assets in a more efficient manner. Some of the key changes to note are:

1. Introduction of analytics software Tableau. This has provided greater visibility of expenditure to our operational staff at a level of detail they recognise, enabling improved cost control and performance management.

2. Continuous assessment of how we work, searching for opportunities to reduce the costs of maintenance and repair activities. An example is our use of Mobile Elevated Work Platforms (MEWPs) as the best practice method on an increased volume of work instead of using scaffolding.

3. New 'ways of working' agreement with our operational teams to drive productivity in T1, the aim of which is to increase the number of productive working hours. Two key components of this are:
    - Targeting a reduction in travel time of more than 100 hours p/a across c.990 employees
    - Incorporating a 'seasonal stagger' which allows for a 9.5 hour working day during the busy summer period. This is widely recognised as the best pattern for high productivity and will allow us to maximise the amount of work we can deliver.

4. Introduction of Single View of the Plan (SVOP) to show all work delivered by National Grid departments on an interconnected system. This allows for greater bundling of our workload to decrease the volume of system access requirements.

5. Creation of a Quantity Surveyor role to drive efficiency through enforcing common working practices, defined goods and materials schedules and effective use of our purchasing arrangements to drive down third-party cost, lowering the unit cost price further.

[4] Note: severance costs have been removed from T1 cost for underlying view. Numbers reconcile to BPDT C2.20 – C2.24 with capex element removed.

Our T2 plans

The plans we have built for the T2 period can be split into two main sections – the underlying activities to maintain the network and the new activity drivers that we are forecasting will impact the direct cost base in T2.

Our underlying costs are underpinned by asset policy and the workforce required to deliver the prescribed activities. Our workforce also needs to be sized and trained accordingly to ensure that, in the event of an emergency event, we are equipped to respond and resolve the situation.

Our operating structure focusses on minimum resourcing levels required to deliver our emergency "Black Start" obligations alongside delivering policy-driven maintenance efficiently. This requires a resourcing level with the technical ability to ensure the smooth restoration of power in the event of a power outage either on part or all the network. Therefore, our resourcing levels are defined by emergency restoration obligations and delivering maintenance commitments efficiently.

There is currently a difference in the number of employees needed for "Black Start" obligations versus the number needed to carry out our maintenance. By resourcing up to the level where both objectives are met means we create additional capacity for our salaried, trained and skilled staff to support capital investment projects and our unlicensed business.

There are six cost drivers in the direct opex cost base in T2:

T2 cost driver	T2 £m impact average p.a.
Western HVDC link	[redacted]
Operational rents	0.7
Condition & system monitoring	1.0
Site and civils	[redacted]
Vegetation management	[redacted]
Physical security	1.9
Total average p.a.	**10.2**

o Western HVDC link - average £[redacted]m p/a across T2:

The Western HVDC Link is jointly owned by National Grid (68.8%) and Scottish Power (32.2%). It comprises a 420km HVDC cable which is predominantly submarine.

	Average T2 Cost
Post burial seabed survey	£[redacted]m
Seabed leases / monitoring	£[redacted]m
Converter station maintenance	£[redacted]m
Site specific costs	£[redacted]m
Subsea cable repairs	£[redacted]m
Total	**£[redacted]m**

One of the most significant costs to be incurred on the Link is the carrying out of a post burial seabed survey. The survey needs to be performed every other year to ensure adequate burial has been maintained and mobility of the seabed has not impacted the cable. The first survey is taking place in 2019 with the second survey due by 2022. The survey scope has been developed in conjunction with expert industry consultants and has been optimised to minimise cost and manage exposure to project risk from weather. The post burial seabed survey has been mandated by the manufacturer as a requirement in order to ensure a level of 15 year warranty cover for the cable. The other assets have warranty cover of 5 years.

We have included in our T2 plan this survey at a cost of £[redacted]m which is incurred every other year, with the first year being in 2019/20 (average over T2 is c. £[redacted]m per annum). This cost assumes a minimum requirement of two passes, the second being more detailed pass where anomalies have been identified. We have also included an annual cost of c. £[redacted]m for seabed leases and monitoring.

In addition to the above, there are further activities such as maintenance of the converter station, where we are in the process of negotiating contracts with third party service providers worth £[redacted]m per annum. Furthermore, we have included costs of £[redacted]m per annum reflecting site specific costs such as additional electricity consumption and other utilities at the site.

With the customer in mind, we have optimised our plan to minimise the cost of maintenance. This includes insourcing as much of the standard maintenance activity that we can. We have absorbed the associated labour cost of this maintenance (equivalent to circa £[redacted]m per annum), by planning to perform the maintenance by leveraging the skills within our existing work force.

As we currently undertake the first subsea survey, we have already identified areas where the cable has become exposed. We anticipate this scenario to replicate every other year, which is largely a reflection of the fishing activities within the vicinity of the cable. We are in early discussions with third party providers on the cost of such remedial work, and have therefore estimated a cost of circa £[redacted]m per annum on the basis that we need to perform some repairs three times over the T2 period (each time the survey takes place), with the assumption that repairs only take 3 days each.

Inherent within our submission for these costs are two key risks. The first is the cost of any repairs outside of the warranty period on land assets. The value of this work is unknown and hence we have omitted any costs for this activity. These costs will likely be incurred in FY25 and FY26. Secondly, the other risk which we accepted within our plan is the risk of whether the insourcing approach to maintenance breaches warranty conditions. If this does, we may incur additional cost sourcing third party maintenance providers. Should either or both of these risks materialise, these would add to our efficiency challenge we have applied to our cost base.

- Operational rents - average £0.7m p/a across T2:

Operational property rents relate to leases for sites such as substation leases. There are currently 112 rental agreements in place for existing assets, the rental for which is typically driven by property value, and over recent years this has typically resulted lead to rental increases over and above general inflation.

We have forecast that the operational rents will increase by £0.7m over the T2 period as rental agreements require refreshing. Historically, property values and associated rents have only trended upwards and we expect this trend to continue. There is currently no indication that this is going to change over T2, even when considering implications from wider macro-economic factors e.g. Brexit. We have therefore factored in an increase based on the historical trend within our T2 plan.

We also maintain operational rent agreements with landlords, and agree annual payment plans in order to secure access to our sites for maintenance purposes. In arriving at our T2 submission, we recognise that these agreements need to be renegotiated, and that during these negotiations we will be exposed to risks such as

some of the landlords being members of a collective group; current rental rates paid may be outdated; some leases have already expired where only pepper corn rents were paid; as well as certain properties and land are being marketed for sale and therefore we expect new owners to enforce a higher rental requirement.

- Condition and system monitoring - £1.0m increase to T1 average:

Condition monitoring (£0.5m increase to T1 average)

In addition to routine inspections we carry out regular Site Condition Monitoring Surveys of the main substation plant using non-intrusive tools such as Thermal Imaging, Radio Frequency Interference (RFI) monitoring and Dissolved Gas Analysis (DGA). We introduced this practice in T1 and have been learning from and adapting to the challenges we face to embed this within our processes and business as usual activities.

Our plan for T2 recognises that benefits on monitoring the condition of our assets performance to help identify symptoms before assets fail, and therefore, we have included a proposal to increase this capability in response to specific changes in our asset portfolio.

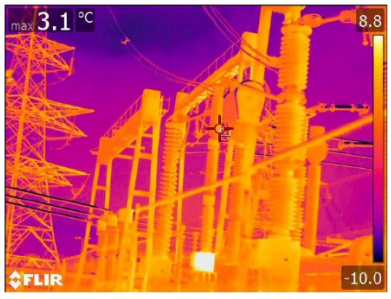
For example, as we have increased the use of non-oil impregnated cables over cables with oil-based insulation (and are forecasting a further £300m within T2), we need to adopt Partial Discharge (PD) monitoring instead of Dissolved Gas Analysis. Our approach for T2 is to deploy PD monitoring as an established and effective technique to detect defects in non-oil impregnated cables and this technique is to deploy this capability for post-commissioning checks, finger-printing, periodic routine inspection, defect management and end-of-life assessment of non-oil insulated cables.

We also recognise that we should periodically monitoring our assets when its most relevant. For example, approximately 50% of the through wall/floor bushing population (approx. 1100 units) will be approaching latest onset of significant unreliability by the end of T2 with no established condition monitoring assessment method and therefore, our T2 plan contains a programme to establish a method and periodically monitor these assets to ascertain the health of the assets with a view to prevent wholesale replacement of bushings in T3.

We intend to use existing proven technologies to monitor other asset groups (not currently subjected to condition monitoring)) to capture asset health data upon its operation. For example, we intend to use online sensors (similar approach to online DGAs currently used on transformers) on other family groups, and these have also been factored into our T2 plan.

The benefits associated with this additional monitoring is anticipated to be realised in more accurately time asset replacement as well as more asset condition specific maintenance schedules. The full benefit is expected to be realised in T3.

Figure A14.17.6: **Example of thermal imaging used as part of condition monitoring strategy**



System monitoring - £0.5m increase to T1 average:

The accurate and dependable operation of Protection and Control (P&C) systems is critical to the reliable and safe operation of the Electricity Transmission Network.

P&C systems (also known as secondary equipment) are designed to automatically detect and isolate a fault from the network to prevent excessive damage to plant, injury to people and to minimise any impact on the operational integrity of the electricity Transmission Network. The risks associated with protection mal-operation include disconnection of healthy circuits, slow fault clearance, failure to disconnect the faulted equipment, cascade tripping, system stability problems and the possible disconnection of demand and generators from the Transmission Network and associated significant economic consequences for consumers.

The change in the network generation and load mix, is having a profound impact on the ability of some protection systems to function reliably. A protection coordination study across the transmission network is required to evaluate protection performance and take appropriate actions to mitigate identifies problems. This is crucial for integrating more renewable energy and achieving the 2050 net-zero target.

Most of the survey costs are for systems and new equipment which are captured within our capital plan, however there are some additional operational costs to support this activity which are included within our cost base. This includes two additional people for data collection and analysis, contracts with third parties for technical support and licenses resulting in £1m p/a in the T2 period.

- Site and civils – average £[redacted]m p/a across T2:

One of our key focus areas as an organisation is safety of our employees. As part of this, we are always looking for risks at our sites and how we could rectify these. An area of risk we will address in T2 is drainage and trench covers. We have many of these at our sites, some of which need replacing to ensure they don't give way. We are forecasting these to cost c£[redacted]m p.a. In addition, we are also looking at improving vehicle and pedestrian crossings on our sites and have included £[redacted]m p.a.in our submission for this activity.

- Vegetation management - £[redacted]m increase to T1 average:

Vegetation Management costs have been consistent throughout the RIIO T1 period with average costs of £5.11m per year. We anticipate that costs for this activity will increase throughout the RIIO-T2 period. This is driven primarily by two factors:

1. Restrictions applied to us - National Grid do not own the land over which our overhead lines system sails. The grantors who own the land restrict our ability to undertake optimum vegetation management plans over defined time periods.
2. Climate change – this has become a major factor recently where we have seen an increase in vegetation growth rates over the T1 period resulting in a need to cut more spans each year. We also recognise that the vegetation cutting schedule may become more volatile and peak in specific years of T2 depending upon specific weather patterns.

Currently, this activity is performed by an external third party, where at the outset of T1 we had fixed the unit cost of cutting "a span of vegetation" only allowing for increases in inflation. We expect issues identified in 1 and 2 above to be fully reflected within the cost of a new contract covering the T2 period, which will inevitably drive the up cost of this activity.

o Physical security costs - £1.9m increase from T1 average:

Many of our operational sites fall into the scope of the Physical Security Upgrade Programme (PUP), governed by the department for Business, Energy, and Industrial strategy (BEIS). Requirements arising from this programme have been a key driver of our activity both before and during the current regulatory period. In addition to capital cost enhancements, operating costs are incurred through

- 24/7 monitoring of Enhanced Physical Site Security sites including alarm and video signals through an ARC;
- Planned maintenance and 'fix on fail' repairs of Enhanced Physical Site Security equipment using ARC direct labour engineers backed by Enhanced Physical Site Security Service and Support Contracts with third parties;
- Management of communication infrastructure between ARC & Enhanced Physical Site Security sites.

Costs associated with these activities have steadily increased in T1 as more sites have been brought into the scope of PSUP requirements. Once all additional sites have been delivered we will provide Enhanced Physical Site Security opex activities to 35 Electricity Transmission sites. Our forecast costs of £3.4m per annum for the T1 period represents an increase on the average T1 costs, because of the steady increase in number of sites through that period. It assumes scale of economy savings through shared use of the ARC for Gas Transmission & Electricity Transmission regulated business, and Cadent Gas.

Supporting evidence

Our costs represent an efficient cost for the operational activities on the network, we validate this through external benchmarking, our own internal benchmarking and procurement strategy.

External benchmarking - ITOMS

Since 1994, we have been engaging in external benchmarking activities comparing our costs and maintenance activities with organisations across the globe. Benchmarking is a licence obligation and the use of benchmarking to support continuous improvement is a feature in ISO 55001 "Asset Management", against which we hold accreditation.

Our direct opex is benchmarked via ITOMS (International Transmission Operational Maintenance Study), a closed confidential forum where more than 31 companies representing 25% of electricity transmitted across the globe can share information, practices, policies, processes and plans to compare efficiency, system performance and operational costs. The participants operate in diverse environments (regulatory, economic, environmental, etc); this diversity serves to benefit the group, as different companies bring different ideas and practices to the table which can be beneficial to all.

The ITOMS benchmarking exercise takes place every two years and is managed by a consultancy group called the UMS group, whose expertise lies in performance measurement of the electric utility industry. ITOMS benchmarks ~50% of our expenditure on inspection and maintenance activities, covering all of our major plant types with the exception of cables as most other participants have small populations. This survey removes non-comparable items of spend, such as maintenance of specialist security equipment and asbestos removal. Data is normalised for cost of labour, currency, categorisation of equipment, and any other variables to ensure valid like-for-like comparisons.

Results from ITOMS over the years have led to improvements in our processes and costs including:

- Providing input to maintenance policy reviews, which support the revision of intervention frequencies and work content; and

- The introduction of new technology to the UK, such as LineScout overhead line maintenance technology from Canada.

The benchmarking results (ITOMS 2017) show that while we do not have the lowest opex costs for activities, we consistently have higher than average reliability and better than average safety performance. The benchmarking places much of our plant and substation performance in the upper performance quartile of the benchmarking study, with one of the best participants in the study with respect to MWhr not served, i.e. one of the lowest levels of MWhr not delivered.

There are three areas where our cost benchmarked as high and performance as low. From our learnings in the study over the years, these are due to the following:

Circuit breakers - our maintenance philosophy is in-line with other leading utilities, however we operate circuit breakers over a life of typically 60 years and strive for an optimal whole lifecycle cost. Other networks have newer technology on their networks which require more frequent replacement (incurring capex). Our totex approach does require more opex as our workforce need to understand and maintain a more diverse set of assets but minimises total costs.

Rights of way - We are different to the majority of the ITOMS cohort due to historical practice established prior to privatisation. We have wayleave agreements to retain and operate overhead lines on third-party land for the majority of our network, whereas 90% of the peer group purchase rights of way (i.e. permanent rights over land). The wayleaves costs are opex but permanent rights are capital costs which explains some of the difference in cost performance in this category.

Instrument Transformers - We plan to improve the position in relation to Instrument Transformers through developing our asset management philosophy to move away from a predominantly reactive approach to a more proactive strategy, which we believe will bring us back in line with our peers in terms of performance and opex costs.

Internal benchmarking

As shown in some of the productivity improvements above, we have driven a culture of cost efficiency over T1 and built this into our plans for T2. We use our previous performance to benchmark our future plans and our reducing unit costs across our main activities and reduction of our underlying costs whilst ensuring maintenance compliance in all zones is 100% demonstrates this is effective.

To ensure we remain efficient throughout the price control we have embedded stretching productivity efficiencies which ensures our operational teams continue to exploit best practice and find efficiencies in our day to day activities.

Our pay and other cash remuneration has been externally benchmarked in preparation for our T2 submission and details of this study are provided in the Closely associated indirects efficiency section below.

Procurement strategy

We purchase goods and services as per negotiated contracts through our Global Procurement and National Contracts team. Where appropriate, reduction opportunities will also come from re-negotiations of contracts, for example splitting single multi-function contracts into separate bespoke supplier contracts. For more information on our procurement strategy please see annex NGET_A14.06_Delivering competitive value through Procurement

Closely Associated Indirects

The CAI costs in our business plan support our load and non-load activities without having a linear relationship to them. They include a broad range of teams including specialist engineers, asset policy experts, customer teams and a host of other costs including training and operational IT.

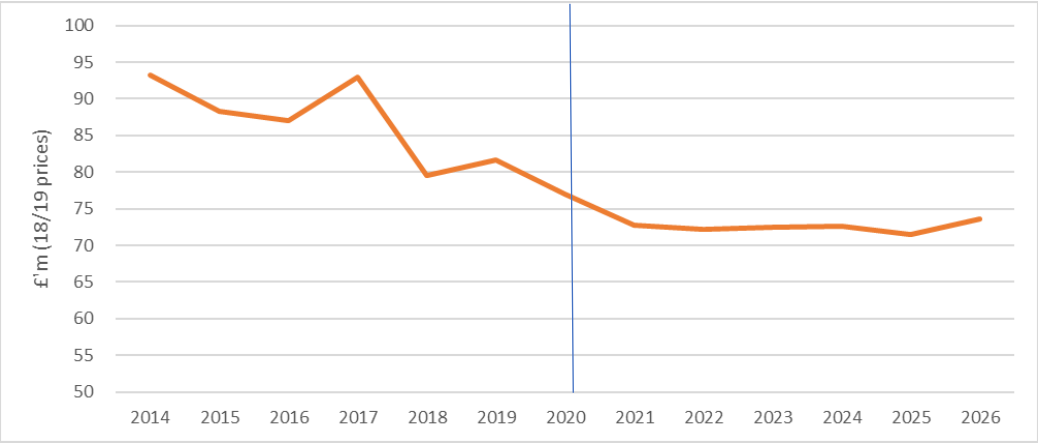
These activities are essential to the operating of our network and enable us to deliver for consumers and customers. Some of this expertise supports our capital projects and accordingly costs are treated as capex and form part of our unit costs. Here, we focus on the remaining opex costs.

A note on the Business Plan Data Tables (BPDT): The BPDT require gross CAI costs which include all the capitalised CAI. For this annex, which describes the T2 opex plan – we will discuss the net opex costs.

Overview & T1 story

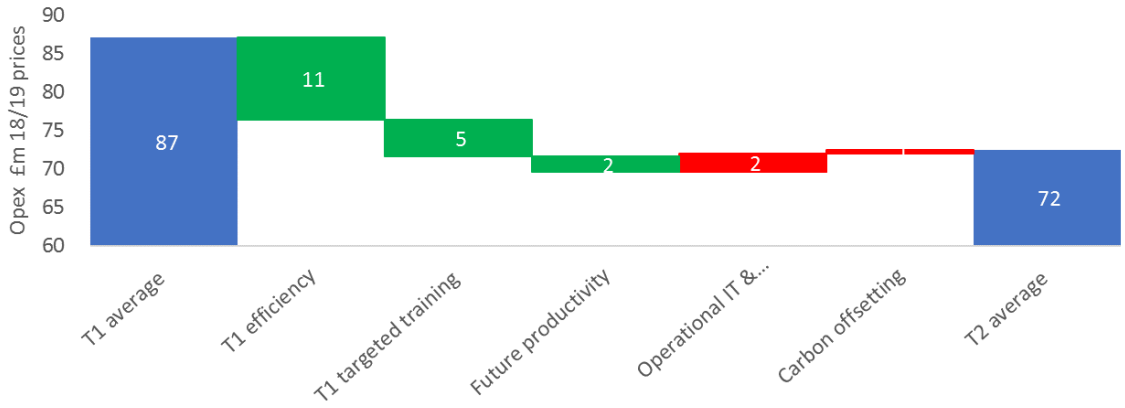
Our closely associated indirect opex costs are at their lowest point since the start of the RIIO framework and in T2 we are forecasting a 17% reduction from the T1 average.

Figure A14.17.7: Trajectory of CAI across T1 and T2



These is driven by three efficiency drivers; PEx value efficiencies forecast in T1, more targeted operational training and T2 future productivity. These reductions are partially offset by T2 cost pressures for IT and carbon offsetting:

Figure A14.17.8: Average CAI T1 to T2 shows net reduction of £15m p.a.[5]



The most significant element of our T1 efficiency story is our PEx Value programme that was initiated in 2018/19. We have already realised savings in creating this new structure and will continue to embed ways of working and supporting initiatives until the end of T1 to achieve the projected efficiency.

PEx Value was a step change in the way we manage our organisation

We took a zero-based budgeting (ZBB) approach, which focused on reviewing all non-operational activities and processes based on how they deliver for consumers and for what cost.

Criteria was established to assess each activity for consumer, customer, regulatory or legal requirement. Through this assessment activities which did not meet the criteria were stopped to release resource and where gaps were identified resource could be reassigned. This review of activities could then be translated into FTE requirements based on service levels and a new structure was designed.

This methodology was rigorous and standardised across much of our UK business, with cross-business and consultant challenge throughout. ET targeted a 30% efficiency through execution of this process, leading to a reduction of 329 FTEs from baseline to T2 structure.

PEx value has been a thorough process reviewing the entirety of our CAI activities. The final structure will be difficult for us to deliver and the remainder of T1 will be focussed on embedded working practices and new structures to ensure we are ready at the start of T2.

Organisational design principles:

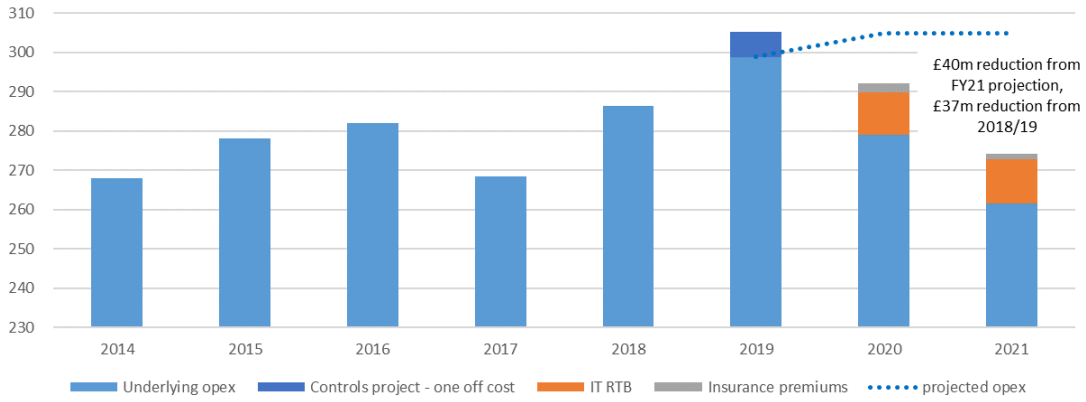
1. Put the customer at the heart of our business. Our Customer Solutions team was at the forefront of our design, and the resulting organisation is based not only on our internal view of requirements, but also takes on board customer feedback. The key piece of customer feedback addressed is ‘I don’t know who to talk to’. We have created ‘Sector Head’ roles, whose accountability it is to own the customer experience across our internal processes, giving customers a consistent point of contact and point of escalation, whilst retaining access to expertise throughout the various stages of a connection process.

[5] Note: Numbers reconcile to BPDT D4.5 CAI with capitalised CAI removed.

2. The approach to reviewing our processes and activities retained a key focus on increasing and improving efficiency, as well as minimising cost. We recognise the importance of continuously driving value for our customers and consumers which is a behaviour we continue to perpetuate into T2.
3. Compliance with industry standard spans and layers organisational construct, removing management layers and thereby increasing accountability and decision-making throughout the organisation.
4. We continue to review this through best practice however our costs reflect the post PEx value structure, there is a downward trajectory towards this efficient benchmark as we embed new ways of working and structures. Time bound roles support this, particularly in our strategy teams.

The total annual savings associated with the initiatives we identified through our PEx value review, including the NGET share of efficiencies from our shared services functions, are forecast to be £40m per annum from FY21 onwards. The scale of savings can be seen in our annual opex trace, once adjusted for one off costs in FY19 and the incremental costs of supporting new IT systems and a growing insurance premium our operating costs will be £37m lower than 2018/19.

Figure A14.17.9: T1 annual opex trace, adjusted for one off costs and upward drivers



The figure is lower in the waterfall in Figure A14.17.1 because the starting point is the average opex for the first six years of T1 rather than our forecasts for FY21 pre any efficiencies (which was the baseline for the PEx value savings).

Our T2 plans

Engineering support and network management covers the following CAI categories and represent most costs relating to our teams which support our operational and investment activities including Project Management, Network design & engineering, Engineering management & clerical support, Network policy and network planning.

Team overviews

Engineering & Asset Management (EAM) – *Ofgem RIGS category mapping: engineering management & clerical support, network design and engineering, network policy & project management.*

As ET's centre of excellence for engineering and asset management, the team is established to use of technical skills and knowledge to deliver solutions that meet the needs and expectations of our internal and external customers.

EAM will remain the epicentre for the establishment and development of new technology and new business ideas for the ET as positive 'disruptors' of BAU process. Examples include development of product options to help accelerate the EV market, and development of alternative connections into the NG system offering alternative connections than a DNO route.

We have reinforced our innovation and product development teams, who will continue to lead the way in the establishing and embedding this culture to serve our internal engineering practices and the emerging needs of the energy sector.

We have an organisation of multi-disciplinary teams under our *Asset Lifecycle & Engineering Services* teams, who create value by focussing on our engineering and asset management activities across the whole lifecycle; development and managing our policies, and ensuring we manage to those policies to balance cost, risk and performance of our asset base. Recognising the criticality of our asset data, we want to manage that data as an asset, and it will therefore be treated and valued as such.

Working across ET & Capital Delivery, our *Asset Assurance* team provides expert advice on the construction, design and management regulations. The team provides assurance to EAM and the wider business that assets are designed, delivered and maintained in line with ET requirements and relevant legislative standards.

Network Optimisation (NO) – *Ofgem RIGS category mapping: network planning and engineering management & clerical support.*

The organisation design provides streamlined investment, scheme development and planning capabilities that are aligned to customer segments and asset portfolios.

A single *Connections Investment* team split into Customer-aligned work streams develop effective, efficient investments that meet and align with customer requirements. Single point accountability takes investments through option selection, development and sanctioning.

A small, focussed and agile *Emerging Customer Drivers* team is tasked with quickly developing appropriate engineering designs which align with the customers' business model through use of innovative technology or design solutions.

The *Network Interventions* team ensures that National Grid delivers on its agreed network risk position and unit cost allowance, with Ofgem as its primary customer. Each team within Asset Investment is accountable for the delivery of a portfolio of asset strategies. This team will be the single point of contact for Engineering & Asset Management, agreeing new or revised asset drivers and supporting the asset health challenge and review process.

The *Delivery Optimisation* team has sole accountability to develop and optimise the overall system access plan. From this, the team will build detailed annual plans which bundle both investment and maintenance works for National Grid assets and those of our customers, in an effective and efficient way to maximise delivery opportunities and optimise critical resource utilisation. The team will carry out system studies and network analysis to ensure a credible overall plan position prior to handing over access requirements to the ESO. In tactical and delivery timescales, regionally-focussed teams will work closely with ET Operations, Capital Delivery and the ESO to finalise outage and critical resourcing plans and minimise churn.

Transmission Network Control Centre (TNCC) continues to support efficient management of system outages and real time customer interfaces. The control team is structured to provide resource and capability more aligned to business need, NG and our customers, for switching and safety activities, with rotas reflecting regular-hour peaks in demand.

Customer Solutions (CS): *Ofgem RIGS category mapping: engineering management & clerical support, network design & engineering and project management.*

We want to be our customers' Transmission Network of choice and we do this by demonstrating that the entire business is geared towards customer delivery. To do this we need to build our capability, improve engagement with our customers, differentiate based on service and ensure our services are understood and accessible to different market segments. We have organised our business around the needs of the customer and therefore created a new structure segmented by customer types. Multi-disciplinary teams have been created to align with these customer segments, such that people with the right skills and capabilities within National Grid can allow us to become our customers' Trusted Energy Partner.

The most successful engineering projects are driven by high levels of communications between disciplines. We have made some progress with the quality and timeliness of customer connection offers over the last year by bringing multi-disciplinary teams together for "offer creation workshops". To fully unlock the benefits of this approach however, we need an organisation which includes high-communication, multi-disciplinary teams focusing on the solutions to customer problems. Each customer segment team will therefore be served by multi-disciplinary teams, capable of working together for the benefit of customers.

As the customer facing part of Electricity Transmission, the team is also particularly cognisant of the feedback we have received from customers which tells us we are not agile enough in response to their needs. We also incorporate the feedback we have received from employees about having conditions which allow them to be as productive as possible. We cannot deliver a great customer experience unless we deliver a great employee experience. In response to this feedback, we have flattened our structure, in line with design principles, removing a layer of management to give employees greater space to act and make decisions that work for customers.

Strategy & Performance: *Ofgem RIGS category mapping: engineering management & clerical support*

A key driver for creation of this new, greatly reduced team, was to consolidate, rationalise and standardise our performance insight across ET. This team is crucial in T1 to ensure we achieve the forecast benefits from our PEx value programme. Our intention is to further reduce headcount in this area through exploiting the standardisation and automation of manually intensive processes, resulting efficiencies of which have been embedded into our T2 structure.

The *Cyber* team are a significant new capability that has been built as part of our new operating structure recognising the need to invest now to protect the network in the future. This enables us to develop and manage our cyber resilience in a centralised team which supports the UK business in demonstrating commitment to raising our cyber maturity and meeting our obligations on the new Security of Network and Information Systems (NIS) directive.

To meet these obligations, the Cyber Resilience team will set and lead our cyber plans, fulfilling our responsibilities to identify, protect, detect, respond and recover from cyber incidents. The team works closely with the EAM & Operations (Direct opex) teams to manager cyber risk associated with the Information & Operational technology assets. In addition, the team works closely with Digital Risk & Security to ensure ET's cyber plans and processes align with corporate standards.

Other closely associated indirect activities

Health & Safety

Our health, safety and environment costs remain flat from T1 to T2. An increase of £2.5m in the last year of T2 is proposed in the SHE costs of our business plan for offsetting our impact on the environment, this results in £0.5m average per annum increase in the previous waterfalls.

We will continue our work from the T1 period on reducing our capital carbon from construction with the ambition to achieve net-zero carbon construction by the last year of the T2 period. This approach aims to reduce carbon emissions as much as possible, through lean design techniques and low carbon materials.

We are on track to meet our 50% capital carbon reduction target during T1. Within the T2 period we are aiming for carbon neutral construction by 2025/26, by continuing to reduce the carbon intensity of our construction projects. Using our current estimates for T2 and the carbon impact of historically tracked schemes in T1, we estimate that our forecast £870m of capex in 2025/26 will equate to a maximum of [redacted] tonnes of CO2.

A value of £2.5m to offset these [redacted] tonnes of CO2 in 2025/26 has been estimated, using an approximate carbon price of £[redacted]/tonne of CO2 and assumes this offsetting is achieved through afforestation. This estimate is based on the average of two quotes, one from the Woodland Trust to purchase [redacted] trees to offset the [redacted] tonnes at £[redacted]m and the second from the carbon trust at £[redacted]m. It should be noted this is one option available to us for any offsets required and using a professional party allows a strategic approach to the country's afforestation plan. There are several variables including the carbon price and the number of trees required through this option.

Other offset options to afforestation, include reducing deforestation, supporting woodland management, energy efficiency projects and supporting community renewables. We are confident that as this forecast spend is in the last year of T2, by this point we will have better defined the chosen option and any associated costs. Our focus however will follow a best practice framework using a hierarchy which starts with the use of our own land in the first instance, then within the local communities impacted by our projects and then using national projects.

Operational Training

Our operational training costs relate to both the price of training as well as the time booked by employees when they complete a course. These costs have reduced by £5m from the average cost incurred to date during T1 due to a change in the way we manage operational training requirements.

This moves away from our traditional approach where all operational staff were trained in a wide range of activities to a more targeted training strategy focussing on requirements for specific roles. This reduces the overall activity cost of operational training and increases productive working hours in operations.

For more information on our people strategy for the T2 period please see annex NGET_A16.02_Workforce planning.

Supporting evidence

Due to the nature of our business, external benchmarks for the costs of our closely associated indirect costs are not available. Where possible we look to best practice to validate the size of the organisation and how it is managed, in T1 this has been through our PEx value project which has been a bottom up process to redesign our organisation in line with best practice principles (for more information see section above).

We can also benchmark against our historic performance; in closely associated indirects we have driven a 17% reduction from the T1 average and will continue to deliver efficiency through our productivity ambition as well as the business as usual totex incentivised cost focus.

A significant portion of our closely associated costs are driven by our people We test our pay deals against our peer group and regularly benchmark our employee remuneration to ensure it remains in line with the market. Our annual pay awards are benchmarked against those of network companies and other competitors in the skills market. We ensure that any deal we put in place with our trade unions or annual pay rise for managers is in line with our peers, so we do not fall out of step with the market but, equally, we do not become a higher than market payer.

From a broader benchmark perspective, we undertake periodic assessments of our total pay packages, with the latest review completed in 2018 by Korn Ferry (a people and organisational consultancy). We adopt a single pay framework across our UK regulated businesses. This means that all of our employee (both direct and support function) costs have been recently benchmarked. In summary, total cash remuneration was in line with median pay for a comparator of 130 entities in the utilities, oil and gas and chemical sectors.

IT opex

Our T2 plan includes spend of around £27m per annum on IT run costs to support our IT systems and infrastructure. We report our IT costs in both closely associated indirect and business support categories depending on whether they relate to the support of operational or non-operational systems, however as both types of systems are managed by our IT function and are subject to the same drivers in T2 we have combined these costs when discussing them here.

The costs of supporting our IT systems has grown through T1 as we have made investments in asset data management systems and built our capability to respond to an escalating cyber risk. Average spend for the early part of T1 was £33m per annum, however our IT costs are forecast to reach £49m by the end of T1 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 T2 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 T2 (see Business Support section for further detail).

Compared with the first six years of T1 spend, average IT costs for T2 will be £17m per year higher. There are three drivers of this increase:

- **Maintaining cyber capability**. Through T1 we have had to invest in systems and develop our capabilities to mitigate the increasing threat of external cyber attack. We will need to continue this capability into T2 as well as continue to support the investments we make to keep resilient to these threats. Our T2 cyber plans drive an average of £7m opex per year.

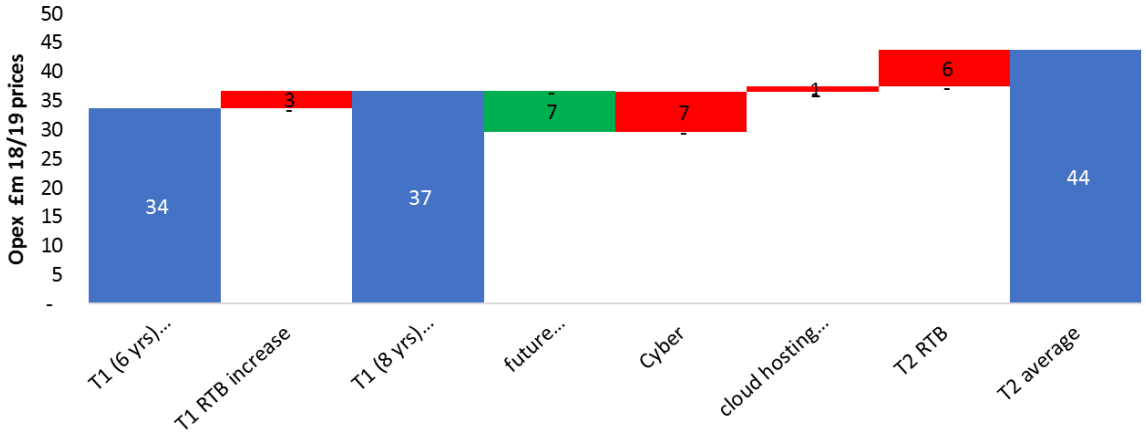
- **Cloud-hosting** In line with our IT strategy, we increasingly expect to move away from traditional built and owned capex solutions to more scalable and flexible cloud-hosted opex solutions, driving up opex costs but with a compensating reduction in our non-operational IT capex costs. We are primarily deploying these solutions in our shared infrastructure and hosting investments, and this will drive an additional £1m per annum of opex for the ET T2 plans.

- **Operating the systems that support business capabilities.** Our IT operating costs are growing at the end of T1 as we start to support IT systems such as those we are implementing to make our transactional business support functions more cost efficient. Including the two final years of T1, our average T1 IT opex costs are £3m per year higher than the average cost for the first six years (which is how RIIO-2 challenge group have asked us to compare operating costs). Further incremental support

costs are incurred as we deliver investments that support our business processes and enable our organisation to work effectively.

In delivering our IT infrastructure modernisation programme we will have the opportunity to rationalise our IT architecture so that we engineer lower running costs in the future. We are targeting IT cost savings in this area of £12m by the end of the T2 period embedding our 1.1% productivity target. The cumulative impact of this efficiency commitment means that, overall, IT operating costs fall year on year through T2 with our forecast costs for 2026 at £40m, compared with £49m in the final year of T1.

Figure A14.17.10 Drivers of T2 IT operating costs



More detail on IT strategy and key investments driving incremental opex costs can be found in our IT strategy in annex A14.08. IT Infrastructure Investment Decision packs are included as Annex A14.03 Hosting, A14.15 Business Services, A14.18 Enterprise Network Refresh and A14.19 Modern Workspace. Our Cyber Strategy is included as Annex A10.03.

We have tested the efficiency of our IT costs

We have modelled the incremental “run-the-business” costs (RTB) of supporting new investments in T2 based on our own historic analysis of the cost impacts in T1. Typical ongoing costs include ongoing help desk support, operational licences for users of the system, periodic software upgrade, cyber security and access management. The level of new RTB costs is dependent on the complexity of the IT and whether similar IT is currently supported. For example the introduction of a new system to our architecture will add materially more opex cost than the replacement of an exisiting system. Each project will vary, however for planning purposes our historic experience is that three classes of IT capital can be used to estimate the nature of future RTB costs.

Figure 28.10 Incremental IT run the business cost assumptions used in our T2 plan

Investment type	Definition	Per annum assumption
Run	Investments in systems used to continue running the business as currently structured	0.5% project value
Grow	Investments in systems targeted on growing business activities or capabilities	2.5% project value
Transform	Investments in systems expected to fundamentally alter the way we do business	4.5% project value

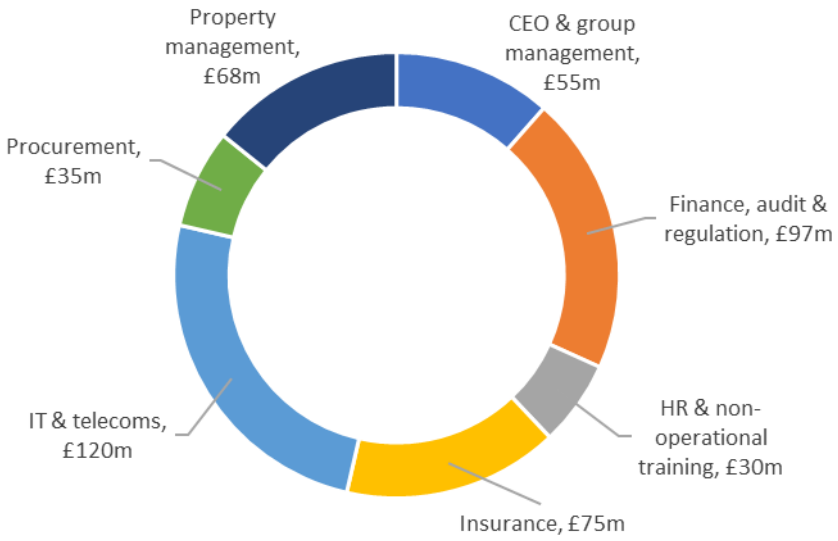
These assumptions include the compensating decrease in costs associated with the decommissioning of any existing system supporting the capability and are gross of any future productivity or efficiency.

The majority of run the business services are procured by third party service providers and are therefore subject to robust market testing. Taking into account contract extension periods, around 75% of our IT operating costs are contracted for the T2 period, giving us a high degree of certainty over our cost base.

Business Support

Our business support functions provide services such as IT, property management, HR and finance to all the National Grid Group businesses. They help with the delivery of our core activities, for example by procuring materials, helping us to find and retain our people, and managing IT systems. Our support functions also perform key business activities such as financial control, and legal compliance. We operate a shared services model for these functions, where a single function provides services across a number of National Grid group businesses. Each business takes a proportion of the shared costs and in doing so benefits from economy of scale efficiencies.

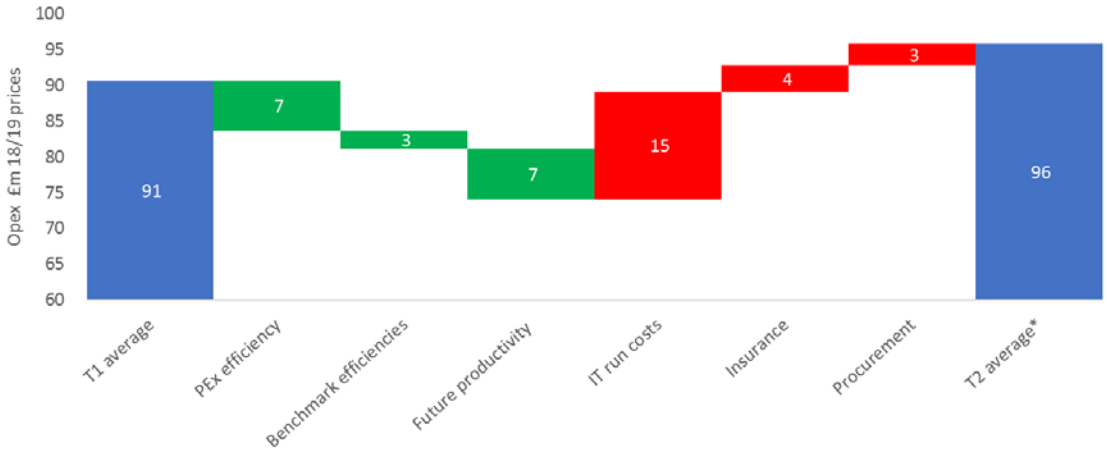
Figure A14.29.8 NGET allocated total business support costs for the T2 period[6]



The cost of most of the business support functions will decrease in the T2 period, thanks to the efficiencies delivered in T1 and our commitment to a 1.1% per annum productivity growth through the T2 period. However, overall business support costs will increase due to a higher level of regulatory and compliance activities than in T1, and an increase in the premiums we pay to insure our business. Business Support costs also include a proportion of the increasing IT operating costs mentioned above. Overall these factors will see costs increase by an average of £5m per annum when compared with the first six years of the T1 period.

[6] Total business support costs £481m, representing costs disclosed in table D4.6 plus business support element of T2 cyber IT opex disclosed in table D4.8b

Figure A14.29.9: Business support costs will increase by £5m per annum on average, due in the main to increasing IT operational costs



There are three key upward cost drivers of business support costs in our T2 plan:

IT run costs

£8m of the total IT cost increase (see IT costs section above) relates to non-operational IT and telecoms and is shown in business support costs

Insurance

Sustained losses due to events such as natural catastrophes, wildfires, etc are driving increases in insurance premiums globally. Whilst we insure our businesses via a captive insurer arrangement (where National Grid effectively self-insures) this arrangement can only mitigate some of the external pressures from the commercial insurance market. These pressures will drive an increase in insurance premiums of £3m on average through our T2 plan, compared with T1 average costs. We have tested the premiums offered by our captive insurance arrangement with those available on the commercial market to ensure that our costs are efficient, the results of this analysis is presented later in this section but in summary even with these increases we will be significantly below external benchmarks.

Procurement

As part of our PEx value work, our bottom up assessment of activities enabled us more granularly assess activities across the UK in order to identify where synergies could best be delivered. As part of this work, 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. Compared to an average cost of the first six years of T1,

our procurement costs increase by £3m due to this change. As set out in benchmarking evidence below, our procurement costs benchmark as better than world class, even once this increase is taken into account.

Our business support costs are tested for efficiency

We regularly use benchmarking exercises to test the value that our business support functions deliver. In testing the efficiency of the business support costs in our T2 plan benchmarking provides some information about the level of efficiency of our costs, however this approach does not wholly determine the efficient cost of the activities our support functions undertake to support our transmission business. For example, our IT spend as a percentage of revenue or number of IT users in the business will be higher than many companies because IT systems are integral to our operations, and because we face a higher cyber threat due to our role as an electricity transmission business. A pure benchmarking approach to determining efficient costs does not take into account the different extents in which businesses invest in support functions in order to drive lower cost in other cost areas.

We commissioned studies to test the efficiency of our HR, finance, audit and regulation, procurement, property management, CEO & group management and Business support IT costs. We did not include health and safety costs or insurance costs, as the varying levels of risk between businesses means comparisons are limited in these areas.

We invited The Hackett Group, a global business benchmarking organisation, to perform a high-level benchmarking assessment for our combined business support costs for electricity transmission, gas transmission and electricity system operator businesses. We asked them to compare our costs with those of similar-sized companies from outside the utility sector. This is because businesses in the utility sector are typically regulated and we wanted to understand the efficient costs of businesses in competitive markets. This approach was also consistent with how Ofgem benchmarked network business support costs when setting allowances in T1, however this approach means that, when interpreting the benchmarking results activities performed by us as a regulated entity that are additional to non-regulated businesses need to be taken into account, such as regulatory and critical national infrastructure compliance.

For our IT costs, we also engaged Gartner (an industry-recognised specialist in IT benchmarking) to perform a more detailed analysis 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 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.

Using Ofgem's business support function definitions, Hackett identified comparable activity categories within their database. We asked Hackett to compare our costs to as many companies from the group as Ofgem had used for T1 business support benchmarking for which Hackett still had current data, a total of 19 companies from across multiple sectors. Hackett performed the comparison to peer group using a single metric for each business support area, such as costs as a percentage of revenue, or cost per full-time equivalent (FTE) employee. Although this is a simplistic approach that averages out key differences (for example, how embedded IT is into an organisation's operations), it provides a reasonable foundation to start analysing and adjusting for more complex areas of our support costs. Hackett provided three measures to compare against;

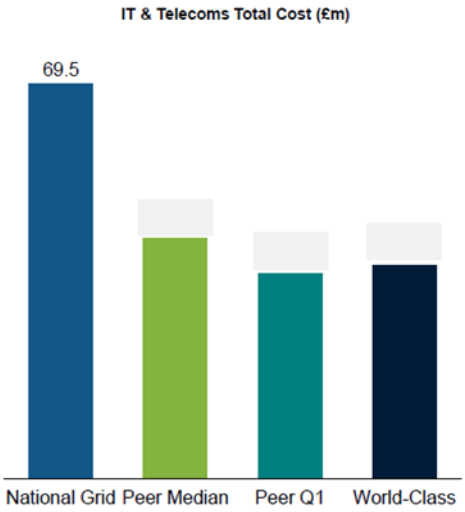
- The median cost of function from the comparator group
- The upper quartile cost of function from the comparator group

- The cost of function from world class performers – defined as organisations on a function level that are upper quartile in both efficiency of cost and effectiveness of delivery. World class metrics are taken from companies across different sectors and of different sizes

Benchmarking results

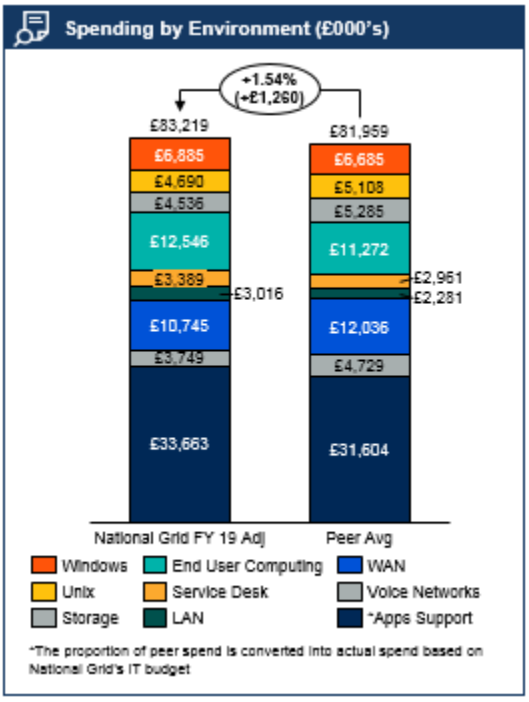
On a cost per end user basis, Hackett found our IT costs to be higher than those of similar-sized organisations. This is consistent with extent to which we use and are reliant on IT systems to operate and monitor the Gas and Electricity transmission networks which is independent of the number of IT users in our organisation.

Figure A14.29.10 IT spend/user for National Grid UK regulated businesses versus non-regulated comparator group and Hackett world class (extract from Hackett Group benchmarking report)



Gartner's more detailed analysis found that, after adjusting for levels of workload, our IT costs were in line with 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 T2 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 T2 period.

Figure A14.29.11 IT spend by activity for National Grid UK regulated businesses versus Gartner database (extract from Gartner benchmarking report)



For the other business support functions Hackett benchmarked, we forecast spend of £105m across the UK regulated businesses at the start of the T2 period. The equivalent median spend on these activities in the non-regulated peer group was £131m, meaning National Grid business support costs are 20% lower than median even before adjusting for activities not included in the benchmark (such as regulatory activities, and our obligations as operators of Critical National Infrastructure Sites).

Figure A14.29.12 non-IT business support costs for National Grid UK regulated businesses versus non-regulated comparator group median cost

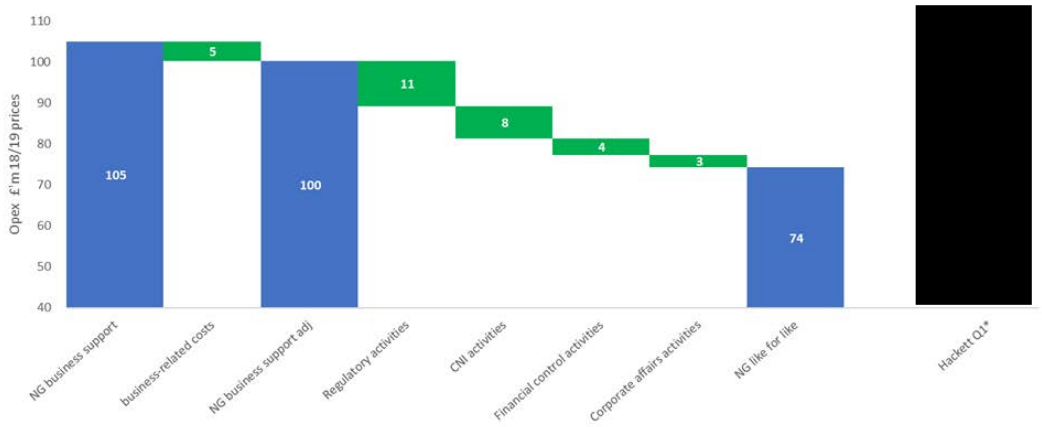
In the T1 price control, our business support allowances were set at the upper quartile efficient level, plus normalisations for activities not in the comparator groups or where we could show additional efficiency evidence

(for example that we spent a higher amount of money in a function in order to generate greater benefits elsewhere). We wanted to test the efficiency of our business support costs against this upper quartile cost view. Hackett caution that no company is upper quartile in every function, and that upper quartile cost performance may come at the expense of effectiveness, and so to account for this we also looked at the costs of functions Hackett defined as world class in efficiency and effectiveness.

The upper quartile efficient cost based on Hackett benchmarks was £[redacted]m. We used world class metrics for HR, finance and procurement functions; we rely on effective HR function to set and monitor our people strategy; effective finance and procurement functions supports the decision making and implementation of innovations that have reduced our capital costs through T1. The combined impact of using world class metrics for these three functions was £6m.

The combined costs of our UK support functions are £105m, excluding IT. After adjusting for the cost of regulatory and CNI-related activities that are not undertaken by non-regulated comparator businesses, our business support costs were £74m, 20% lower than the Hackett benchmark.

Figure A14.29.13 non-IT business support costs for National Grid UK regulated companies versus non-regulated comparator group upper quartile cost



*Upper quartile costs of comparator group adjusted for world class effectiveness costs for HR, procurement and Finance, Audit and regulation. NG business support costs of £105m excludes IT business support costs.

Normalisations

We identified four areas of activity that were not included in the comparator group costs and so required adjustment to reach a like for like comparison of costs:

Regulatory activities – we chose a non-regulated comparator group so that we could identify upper quartile efficient costs of companies operating in competitive markets, and because there are limited regulatory peers. In doing so, we need to add back the costs of operating in a regulated environment. We have a regulation team who support compliance with our licence obligations, submissions for price controls and other mechanisms within the framework. We also need finance and legal resource to support these activities and to prepare the annual regulatory reporting packs to Ofgem.

CNI activities – At some of our key sites we have additional requirements around repairs & maintenance and security costs. This is particularly the case at the locations where our Electricity and Gas system operator control centres are located. This is in part due to the fact that parts of these building house operational assets and CNI systems, requiring enhanced physical security measures. It

also drives a higher level of services for these sites, to support round the clock critical operations, in turn driving higher costs than typical non-operational office sites.

Financial control activities – As part of our ex-nationalised history, we continue to operate two defined benefit pension schemes for Gas and Electricity members. The level of governance and compliance required to manage these schemes so that its future liabilities can continue to be met without detriment to future consumers is greater than the defined contribution schemes that companies have typically moved towards in the last decade. As a US listed group we operate an additional layer of finance and management “SOx" controls. National Grid currently has 2 DB pensions schemes with Trustee’s this will be driving costs higher than comparator benchmarks given DB schemes are in the minority.

Corporate Affairs activities – National Grid is seen as a key public institution and faces greater scrutiny from the public than typical companies. Our corporate affairs and communications functions play a vital part in discharging that role, as highlighted with the August 2019 power cut, and we have higher than typical resource levels in this area to support with this role.

We performed a market testing exercise on our insurance premiums

We insure our businesses through our captive insurance company, wherever it is efficient to do so. Under this arrangement, insurance is provided by a licenced insurance company owned by the group, set up specifically to underwrite the insurable risks of our business operations. We periodically use external consultants to review the premiums considered achievable in the commercial market for our risks, and 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 Speciality, who estimated the commercial market premiums would be over 30% more than our proposed premiums for the T2 period. This equates to over £10m of savings to consumers for the five years.