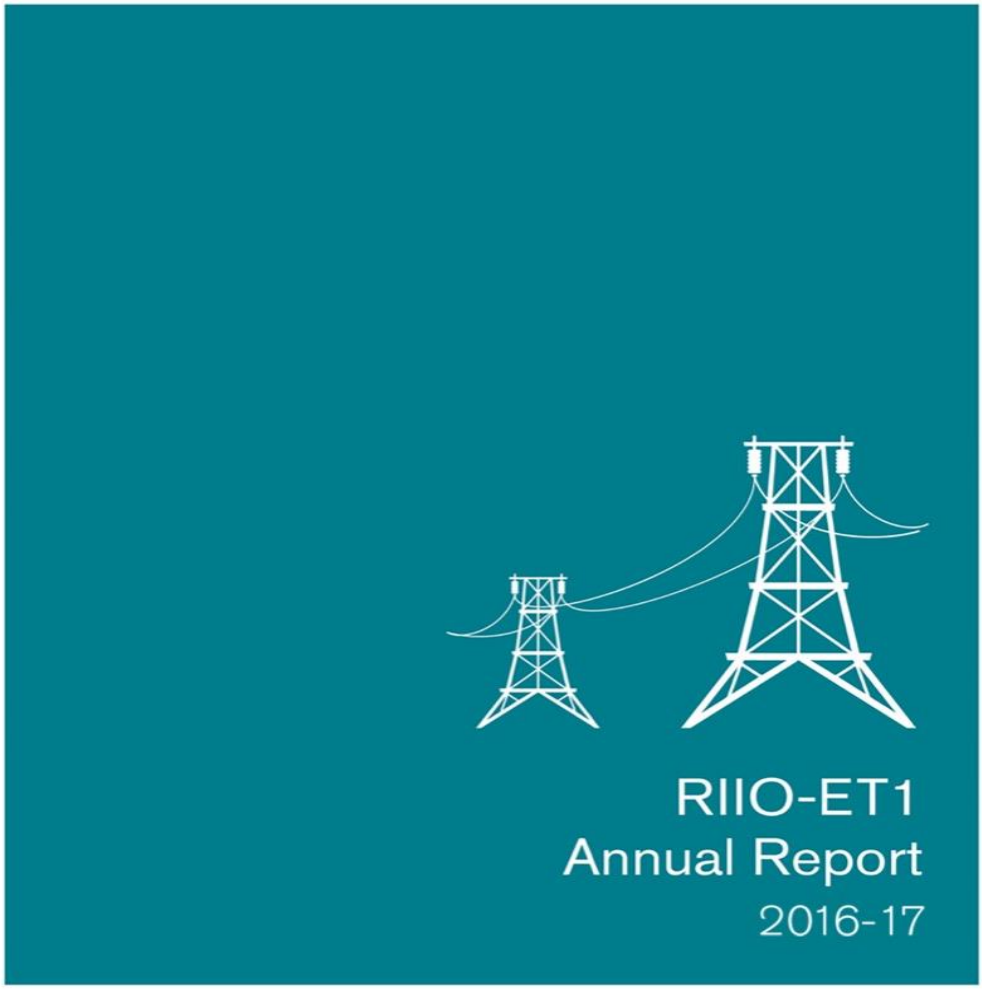
ofgem
Making a positive difference
for energy consumers



Publication date: 19 December 2017

Contact: Anthony Mungall
Team: RIIO Electricity Transmission
Tel: 0141 331 6010
Email: anthony.mungall@ofgem.gov.uk

Contents

Associated documents

Price Control Documents:
RIIO-T1: Final Proposals for NGGT and NGET - Overview
RIIO-T1: Final Proposals for NGGT and NGET – Outputs, incentives and innovation
RIIO-T1: Final Proposals for NGET and NGGT – Cost assessment and uncertainty
RIIO-T1: Final proposals for SP Transmission Ltd and Scottish Hydro Electricity Transmission

Transmission networks own reports on their performance:
NGET: http://www.talkingnetworkstx.com/general-performance.aspx
SHE Transmission: https://www.ssen-transmission.co.uk/media/2294/transmission-annual-performance-report-2016-17.pdf
SPT: https://www.spenergynetworks.co.uk/pages/transmission_annual_performance_reports.aspx

Other documents:
National Grid's deferral of RIIO-ET1 allowances
https://www.ofgem.gov.uk/publications-and-updates/modifications-et1-gtd1-pcfms-account-london-medium-pressure-refund-and-national-grid-voluntary-allowance-deferral

Mid-period review parallel work decision
https://www.ofgem.gov.uk/publications-and-updates/mpr-parallel-work-decision

Executive Summary

RIIO-ET1 is the first electricity transmission price control that utilises the RIIO (Revenue = Incentives + Innovation + Outputs) price control model. This report outlines our key findings of onshore electricity transmission sector performance under each of these areas for both the transmission owner (TO) businesses and the system operator (SO).

Performance against annual output targets

All TOs performed well against the agreed output targets in 2016-17. All have met or exceeded the annual targets set against five of the six output categories, namely: safety; reliability; availability; customer satisfaction; and environmental. Based on current information, only SHE Transmission will be penalised for not meeting their agreed target for reducing leakage of SF6 gas in the environmental output category.

The sixth output category is 'connections and wider works'. It has two elements related to the installation of new assets on the network to accommodate changes in electricity generation and demand ('load'). One element relates to the process of offering terms for connection to new users. All licensees are meeting their requirements to provide offers (where requested) in a timely manner.

The second element relates to providing network capacity to accommodate changes in generation and demand. As the output is heavily influenced by the scale of change in customer-driven activity, the expected output is based on the 'baseline' assumptions set at the start of RIIO-ET1 and then adjusted with actual outturn.

For NGET TO, the required output is expected to be significantly lower than the original baseline due to the reduction in the number and size of customer connections expected across the period. SHE Transmission is forecasting to meet and exceed its baseline levels, whereas SPT is currently expecting to fall short against its baseline expectations in relation to new generation connection ('sole use'). All three TOs indicate that whether the actual outputs are near, over or under the baseline level, their delivery are likely to be different from the project portfolio in their original business plans.

Eight-year expenditure performance and drivers

Total expenditure (totex) performance is presented across the entire price control period and combines 'actual' performance to date and the current company forecasts for the remainder of the eight-year period.

All of the TOs are currently expecting to underspend relative to their expected allowances, with forecast underspends ranging between 4% and 12% across RIIO-ET1.[1]

We have identified the factors that are contributing to the companies' totex underspend. We acknowledge that some of the forecast underspend is driven by the companies reporting a significant change in working practices and new ways of managing processes. We also note that an element of underspend will be driven by factors outside of the TOs' control, for example, the TOs have benefitted from a slower growth in input prices than anticipated relative to the RPI inflation index.

[1] The figures are based upon the TOs' published values.

At a company level, NGET (TO) is currently expecting to achieve significant underspend (over £1 billion, or 20% below forecast allowance) across the entire RIIO-ET1 period as a result of the net effect of re-scheduling of work and change in its intervention strategies to monitor, maintain and replace existing assets ('non-load'). On the load side of the business, a forecast underspend (c.£280 million, or 7%) is largely driven by changes in its portfolio of investment relative to the original business plan for the baseline and adjustment around it.

SHE Transmission's expected totex underspend (c. £180 million, or 6% below forecast totex allowance) is largely driven by the costs incurred in the delivery of the three Strategic Wider Works projects being lower than the original allowance – primarily the result of project delivery efficiencies reported by the company. It currently expects these savings to offset the overspend anticipated on non-load activities across the eight-year price control period (c.£100 million, or 33% above non-load allowances).

SPT's current forecast of totex underspend (c.£80 million, or 4% below forecast totex allowance) is driven by three main factors. First, there have been changes in the scope of works necessary to connect new generators to its network and increased capacity across some routes are no longer needed. Second, contracting techniques, particularly on large-scale projects. Thirdly, re-profiling of investment to manage network access and outage issues has led SPT to substitute equivalent asset types and volumes and to reduce its forecast spend.

NGET, in its role as SO, is currently expecting totex savings of £47 million (4% below forecast totex allowance) across the RIIO-ET1 period driven by an underspend in the area of controllable operational costs (c.£40 million). This is largely due to the expected expenditure increase over the next four years - reflecting enhancements to the SO's role - being lower than the forecast level of allowance over the same period.

Financial performance

The financial performance is presented using the Rate of Regulatory Return on Equity (RoRE) measure. Based on our own assessment of the value of TOs' forecast totex performance at the end of the eight-year period, we have calculated a current RoRE range between 9.3% and 10.1%.

Customer bill impact

The financial and output performance of TOs affects the Allowed Revenue that they can collect through customer bills. The performance in 2016-17 will impact on Allowed Revenue, and therefore customer bills, in 2018-19. We estimate that the average GB customer will pay c.£37 per annum (nominal prices) to cover electricity transmission network costs in 2018-19.

1. Introduction and context

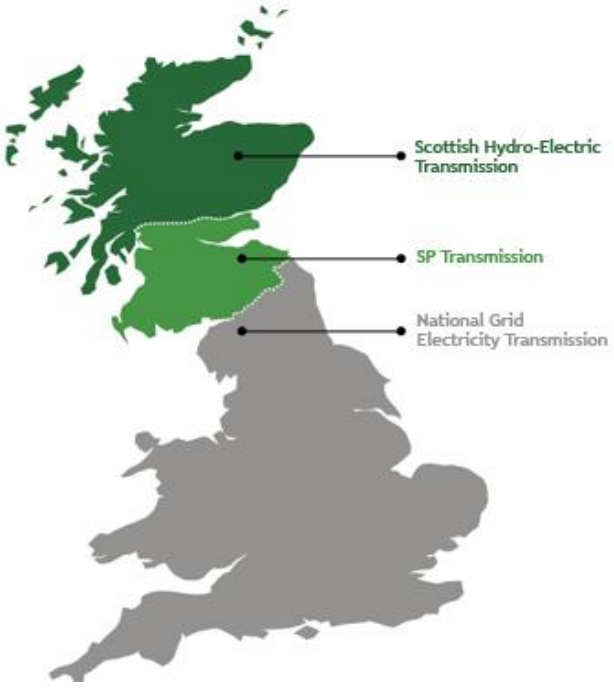
1.1. The electricity transmission network in Great Britain (GB) consists of the high voltage electricity wires and cables, which convey electricity from power stations to local distribution networks and large-scale customers directly connected to the system.

1.2. Owners of the networks have obligations including ensuring that they are able to provide an economic and efficient service to parties who wish to connect onto their network. This means having in place necessary new infrastructure or refurbish existing infrastructure appropriately to ensure its network is capable of transporting electricity at all times.

1.3. Three activities are crucial in providing a robust network: minimising the impact of construction activities to accommodate new generation and demand (to avoid unnecessary interruptions), good management of existing assets (to reduce the likelihood of failure) and, when there is a loss of supply, to ensure supplies are restored as quickly as possible. The challenge is to do this safely, effectively and at lowest cost to consumers.

1.4. The TOs are natural regional monopolies. To ensure value for money for consumers, we regulate TOs through periodic controls. Among other things, this determines the amount of revenue that TOs are able to earn from network users (through the charges users pay) and stipulates the level of performance we expect TOs to deliver. It also sets the framework for the capital investment they are able to make in maintaining and developing the networks. There are three onshore providers of electricity transmission services.

Company	Network	Ref. used in report
National Grid Electricity Transmission	England & Wales	NGET
Scottish Hydro Electric Transmission	North of Scotland and Scottish island groups	SHET
ScottishPower Transmission	South of Scotland	SPT



RIIO framework

1.5. To set our price controls we use the RIIO (Revenue = Incentives + Innovation + Outputs) framework. The current electricity transmission price control lasts for an eight-year period from April 2013 until March 2021.

1.6. At the start of the price control, we set the 'baseline' allowance that would determine the revenue that TOs can earn. The value of this allowance was based on knowledge of projects that were deemed fairly certain to proceed at the time of settlement. There are outputs associated with baseline allowances that TOs must deliver either on an annual or eight-year basis. The outputs are intended to capture the things most valued and needed by consumers.

1.7. Three main categories of allowances were set in the RIIO-ET1 price control:

- Ex-ante (upfront and fixed) allowance. This reflects areas of work where there was an established customer-driven need for the delivery of pre-agreed outputs (or works not linked to specific outputs because of their unique nature).

- Allowances driven by 'uncertainty mechanisms'. In some areas (like connecting to the electricity system), the future costs to be incurred and outputs to be delivered over the current RIIO period were uncertain and expected to evolve. To reflect this uncertainty allowances flex year-on-year, depending on TOs' performance against targets. The parameters of these mechanisms were agreed upfront.

- Where there is significant uncertainty with some investment projects, the individual schemes are subject to a within-period determination by the Authority. The most notable example is the Strategic Wider Works (SWW) process.

Annual reporting

1.8. Each year we report on how the onshore electricity transmission owners (TOs) have performed against the outputs and allowances set for the RIIO-ET1 price control. This is part of our annual process of monitoring network companies, and holding them to account for the money they spend and collect from consumer bills.

1.9. In July of each year, each TO must submit information to us that outlines the actual costs they have incurred up to 31 March of that year and forecast costs to the end of RIIO-ET1. They also provide a written commentary with further detail, including reasons for differences between costs, allowances and forecasts.

1.10. We analyse this information and examine any variation in TO performance against their annual and eight-year output targets. We also meet with the companies to discuss technical and financial aspects of their submissions.

1.11. This report outlines the company view of their eight-year performance against their price control obligations and incentives using data and supporting information provided by the companies.

1.12. The following chapters provide more detail:

- **Chapter 2: Financial information** – explains the financial aspects of performance; allowed revenue, RoRE and the impact on consumer bills.

- **Chapter 3: Outputs, incentives and innovation** – explains how the TOs have performed against their output commitments over the fourth year of the RIIO-ET1 period. It also indicates the incentive payments earned by the licensees in respect of their performance levels and presents an overview of TOs' expenditure in relation to the various innovation incentives.

- **Chapter 4: Eight year TO totex performance** - outlines the current eight-year view of TO totex as compared with the current company view of forecast totex allowances (adjusted for MPR and voluntary deferral where appropriate). The totex values are not adjusted for the current forecast "true up"[2] of allowances.

- **Chapter 5: SO performance** – provides information regarding the performance and costs incurred by the SO.

- **Appendices** – appendix 1 provides more detail on the current forecast company view of SHET and SPT. Appendix 2 provides more detail on the current company forecast of NGET TO. Appendix 3 summarises our assessment of totex values upon which our RoRE analysis is based on.

1.13. Unless otherwise stated, all financial values in this report are in 2016-17 prices.

[2] The original business plan included forecasts of the contributions expected to be received from customers with connections to single users. The net expenditure for these connections is funded directly by the customer and any income received by the TO is not treated as part of the allowed revenue permitted to be recovered through network charges. Final Proposals clarified that the position would be "trued up" at the end of RIIO-ET1. Our "true up" reflects the removal of actual "excluded services" income from total allowed revenue, and the expectation that the monies received by TOs through customer contributions will be paid back.

2. Financial information

Chapter Summary

This chapter explains how we determine the annual allowed revenue of each TO that can be collected through network charges. It also contains an analysis of how expenditure by the TOs impacts on customer bills.

Introduction

2.1. For each network company we report:

- their total controllable expenditure (totex[3]) on maintaining and improving GB's electricity transmission network infrastructure
- their Allowed Revenue for these activities[4]
- the impact of Allowed Revenue on customer bills
- an estimate of the associated return on regulatory equity (RoRE) for investing in the electricity transmission network.

Total controllable expenditure (totex)

2.2. For each year of the price control, network companies are required to report their actual totex, explaining their performance compared to the allowed totex and in relation to their agreed outputs annually.[5] They are also required to forecast their totex performance to the end of the price control.

2.3. As totex refers to total controllable expenditure, it comprises both capital expenditure (capex) and operational expenditure (opex). Therefore, network companies are incentivised to deliver outputs based on total whole life costs, rather than being driven to preferring either opex or capex.[6] This better incentivises them to select the best overall solutions for customers.

Actual and forecast expenditure

2.4. Table 1 details the cumulative company view of totex expenditure for each network company to date (the first four years of the price control) and the current forecast across the remainder of the price control period.

[3] Includes only controllable costs, excluding uncontrollable costs such as business rates, and licence fees.
[4] Allowed revenues are recovered from users of the transmission network through charges levied and collected by NGET in its role as SO on behalf of all TOs.
[5] For RIIO-ET1 the reporting requirements have been consolidated in Standard Condition B15.
[6] Historically capex solutions have been preferred, as the cost was capitalised and increased their regulatory asset value (RAV). Under the Totex approach, when a company spends money on a solution, the same percentage is capitalised irrespective of whether that solution involves opex or capex. This means that companies are more likely to use the overall cost-effective solution.

2.5. To date, all three TOs underspent against their totex allowances over the first four years of the RIIO-ET1 price control. The cumulative four-year allowance across all TOs was £9,868 million, and actual expenditure was £7,679 million; an underspend of £2,189 million, or 22%.

2.6. The NGET SO has a cumulative out-performance of 3% relative to its allowed totex across the first four years of the price control (£604 million).

2.7. The cumulative TO allowed totex over the entire price control (after the company's expectation of future revisions) is expected to be £17.5 billion. It is currently forecast that after all revisions the TOs will underspend by £1.67 billion (10%). The NGET SO is equivalently forecasting a total underspend of 4% relative to its allowed totex value across the RIIO-ET1 price control.

2.8. The values of allowed totex within our current financial model will differ from the network companies' published values.[7] This is because the published values reflect the outcome of the revisions to the allowed totex at the end of the eight-year price control period. The value of the revisions reflect forecasts of its performance for the remainder of the price control (2017-18 to 2020-21) based on their expectations. This includes estimates of volume driver allowances and expenditure as well as within period determinations (not yet approved). The financial model is not calibrated to be 'forward looking' in this way.[8]

Table 1: Company forecast of final allowed totex and expenditure[9]

£m 2016-17 Prices	*Cumulative to date 2013-14 to 2016-17*				*Eight-year forecast: 2013-2021*			
	Allowed Totex	Actual	Difference		Allowed Totex	Actual + Forecast	Difference	
	£m	£m	£m	%	£m	£m	£m	%
NGET TO	6,286	4,900	-1,386	-22%	12,119	10,684	-1,435	-12%
SPT	1,407	1,250	-157	-11%	2,177	2,095	-82	-4%
SHE Transmission	2,175	1,530	-646	-30%	3,225	3,044	-181	-6%
TO Total	**7,679**	**9,868**	**-2,189**	**-22%**	**17,520**	**15,364**	**-1,673**	**-10%**
NGET SO	604	585	-19	-3%	1,336	1,288	-47	-4%

2.9. Further detail on the TO forecast position across the RIIO-ET1 period is set out in chapter 4. Chapter 5 provides more detail on the SO expenditure against allowances for specific cost categories.

[7] The values also differ from our own assessment of the company submissions set out in appendix 3.
[8] Another source of difference will be small scale 'backward looking' adjustments for outputs incentive payments, innovation funding and other costs such as differences between previous years' Allowed Revenue and the actual amount that has been collected.
[9] Totex values are not adjusted for our current forecast "true up" to remove the gap between the allowance for excluded services income and the costs. The figures do include the impact of the MPR decision and voluntary deferral by National Grid (£480m in 2009-10 prices).

Totex Incentive Mechanism (TIM)

2.10. Network companies are incentivised to outperform their totex allowance. Through the TIM any underspend compared to the allowed totex is shared between the network company and its customers. Therefore, efficient spending leads to better returns for investors and lower network charges for customers. The totex incentive rate (TIR) is symmetrical for any overspends: a network company is exposed to any shortfall and the remainder is passed onto customers by increasing allowances to be recovered through network charges.

2.11. Table 2 sets out the values of allowed totex within the current financial model that are driving the allowed revenue calculations for each company. The combined allowed totex for the TOs in the reporting year 2016-17 is currently £2,573 million. Actual expenditure was £1,924 million; an underspend of £649 million or 25% (note that this is the figure before the application of the efficiency incentive rate).

Table 2: Pre-tax Totex in 2016-17

£m 2016-17 Prices	NGET TO	NGET SO	SHET	SPT	**TOTAL excl SO**
Allowed Totex	1,698	144	694	181	**2,573**
Actual Totex	1,116	162	462	346	**1,924**
Overspend / underspend	-582	19	-232	165	**-649**
TIR [10]	53.11%	53.11%	50.00%	50.00%	
Allowed Totex after TIR[11]	1,389	154	578	264	**2,231**

Allowed revenue

2.12. Allowed Revenue is the total amount of money that TOs can collect from customers through Transmission Network Use of System Charges (TNUoS). It is ultimately paid for by customers through their electricity bills. Actual totex and the TIM are two of the factors that impact on the Allowed Revenue a TO can collect.

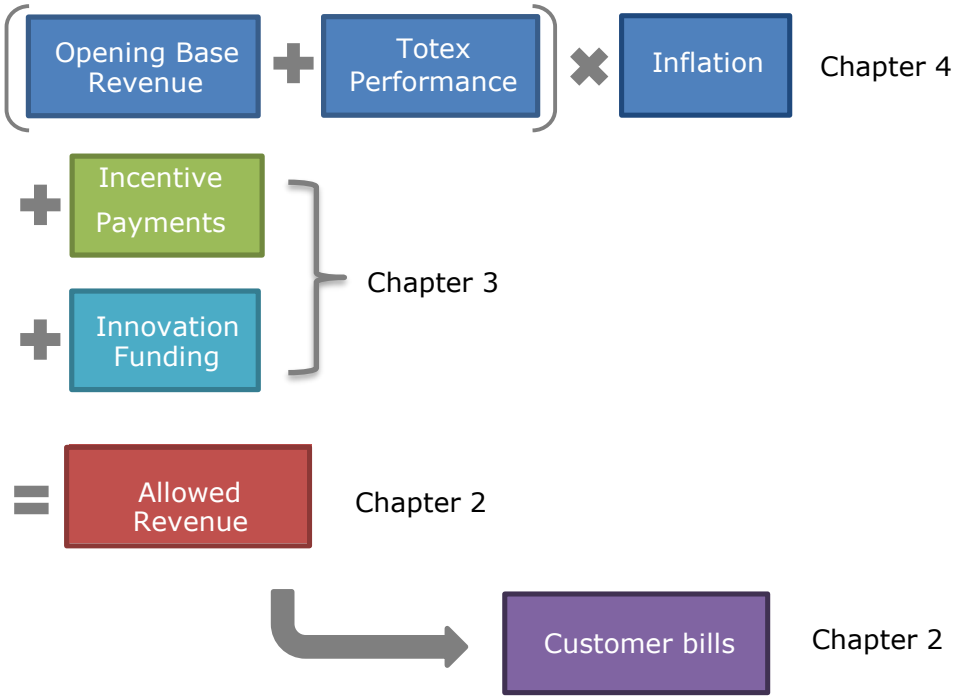
2.13. The process of reaching final Allowed Revenue was explained in detail in last year's annual report.[12]

2.14. Each year we calculate the Allowed Revenue that each TO can earn on its regulated business. To calculate the Allowed Revenue the ex ante forecast Opening Base

[10] This is the proportion of underspend / overspend the consumer receives (after accounting for tax).
[11] The allowed Totex after TIR is not wholly remunerated in the year it occurs. A minority of the expenditure is funded immediately through the Fast Money part of Base Revenue. The majority is added to the company Regulatory Asset Value (RAV), which is paid out over a period that is reflective of the average lifetime of long-term network assets (multiple decades).
[12] Appendix 1 of the 2015-16 report explains the Allowed Revenue process and Appendix 4 provides definitions of financial terms - https://www.ofgem.gov.uk/publications-and-updates/riio-electricity-transmission-annual-report-2015-16

Revenue is adjusted for a number of factors (see Figure 1). The main ones are: Totex performance, specifically the share of over or underspend borne by the company, discussed above; and incentive payments.

Figure 1: Simplified process for calculating Allowed Revenue



2.15. Allowed Revenue for 2018-19 is calculated following our price control Annual Iteration Process (AIP), which was completed on 30 November 2017. The AIP:

- determines the TIM reward/penalty based on the latest available actual spend
- accounts for changes to other factors that are updated, for example the allowance for borrowing associated with corporate debt, tax and updates through re-opener windows; and determines an annual modification term (the "MOD"), which modifies the Opening Base Revenue (set at the start of the price control).

2.16. Table 3 shows Allowed Revenue we have determined may be collected during the price control so far. This is presented in a consistent price base and is exclusive of the reconciliation of the revenue collection correction factor to improve cross-years comparisons of the consumer cost for the services provided. Also provided are details of what comprises Allowed Revenue in 2018-19. Note that minor constituent parts of the Allowed Revenue are still subject to uncertainty or are not forecast in advance.

Table 3: Allowed Revenue

	NGET TO	SHET	SPT
Allowed Revenue (exc. Revenue collection correction)	**£m 2009/10 Prices**		
2013/14	1,372	152	246
2014/15	1,464	192	276
2015/16	1,427	283	257
2016/17	1,411	270	252
2017/18	1,303	229	272
2018/19	1,291	244	275
2018-19 Allowed Revenue	**£m nominal prices**		
Opening Base Revenue	2,088	158	333
MOD	-408	102	-5
Non controllable Costs	3	-17	-3
Incentive Payments	10	0	6
Innovation Funding	14	1	2
TIRG	-	78	31
Correction Factors			
Revenue collection	-55	4	-1
Inflation forecast true-up	-8	-2	-1
Corrected Allowed Revenue	1,643	324	361

Customer bill impact

2.17. We have used assumptions consistent with those that underpin our Supplier Cost Index (SCI)[13,14] to provide an estimate of the cost to typical domestic energy bills due to Allowed Revenues for each region of GB.

2.18. Actual customer costs are sensitive to geographic region, meter type, consumption volume and the timing and duration of contracts. Our methodology is based on typical domestic consumption values (the median domestic consumer in GB). Individual consumer costs may differ significantly from these values. We report costs on an annualised basis using our latest assumptions[15]. The values we are reporting use our published typical domestic consumption values[16].

2.19. We estimate that the typical GB domestic customer will pay £37 in nominal terms in 2018-19 for electricity transmission costs.

[13] SCI: https://www.ofgem.gov.uk/data-portal/retail-market-indicators
[14] SCI Method: https://www.ofgem.gov.uk/publications-and-updates/supplier-cost-index-methodology
[15] We used the January 2017 version of our Supplier Cost Index model. Note that the SCI uses a consistent view of a typical consumer for all years, in recent years this consumption has been reducing. This and future trends in consumption are not accounted for by this analysis.
[16] https://www.ofgem.gov.uk/gas/retail-market/monitoring-data-and-statistics/typical-domestic-consumption-values

2.20. Charges differ considerably depending on the region that a consumer resides in. For a typical consumer 2018-19 charges are expected to range from £20 in South Scotland and up to £46 in the South East and South West. Bill estimates are reported in Table 4.

Table 4: Regional estimates of typical GB consumer cost to meet Allowed Revenue

£ nominal prices per typical domestic customer

Year	Apr-13	Apr-14	Apr-15	Apr-16	Apr-17	Apr-18
GB customer count weighted average:	23	27	32	38	38	37
Region						
North West	22	25	29	34	36	35
North East	18	22	26	40	35	29
Yorkshire	21	25	31	39	35	35
Midlands	24	28	33	38	39	40
East Midlands	24	27	31	38	38	37
South Wales	22	25	31	38	34	33
South West	27	31	34	41	45	45
London	27	30	36	39	33	36
South East	27	31	35	40	45	46
East Anglia	25	28	33	38	42	43
South Scotland	14	18	22	37	25	20
Merseyside and N Wales	23	26	35	40	40	36
North Scotland	9	13	20	35	37	34
Southern	28	32	36	38	42	43

Return on Regulatory Equity (RoRE)

2.21. We assess the overall financial performance of network companies using RoRE. RoRE is calculated post-tax and its estimation includes the use of certain regulatory assumptions, such as the assumed gearing ratio of the companies, to ensure comparability across the sector. To eliminate phasing impacts over the course of the price control, we use a mix of actual and forecast performance to calculate eight-year average returns. These returns may not equal the actual returns seen by shareholders.

2.22. For the TIM component of RoRE, we have used our own assessment of eight-year spend, based on information provided by the companies for the entire control period. We have included the company forecast impact of the excluded services income "true-up" which will occur at the end of RIIO-ET1, our Mid-Period Review decision and NGET's voluntary deferral. Tables A3.1, A3.2 and A3.3 in appendix 3 summarise the allowed totex and expenditure values for each network company used in our calculation.

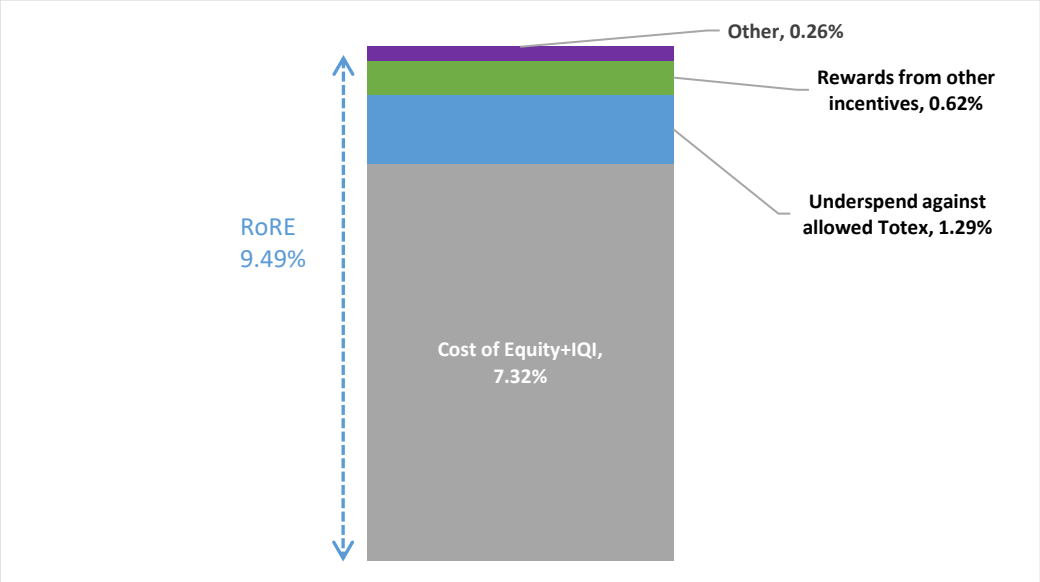
2.23. Our RoRE should be compared to the cost of equity allowed at the start of the price control. For Electricity Transmission, the cost of equity was set at 7.0%.

2.24. Returns are predominately driven by all TOs forecasting underspends through the TIM. A large portion of SHET's and SPT's return comes from the Transmission

Investment in Renewable Generation (TIRG) mechanism[17], where specified projects were incentivised at a higher pre-tax cost of capital, compared to current levels. All TOs have also gained through the incentive mechanisms.

2.25. The RAV-weighted RoRE across the sector is 9.49%, see figure 2 below.

Figure 2: RAV-weighted RoRE across the ET sector



2.26. There are a number of factors which are not reflected in our RoRE calculations, but which may impact the return realised by shareholders. We have not included the potential end-of-period clawbacks for under delivery on Network Output Measures (NOMs). The methodologies for these are still under development. Our RoRE analysis also excludes companies' actual debt costs relative to our regulatory assumptions, innovation funding, legacy assumptions from prior control periods and un-funded pension deficits. We may include some of these items in the future as we continue to develop our RoRE methodology.

2.27. Finally, we apply an arithmetic mean to calculate our 8-year average RoRE, rather than applying a geometric mean or weighted mean. While other averaging methodologies may better represent a long-term investment in a single company, our approach is consistent with how we informed our judgement on return on equity. For our RIIO-ET1 cost of capital decisions, we used the Capital Asset Pricing Model (CAPM) framework, which expresses the cost of capital as the amount needed to attract investment from a diversified investor that invests every year. The arithmetic average more accurately reflects this, and we are not considering a project return from a long-term investment in one particular company.

[17] Excluding TIRG Revenue reduces our assessment of NGET's return to 9.26%, our assessment of SHET's return to 9.85% and our assessment of SPT's return to 9.79%.

3. Outputs, incentives and innovation

Chapter Summary

This chapter examines TO actual performance in meeting their output commitments over the fourth year of the RIIO-ET1 period. This chapter also presents an overview of TOs' expenditure in relation to the various innovation incentives.

Outputs and measures of performance

3.1. RIIO-ET1 was set as an outputs-based price control. On output delivery, our assessment is against expectations set out in the licence and/or detailed in the Final Proposals (FP) document, including:

- targets which have associated rewards/penalty through incentives
- targets (and associated allowances) which adjust automatically with changing needs
- other expectations against which we hold TOs and SO to account.

3.2. The following seven outputs form the cornerstone of the RIIO price control framework[18]:

i. safety
ii. reliability
iii. availability
iv. environmental
v. customer satisfaction
vi. timely connections
vii. connection works and wider works

3.3. In this chapter, we focus on those outputs which are financially incentivised through rewards and/or penalties. We finish the chapter with an overview of TOs' expenditure in relation to the various innovation incentives over the RIIO-ET1 period.

3.4. Table 5 below provides an overview of output performance across all categories. Where outputs have multiple metrics, we present some quantifiable measures for illustration.

[18] Further detail of the outputs framework in RIIO-ET1 is available on the Ofgem website in the link: RIIO-ET1: Final Proposals for NGGT and NGET – Outputs, incentives and innovation

Table 5: Outputs and measures of performance

White: no financial incentive
Green: on target / ahead of target
Orange: partially missing target
Red: substantially missing target

Output requirement	RIIO measure	TO's Performance
i Safety		
Comply with Health & Safety Executive (HSE) law	To meet all safety legislation requirements.	**All met**
ii Reliability		
Minimise how much electricity is lost to our customers because of failures of the assets on the network Work is ongoing to develop the NOMs common methodology.	Targets[19] NGET: less than 316 MWh SPT: less than 225 MWh SHET: less than 120 MWh	**On target**
iii Availability		
Implement the Network Access Policy[20]	Implement and maintain policy.	**All met**
iv Environmental benefits		
Minimise SF6 greenhouse gas emissions Reward/penalty based on the non-traded carbon price for carbon equivalent emissions.	Limits NGET: 12,241.5 tCO2e SPT: 707.4 tCO2e SHET: 252.5 tCO2e[21]	**SPT & NGET:** below limits. **SHET:** exceeded the limit by 0.1%.[22]
Environmental Discretionary Reward (EDR) Annual funding of up to £4m will be available in each scheme year.	Performance band: SPT: Leadership NGET: Proactive SHET: Proactive	**Financial reward** SPT: £4 million NGET: None SHET: None
Publish annual progress on • **Business Carbon Footprint[23] and** • **Transmission Losses**	No financial incentive	**All met**
v Customer satisfaction		
Customer Satisfaction Survey (NGET only) and Stakeholder Satisfaction Survey	Targets • NGET Customer 6.9/10 • NGET Stakeholder 7.4/10 • SPT Stakeholder 7.4/10 • SHET Stakeholder 7.4/10	**Score out of 10** **NGET: 7.41** **NGET: 7.66** **SPT: 7.9** **SHET: 8.7**
Stakeholder engagement discretionary reward	Neutral point at 4.0/10; higher scores reflect positively on the licensees engagement strategy.	**Score out of 10** **NGET: 7.0** **SPT: 6.25** **SHET: 5.4**

[19] These target values are applicable in each of the eight years of RIIO-ET1.
[20] In June 2015 the Authority approved a single common NAP for Scotland, applicable to both SPT and SHE Transmission, and a separate NAP for England and Wales, capturing NGET's functions of SO and TO.
[21] The target for SF6 leakage increases as the number of assets on the network using SF6 increases.
[22] Although SHET has failed to reduce leakage rates to the pre-agreed annual limit, the reduction is a marked improvement on the previous year performance (exceeded limit by 22%).
[23] Total BCF (tonnes per CO2 equivalent) in 2016-17: 2,384,362, Total BCF in 2015-16: 2,911,307 Total BCF in 2014-15: 3,151,539.

vi Timely connections		
Send customer offers within 90 days The timely meeting of existing licence requirements in relation to delivering new generation connections & local demand connections.	Financial incentives apply to Scottish TOs only; no direct financial incentive on NGET as it is the contractual interface with all customers.	**All new or modified offers provided to customers within the 90 days.**
vii Connection works		
NGET (TO): Connection of new generation **Construction of new overhead line (OHL) to accommodate new customers**	• Baseline target: 33.7GW[24] • Current T1 forecast: 10.5GW • Baseline target: 215km OHL • Current T1 forecast: 41km OHL	**These measures are subject to company specific volume driver mechanisms. Further detail is provided in the appendices.**
NGET (TO): Construction of new super grid transformers (SGT) **Construction of new OHL to accommodate new customers.**	• Baseline target: 72 SGT • Current T1 forecast: 52 SGT • Baseline target: 27km OHL • Current T1 forecast: 5km OHL	
NGET (TO): Incremental Wider Works (IWW) to strengthen specific boundaries	• Baseline target of 23.05GW by the end of T1. • Current T1 forecast: 9.97GW	
SPT: New generation connections (MW)	• Baseline threshold: 2503MW • Current T1 forecast: 1634MW SPT is currently expecting the mechanism to clawback revenue as a result of missing the target.	
SPT: New network capacity (MVa)	• Baseline threshold: 1073MVa • Current T1 forecast: 3332MVa	
SHET: New generation connections (MW)	• Baseline threshold: 1168MW • Current T1 forecast: 1862MW	
SHET: New network capacity (MVa)	• Baseline threshold: 1006MVa • Current T1 forecast: 2518MVa	
Timely delivery standards for Baseline Wider Works (BWW) and Strategic Wider Works (SWW) BWW and SWW outputs specified in SpC 6I.	**SPT:** The Western HVDC undersea cable link is forecast to be delivered to a revised completion date. This is a joint venture with NGET. **SHET:** Of the three approved SWW projects, two have been delivered ahead of schedule. The third, Caithness Moray, is on schedule to complete in 2018. **NGET (TO)**: All BWW projects have been delivered, except for WHVDC. Three SWW projects are currently forecast to incur cost over the RIIO-ET1 period.[25]	**Further detail is provided in the appendices.**

[24] There has been a 23.2GW reduction against the baseline set by Ofgem, which was based on an energy outlook premised on the 2012 Gone Green scenario.
[25] The connection of the planned Hinkley Point C nuclear power station, the North West Coast Connnection at Moorside and Horizon nuclear at Wylfa.

Incentives

3.5. Table 6 below summarises the indicative revenue rewards and penalties accumulated to date over the first four years of RIIO-ET1 for the output incentive mechanisms with an associated annual revenue reward or penalty. There is a two year lag between a TO incurring a reward or penalty and the adjustment to its allowed revenue.

Table 6: Output incentive mechanisms – indicative cumulative revenue rewards and penalties for 2013-17[26]

	Cumulative reward or penalty			
(£m, 2016/17 prices)	NGET	SHET	SPT	Total
Total all mechanisms	**74.4**	**13.6**	**29.5**	**117.4**

3.6. So far, based on current indicative information taken from our price control model, the TOs have earned £117m of incentive payments for exceeding targets during the first four years of the control period.

Innovation

3.7. The RIIO innovation mechanisms encourage TOs to make innovation central to the transition to a low carbon economy.[27]

Network Innovation Allowance (NIA)

3.8. The NIA was established as part of the RIIO-ET1 price control. It is designed to fund smaller scale research, development and demonstration projects. The NIA provides each licensee with an allowance to spend on innovation projects in line with the NIA Governance Document.[28] This year all licensees have registered further NIA projects. Details on all the registered NIA projects can be found by following the footnote link.[29]

26 Figures are based on indicative estimates derived from our price control model and there will be differences with the values reported via the annual revenue returns provided by each company.
27 Changes to the NIA and NIC governance arrangements will be applied next year https://www.ofgem.gov.uk/publications-and-updates/network-innovation-review-our-policy-decision
28 The NIA Governance Document can be found here: https://www.ofgem.gov.uk/publications-and-updates/version-30-network-innovation-allowance-governance-documents
29 http://www.smarternetworks.org/

Table 7 – Company activity under the NIA

		Actual allowance claimed for the year (£m, nominal prices)			
Company	**Total number of projects since 2013**	**13-14**	**14-15**	**15-16**	**16-17**
NGET[30]	**173**	6.1	9.1	8.8	6.1
SPT[31]	**36**	0.6	0.7	0.8	1.1
SHET[32]	**27[33]**	1.2	1.3	1.1	1.2

Network Innovation Competition (NIC)

3.9. The NIC is an annual competition open to both electricity transmission and distribution companies. It provides funding to a small number of large-scale innovation projects. If successful, these projects should bring a wide variety of financial and environmental benefits.

3.10. In 2016, two electricity transmission projects were selected by us to receive a total of £23.6 million of funding. Further information on these projects is in our funding brochure[34] and the companies' full submissions published on our website[35].

Table 8 –Projects selected for funding in the 2015 NIC

Project Title	Lead company	NIC funding awarded (£m)	Total project costs (£m)*	Project end date
TDI 2.0	NGET	8.0	9.6	2019
Phoenix	SPT	15.6	19.9	2021

*Includes other contributions e.g. from project partners or the network company shareholders.

Innovation Rollout Mechanism (IRM)

3.11. The purpose of the IRM is to facilitate the rollout of proven innovations, which will provide long-term value for money to consumers, in advance of the next price control period. To qualify, rollouts must deliver carbon and/or environmental benefits and must not provide a commercial return for the licensee within the price control period. The next window for transmission licensees to apply for IRM funding opens in May 2018.

[30] NGET's Annual Summary of NIA Activity is available here
[31] SPT's Annual Summary of NIA Activity is available here
[32] SHE Transmission's Annual Summary of NIA Activity is available here
[33] SHE Transmission do not have a cap on their annual NIA allowance – they have a cap on their allowance for the whole price control period. Their spending against the cap will be reviewed by us at the end of T1.
[34] https://www.ofgem.gov.uk/publications-and-updates/2016-network-innovation-competitions-brochure
[35] https://www.ofgem.gov.uk/network-regulation-riio-model/network-innovation/electricity-network-innovation-competition

4. Eight-year totex performance drivers

Chapter summary

This chapter compares the TOs' forecast totex for the whole price control with the TOs' current view of the adjusted totex allowance. It also outlines our views on what is responsible for driving the current forecast of totex for each TO across RIIO-ET1.

Introduction

4.1. This chapter considers the TOs' forecasts of total expenditure across the eight-year control period, against the TOs' current view of adjusted totex allowance. Further details on the main components of totex: load related capital expenditure (LRE) and non-load related capital expenditure (NLRE), non-operational capital expenditure and operating costs (opex) can be found in the appendices to this document.

4.2. The TOs have revised their forecasts of allowances to reflect their own view of the operation of uncertainty mechanisms, the current levels of outputs and their current forecast of future outputs in the remaining RIIO-ET1 period.[36]

4.3. The totex values summarised in this chapter are not adjusted for the current forecast "true up" of allowances[37], to remove the gap between the allowance for excluded services income and the associated costs. The figures in this chapter are adjusted to reflect the impact of the Mid-Period Review (MPR) decision and the reported value of the voluntary deferral by National Grid (unless stated otherwise).[38]

4.4. We conclude the chapter with a summary of our high-level analysis of the drivers of the differential between the TOs' forecast total expenditure and their allowances.

RIIO-ET1

4.5. TOs are incentivised to outperform the RIIO-ET1 allowances as they retain a share of any underspend. However, the scale of underspend is currently higher than anticipated.

[36] TO adjustments, reflect changing circumstances. For example, downward adjustments may reflect a current view that certain outputs are no longer required or the licence target will not be met in the eight-year period.
[37] The original business plan included forecasts of the contributions expected to be received from customers with connections to single users. The net expenditure for these connections is funded directly by the customer and any income received by the TO is not treated as part of the allowed revenue permitted to be recovered through network charges. Final Proposals clarified that the position would be "trued up" at the end of RIIO-ET1. This will reflect the removal of actual income from total allowed revenue, and the expectation that the monies received by TOs through customer contributions will be paid back. For the avoidance of doubt, the approach applied in our assessment is a snapshot based on current information, the parameters of the actual "true up" to be applied is the subject of ongoing discussion between Ofgem and the network companies.
[38] For the avoidance of doubt, the values do not reflect SSEN's recent announcement. http://sse.com/media/485986/SSE-Interims-17_18.pdf

4.6. Based on the information provided to us through the 2016-17 regulatory reporting pack the TOs currently expect to receive £17.5 billion over the entire RIIO-ET1 period. This represents actual totex for 2013-17 plus a four-year forecast spend for 2017-21.

4.7. All TOs currently anticipate an underspend across the price control period (ranging between 4% and 12%). The combined value of total expenditure for the TOs across the period is currently forecast to be £15.8 billion; a cumulative forecast underspend of 10% (£1.7 billion). The variance between the TO's current view of costs and allowance across the entire RIIO-ET1 period is due to the following factors.

- The impact of National Grid's voluntary deferral and the MPR decision, reducing the size of the eight-year totex allowance relative to position reported in 2015-16.

- On the load-related (LR) side, as we move deeper into the T1 period, the range of volume driver mechanisms take effect by automatically flexing allowances to reflect the level of outputs required.[39]

- Also on the LR side, changes in the portfolio of investment relative to the original baseline plan and the TOs' response to the level of change is an important driver of costs being less than forecast allowance. In the majority of cases, the actual unit cost currently delivering outputs in the RIIO-ET1 period is seen to be lower than the unit cost adjustment for delivering an additional unit of the relevant output. Lower costs (below UCA) are mainly driven by reductions in the size of the connection, delays to projects beyond the end of the eight-year period, or where sufficient capacity or space at existing site exists. Based on current information, all TO's are expecting LR spend across RIIO-ET1 to be lower than the forecast level of adjusted allowances which were set on the basis of the portfolio of projects in the original business plans.

- On the non-load related (NLR) side, there has been considerable change in the timing, working practices and internal processes to monitor, maintain and replace existing assets applied by some companies. Much of this has been caused by their understanding of asset condition levels (relative to the business plan stage) and changes in external circumstances.

    - For NGET TO, revised understanding of asset conditioning has driven some of the forecast reductions in spend. Other drivers of the forecast reduction include some work being deferred (eg. some tunnel projects), the extension of asset lives[40] and a more targeted asset replacement approach[41].

[39] For example, SPT is currently expecting to fall short of its new generation connection originally anticipated (2,503MW) and currently expects the mechanism to 'claw back' allowance. In some instances, funding can also be triggered by events defined in the licence.
[40] For example, NGET reports some OHL conductor lives that could safely be extended.
[41] For example, NGET TO's has redesigned its refurbishment techniques to identify and replace parts that become obsolete whilst bay infrastructure and complex plant wiring is retained.

- For SHET the opposite holds true: revised understanding of asset conditioning has triggered additional requirements due to asset condition being worse than expected. As a result, SHET currently forecasts a cumulative overspend against allowance of c.£100 million across RIIO-ET1.

- For SPT, asset condition re-assessment is not a primary driver for expected cost reductions. The main reason for lower costs in delivery of non-load projects is the change to SPT's working practices associated with the procurement and management of capital delivery.

4.8. Table 9 summarises the current forecast performance position of each TO across the entire price control period. For comparison, the table provides our own assessment of the performance position. More detail on our assessment is available in the appendices.

Table 9: Totex expenditure vs adjusted allowed totex (£m)

2016-17 prices	*Current RIIO-ET1 company forecast totex view (company adjustments applied)* †				*Our RIIO-ET1 forecast totex view (pre true-up)*[42]			
	Allowance	Expenditure	Difference		Allowance	Expenditure	Difference	
			£m	%			£m	%
NGET (TO)	12,119	10,684	-1,435	-12%	10,982	9,744	-1,238	-11%
SPT	2,177	2,095	-82	-4%	2,176	2,091	-85	-4%
SHET	3,225	3,044	-181	-6%	3,155	2,977	-178	-6%
Total	**17,520**	**15,823**	**-1,698**	**-10%**	**16,313**	**14,812**	**-1,501**	**-9%**

† *The figures are based upon the TOs' published values. Actual Totex here has not been modified by underspend/overspend TIR.*

4.9. We have focussed our analysis on working towards understanding drivers of forecast underspend and whether we consider them to be attributable to the following three factors:

- **Efficiency:** reflecting genuine improvements in how things are being done, resulting from eg innovation and more efficient working practices.

- **External factors**: windfall gains or losses achieved by external factors outside of the control of network companies.

- **Provision in the price control settlement:** assumptions made within the RIIO-ET1 settlement that have varied against the actual position.

[42] Totex values deduct the TOs' current forecasts of costs and allowances we deem to be uncertain, including construction costs associated with the development of unapproved SWW projects and the licence term TPWW (NGET only). Totex values are not adjusted for our current forecast true-up but do include the impact of the MPR decision and voluntary deferral by National Grid.

4.10. We have been engaging with the TOs to understand their view of key cost drivers. Our views in the next section are based on our discussions with the TOs, and our current view on information submitted by them.

Input price changes (or Real Price Effects)

4.11. As previously highlighted, all TOs are forecasting an underspend over the eight year RIIO-ET1 period against their view of allowed Totex. The TOs highlighted operational and delivery improvements and technical innovation leading to cost savings. Changes in input prices are also a driver for some of the underspend.

4.12. In our Final Proposals (FPs) we acknowledged that several key inputs (labour, material equipment/plant) do not necessarily change in line with RPI and will not match main components of network companies' costs. To account for this differential between the economy-wide RPI inflation index and inflation on inputs, we provided an ex-ante allowance based on the Real Price Effects (RPEs) forecast.

4.13. The RPE values were different for each TO. It was then left to the network companies to manage any actual above inflation input price fluctuations. At this point in the RIIO-ET1 control period, the level of inflation has been below the level of the historical indices used when setting the ex-ante allowance. The current forecast view is that in total the RPE's will not reach the levels that were forecast in any of the TO's business plans, or in Ofgem's own forecast at the FP stage.

4.14. Based on current information, we estimate that TOs have benefitted from slower than expected growth in input prices by c. £800 million[43] (the counterfactual is full indexation of RPEs). We place this under the drivers of "external factors" due to lower than expected inflation.

TO performance insights

4.15. In this section we outline some of the key cost drivers outlined by each of the TOs.

SHET

4.16. SHET is currently forecasting to spend just over £3 billion by the end of RIIO-ET1. This represents 94% of forecast totex allowances. This totex underspend (c.£180 million) is driven by savings in load-related expenditure (LRE) which outweighs the expected overspend in both non-load related expenditure (NLRE) and non-operational capex across the RIIO-ET1 period.

[43] This calculation is the cumulative difference between the level of ex ante allowance in the FPs and the level of allowance that would be established if we were to base this on the TO's updated view of RPEs (a 'perfect hindsight' approach); c.£480m for NGET, c.£110m for SPT and c.£210m for SHET. This analysis takes no account of the contracting strategies applied by each TO or the impact of internal efficiency measures.

4.17. Controllable opex spend is currently expected to be on a par with the forecast allowance across RIIO-ET1.

4.18. LRE is currently forecast to be c.£300 million lower than forecast allowance. Approximately half of this underspend is directly related to expenditure on the SWW projects (capex lower than allowance by c.£140 million). This is due to phasing and project delivery efficiency savings realised on the Beauly-Mossford and Kintyre-Hunterston projects and anticipated savings on the ongoing Caithness Moray project. The remaining forecast LRE underspend is primarily delays in and/or cancellations to a number of connections and the associated reinforcement works.

4.19. On the non-load side of the business, SHET is forecasting an overspend against allowance of c.£100 million across the RIIO-ET1 period. The main reason for this overspend is that SHET now have better information on asset condition, particularly in relation to some large OHL schemes. These schemes now require major upgrades or complete rebuild in contrast to the scope of requirements set out in the business plan (which envisaged a simple like-for-like conductor replacement). Non-load investment has also been impacted by the delays and cancellations in the LR programme.

SPT

4.20. SPT is currently forecasting to spend close to £2.1 billion by the end of RIIO-ET1. This represents 96% of forecast totex allowances. This totex underspend (c.£80 million) is driven by savings in both LRE and NLRE which outweigh the expected overspend in controllable opex across the RIIO-ET1 period.

4.21. SPT currently expects expenditure on LR activities across RIIO-ET1 to be lower than forecast allowance by c.£60 million. This is attributable to several factors including those beyond SPT's control (ie. changes in customer-driven circumstance) and the impact on the associated infrastructure works required to facilitate increases and changes in demand and generation. This underspend also reflects the impact of the MPR decision which confirmed that a subset of works currently being progressed by SPT to deliver connection solutions is not suitable for funding through the pre-agreed mechanism.[44]

4.22. An important driver of net forecast underspend on the load side of the business is SPT's approach to the management of its capital delivery process. SPT has moved away from a 'turnkey' approach towards greater use of 'in-house' design and capital delivery management expertise. This has led to engagement with a broader base of contractors and a more competitive procurement process. This 'disaggregated' model is estimated by SPT to account for approximately half of the potential savings on the LR side.

[44] More information on this can be found in the MPR decision document.

4.23. A key example highlighting the positive impact of its approach to design and tendering of the works is the Series and Shunt Compensation project[45]. SPT reports that its approach enabled the procurement of a solution which required the installation of equipment at fewer sites and enabled it to deliver the required output at a lower cost (c.£43m, or 42%, below allowance).

4.24. On the non-load side of the business, SPT is forecasting an underspend of about 10% (c.£80 million). This underspend is reported by SPT to primarily be the result of a disaggregated investment model and the timing of supplier engagement (after our decision to fast-track) in the case of its overhead line (OHL) modernisation work.

4.25. A secondary driver impacting non-load investment is the level of customer-driven changes to its load-related programme, which are driving consequential changes in the assets requiring replacement through non-load work programmes. There are two factors that contribute to this aspect of non-load investment.

- **The scope of work has changed.** In some cases, SPT's asset condition assessment has highlighted that the replacement of some conductors can be deferred, reducing the scope of replacement works.
- **Decisions to re-profile investment** driven by the evolving picture of generation connections and the ongoing challenges associated with obtaining the necessary consents.

NGET (TO)

4.26. NGET TO is currently forecasting to spend £10.7 billion by the end of RIIO-ET1. This represents 88% of forecast totex allowances. This totex underspend (c.£1.4 billion, or 12%) is driven by savings across LRE, NLRE and controllable opex across the RIIO-ET1 period. These figures include the impact of the MPR decision and the reported value of the voluntary deferral by National Grid.[46]

4.27. NGET estimates that LRE is lower than forecast allowance by c.£280 million. This cost reduction is due to several factors, summarised below.

- New connection projects which have a unit cost lower than the level to which the mechanism was originally calibrated.
- Refinements to reduce the scope of works to facilitate transmission connections. An example is the Kings Lynn B connection where an optimised substation design

[45] Boundary B6 is the boundary between SPT in southern Scotland and the NGET system in the north of England. The reinforcement of the boundary is being realised by the completion of two complimentary projects: (a) Series and Shunt Compensation; and (b) East-West 400kV Upgrade.
[46] Excluding the value of the voluntary deferral from NGET's forecast allowance from our analysis (ie. not deducting c£590m from the forecast eight-year allowance value) increases the level of totex underspend to c.£2billion, or 16%, against the adjusted allowance across RIIO-ET1.

avoided expenditure on additional bays and circuit breakers (estimated £25m savings).

- The change in the number and location of connections have led the energy background to evolve in a different way to that originally anticipated. In some cases, this has led to an increase to the boundary capacity provided by investments, the majority of which were not included in the design of the RIIO-ET1 arrangements. For example, the Fleet-Lovedean reconductoring project was not included in the baseline because it required other reinforcements to be undertaken first. However, higher than expected levels of new interconnectors and generation has changed this. This work provides 1780MW for a cost of £38m.

- Targeting of critical elements of capital projects to provide an uplift in transmission capability more quickly. For example, NGET progressed one element of the proposed Eastern HVDC link in its own right - a 'turn-in' at Hawthorn Pit - to provide 1650MW boundary capacity and a saving of c. £130m.

4.28. On the non-load side of the business, NGET explains that the level of underspend (£1.1 billion[47]) is the direct result of developments in its intervention and asset condition strategies. The range of factors driving this cost reduction include the following.

- **Revised understanding of asset condition** through introducing developments in IT and internal asset management processes. For example, NGET explains that it now better understands the deterioration of its transformers, and subsequent refinements to the replacement plan, coupled with a bulk procurement strategy, drive an estimated c.£260 million of efficiencies.

- **Changing asset intervention plans.** An example is in the area of protection equipment. NGET describes an approach, in which it targets replacement of higher-risk, life-expired components (eg fault detection relays), while retaining lower risk, reliable infrastructure (eg fixed wiring). NGET estimates that such strategies will deliver c.£170 million of savings compared to forecast allowances.

- **Delivering work in different ways that are significantly different to the working practice and processes underpinning the original business plan**. This area involves targeted efforts to reduce the scope of delivery and methods of working to reduce time and cost (ie minimise outages). An example is NGET's targeted bay replacement approach. NGET estimates that, in this example, a saving of c.£80 million has been achieved by moving away from the "traditional" approach (replacement of the entire bay including the switchgear). This and other similar strategies are estimated to reduce costs - due to material reductions in the scope of work envisaged in the original settlement - by over £200 million across the RIIO-ET1 period.

[47] £1.5 billion pre-voluntary deferral.

5. SO Performance

Chapter summary
This chapter evaluates RIIO-ET1 forecast expenditure for NGET in its role as SO against the costs allowed to deliver the associated outputs across the eight-year RIIO-T1 period.

Introduction

5.1. NGET is the designated electricity System Operator (SO) responsible for day-to-day system operation, including balancing supply and demand and constraint management. To do this, NGET buys and sells electricity and procures associated services. The costs NGET incur are recovered from users of the system via Balancing Services Use of System charges.

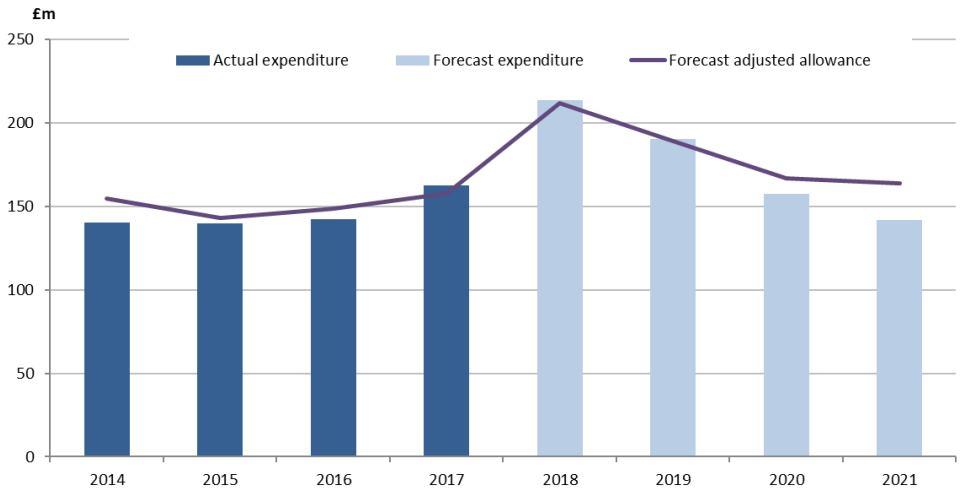
5.2. There are various costs that NGET incurs as SO, which it recovers as revenue. The RIIO-ET1 price control for NGET SO includes allowances for capex (primarily related to investment in IT systems) and opex (covering the ongoing costs of running the business, including support for IT systems).

5.3. All SO cost allowances for system balancing are determined via a separate process outside the RIIO-ET1 mechanism. The main incentive is the Balancing Services Incentive Scheme, which incentivises NGET (SO) to take action to operate the GB electricity transmission system.

Forecast totex performance

5.4. The figure below shows NGET SO's current totex forecast over the course of the RIIO-ET1 price control period against its adjusted totex allowances.

Figure 3: Actual and forecast expenditure vs SO forecast allowance



5.5. NGET SO is currently forecasting to spend close to £1.29 billion by the end of RIIO-ET1. This represents 96% of forecast totex allowances (£1.33 billion). The totex underspend (£47 million) is primarily driven by savings in controllable opex across the RIIO-ET1 period.

5.6. NGET SO forecast allowances include the provision resulting from the MPR (£21 million). It also includes forecast allowances in relation to incremental costs associated with data centres and cyber security[48], the SO Legal Separation Programme (LSP)[49] and Future of the SO (FRSO). The allowance categorisation applied by NGET SO for the LSP and FRSO work is summarised in the table below.

Table 10: Categorisation of additional allowance

£m, 16-17 prices	Forecast allowance		**RIIO-ET1 TOTAL**
	LSP	**FRSO**	
Non-operational capex	15	12	27
Opex	43	n/a	43
TOTAL	**58**	**12**	**70**

5.7. The SO has two major cost categories: non-operational capex and controllable opex.

5.8. NGET SO has forecast controllable opex spend of c.£880 million for the eight years, which is c.£40 million lower (5%) than adjusted allowances across the price control period. NGET SO reports that the main reason for this underspend is lower information system (IS) support costs and fewer IS projects going ahead than forecast at the business plan stage. This decrease in eight-year expenditure is partially offset by additional spend associated with establishing the future role of the SO and legal separation of the SO not foreseen at the start of RIIO-ET1.

5.9. The total opex forecast includes spend of c.£50m over the next four years on the LSP. This incorporates a one-off opex cost up to 2019 associated with implementing the separation of c.£35 million and two years of enduring incremental costs for the remainder of the RIIO-ET1 period. These costs were not forecast in the previous years' RRP submissions. We note that NGET is of the view that the IS implications of separation can be achieved through re-configuration of the existing systems (with additional controls to ensure appropriate access), rather than the implementation of new or duplicate systems.

5.10. An additional £12 million of cost is forecast to be incurred in relation to underlying controllable opex. The main driver for this is an increase in direct opex costs of

[48] National grid has signalled that a submission will be made within the May 2018 re-opener window. This is dependent on the finalisation of the BEIS mandate under Special Condition 7D.
[49] This is work to legally separate the Electricity SO and TO businesses of National Grid. This program is considering how the new SO entity will operate within the group structure (eg. deliver sufficient property separation and changes to NGs' Enterprise Resource Planning system), as well as detailed planning for all industry changes to codes and licences.

approximately £2 million per annum due to additional cost pressures eg. additional resourcing.

5.11. NGET SO is currently forecasting to underspend by £5 million (1%) against its non-operational capex allowances of £415 million across the RIIO-ET1 period. This forecast is higher than the previous forecast due to the inclusion of additional forecast costs associated with LSP and higher expected costs for the data centre project and the emerging cyber security threat.

5.12. The drivers of capital expenditure across the RIIO-ET1 period are targeted at maintaining and improving the security and resilience of the network. The key investments include the following.

- **The replacement for the Critical National Infrastructure Balancing Mechanism system.** This is intended to improve power system security by introducing modern hardware to a resilient design and software that will improve economic optimisation of the scheduling and despatch processes. As noted above, NGET SO currently anticipates incurring costs of c.£70 million across RIIO-ET1. We note that the project has taken longer to complete than originally planned and we will continue to monitor progress and costs in this area.

- **The development of an improved integrated electricity management system.** A more flexible and integrated system to meet the evolving requirements of a larger and more complex network. The new iEMS is currently undergoing the final stages of testing with the expectation that the programme will close in 2017/18. NGET currently anticipates incurring costs of c.£35 million across RIIO-ET1.

Appendices

Index

Appendix 1: SHET & SPT view of totex (company view)

A1.1. In their Original Business Plan (OBP), SHET and SPT presented a 'best view' position of all the costs they expected to incur in continuing to look after assets and the impact of plans to grow the network to accommodate new customers between April 2013 and March 2022.

A1.2. We decided to 'fast track' both Scottish TOs. This meant that we set their ex-ante allowances on the basis of their business plan, including their view of real price effect's (RPEs).

A1.3. The 'best view' position was not fully funded with ex-ante allowances as part of the RIIO-ET1 settlement. Instead, we included a combination of ex-ante allowances and allowances that would be released through "uncertainty mechanisms" (UMs). The agreed UMs automatically increase the level of allowance to cover additional costs incurred or flex downward in response to lower volumes below an agreed threshold. The parameters of such mechanisms were agreed upfront.

A1.4. The 'automatic' UM approach was not suitable to all aspects of the OBP; there was significant uncertainty associated with some large-scale investment projects. To deal with these in RIIO-ET1, we put in place the Strategic Wider Works (SWW) process for the approval of future major investments that we had decided not to fund up-front and which where not captured by the volume drivers. The SWW process allows us to consider the need for and the funding of these projects during the price control period, so that delivery of these outputs can be brought forward in a timely manner.[50]

A1.5. The table below illustrates how SPT and SHET's current view of the totex allowance position across the eight-year RIIO-ET1 period has evolved. This includes forecasts of performance for the remainder of the price control (2017-18 to 2020-21) based on their expectations of the adjustments to volume driver allowances and expenditure.

A1.6. There are broadly four types of allowed expenditure category:

- **Load-related:** investment on the network to accommodate changes in the level or pattern of electricity generation and demand.
- **Non-Load related**: mainly capital investment on replacement and prevention maintenance (refurbishment) to keep assets in good condition, but also other

[50] To date, only SHET has been granted approval for project funding under the SWW mechanism. Three projects have received funding; Beauly Mossford, Kintyre Hunterston and Caithness Moray.

capital expenditure directly related to maintaining a reliable network, such as investments to improve flood defences.

- **Non-operational capex**: expenditure on equipment not directly related to transmission operations, for example, IT capital expenditure.

- **Controllable operational costs (opex)**: this is day-to-day spending on activities required to maintain and operate the transmission networks.

Table A1.1: Current view of T1 allowed totex[51]: SPT & SHET

Cost category	*£m 2009-10 Prices*	SHET	SPT
Load related	Current forecast of T1 allowances	2,161†	952††
Non-load related	Current forecast of T1 allowances	259†††	656
Non-op capex	Current forecast of T1 allowances	7	7
Opex	Current forecast of T1 allowances	198	157
T1 TOTEX TOTAL (forecast)		**2625**	**1,772**

† This figure includes the value of capital contributions assumed at settlement and forecast compensation for wayleaves; it does not include the impact of the "true up" and Related Party Margins.
†† This figure includes the value of capital contributions assumed at settlement; it does not include the impact of the "true up" and Related Party Margins.
††† includes VISTA.

Load related expenditure

A1.7. The current forecast of LRE across the eight-year price control period for SPT and SHET is summarised in tables A1.2 & A1.3 below. Alongside SWW, there are a further six main categories of load related expenditure applicable to SHET.

- **Local enabling entry/exit sole use (excluded services).** This includes expenditure on assets that are covered by connection charges. The net expenditure for these connections (deducting any customer contributions) is funded directly by the customer over the life of the asset[52].

- **Local enabling shared use infrastructure:** expenditure triggered by individual projects (generation or demand) that provides assets or reinforcements that are shared by several users of the transmission network (MVa).

- **Local enabling sole use infrastructure.** This is expenditure triggered because of generation/load growth. It includes expenditure on assets that connect a single user to the transmission network (MW).

[51] Values include RPEs but exclude the value of approved projects under the Transmission Investment Incentive (TII) or Transmission Investment for Renewable Generation (TIRG) mechanisms.
[52] The connection charging methodology allows users to pay upfront capital contributions as well as annual charges for their connection over the lifetime of the asset. SHET's OBP did not consider the upfront contribution method of payment (ie assumed a zero value for potential customer contributions in this area).

- **OFTO and Shetland connections**: expenditure associated with facilitating the connection of potential offshore transmission projects to the onshore network and the proposed construction of an undersea link to Shetland.

- **Wider Works**: transmission reinforcement works (not local enabling works) associated with reinforcing the integrated network.

Table A1.2: SHET's current view of T1 LRE vs allowance (pre true-up)

Cost		*£m 2009-10 Prices* Pre true-up Allowed Totex	Expenditure	Performance
"Excluded services" (LR1 & LR2)	Costs Customer contributions[53]		119 -31	
	Current forecast	**229**	**88**	
Sole use (LR5 & LR6)	**Current forecast**	**308**	**320**	
Shared use (LR7 & LR8)	**Current forecast**	**242**	**310**	
Ex ante (LR3)	**Current forecast**	**7**	**12**	
OFTO (LR3)	**Current forecast**	**31**	**20**	
Shetland	**Current forecast**	**31**	**7[54]**	
Other capital contributions			-34	
Baseline Wider Works & pre construction (LR13)	Current forecast Customer contributions		139 -2	
	Current forecast	**151**	**137**	
SWW (LR18)	**Current forecast**	**1155**	**1042[55]**	
TSS (LR22) [56]	**Current forecast**	2	**2**	
Wayleaves	**Current forecast**	**6**	**6**	
Other	**Current forecast**	**0**	**3**	
Published RRP values (small rounding differences may exist)		**2,161**	**1,911**	**-250 (12%)**

A1.8. The reporting template is identical for both SPT and SHET, but differences apply in the reporting categorisation applicable to specific network reinforcement works. As a result, SPT is currently reporting no expenditure under categories LR3 or LR11 but is instead reporting expenditure under LR13 (six schemes to increase the transfer

[53] Relates to "customer choice" design under the network – for example, developers who have opted for an underground cable option rather than a cheaper OHL solution. As such, developers fund this differential. The cost of this solution is included with SHET's infrastructure forecast but is ultimately offset by this income so that the wider GB users do not get impacted by this cost.
[54] The OBP included an allowance (£30m) for a demand scheme on Shetland that has since terminated. Expenditure in this category relates to three reactor investments on the mainland.
[55] This relates to the capex element only.
[56] Investment on the network driven by the SO entitled "Transmission System Support".

capability across the B6 boundary) and LR15 (progress on specific Grid Supply Point reinforcement projects).

Table A1.3: SPT's current view of T1 LRE vs allowance (pre true–up)

Cost		*£m 2009-10 Prices* Pre True-up Allowed Totex	Expenditure	Performance
Connection (LR1 & LR2)	Costs		100	
	Customer contributions		-45	
	Current forecast	**50**	**54**	
Sole use (LR9 & LR10)	Costs		67	
	Customer contributions		-12	
	Current forecast	**33**	**55**	
Shared use (LR11 & LR12)	**Current forecast**	**258**	**277**	
GSP reinforcement (LR13)	**Current forecast**	**57**	**45**	
MSCDN (LR15)†	**Current forecast**	**15**	**7**	
SWW (LR20)[57]	**Current forecast**	**22**	**20**	
BWW (LR21)	**Current forecast**	**513**	**428**	
TSS (LR22)	**Current forecast**	**1**	**2**	
Other		**3**	**13**	
Published RRP values [58] (small rounding errors may exist)		**952**	**901**	**-50 (5%)**

† *Series and shunt compensation works on the B6 boundary; these costs are excluded from LR21.*

A1.9. The next sections provide further summary detail on performance under each cost category.

Transmission connection assets

A1.10. Both Scottish TOs are forecasting incurring costs attributable to the connection of new generation and demand users below the forecast level of allowance. This takes into account income received from customers choosing to pay upfront capital contributions (rather than as revenue).

A1.11. The differential is primarily due to the reduction in the number of schemes anticipated to progress to connection. SHET report that around two thirds of OBP schemes have not progressed during the RIIO-ET1 period. Reasons include customer termination, deferrals to RIIO-ET2 and decisions to connect at a lower voltage. For projects that have been delivered to date, the companies indicate that refinements in scope and construction (reducing the footprint of the project) and improvements in contracting strategies, in some instances, have delivered the project for lower costs than

[57] This relates to costs incurred in relation to pre-construction works.
[58] Differences in expenditure are related to the treatment of Innovation Roll Out Mechanism costs.

forecast. While there may be instances where higher costs have been incurred (due to delays) these do not outweigh the cost reductions.

Generation connection volume drivers

A1.12. There is a two stage approach to the funding of some load related elements; an upfront allowance to deliver a specified threshold capacity based on the best estimate of projects most certain to proceed at the time, augmented by a volume driver, designed to flex the allowance in accordance with the actual outturn demand and consequential system-wide requirements.

A1.13. Two mechanisms apply to the costs of connecting new electricity generation sources (SpC 6F); the costs of connecting sole use assets (MW) and the costs of associated infrastructure (network capacity, MVa).[59] The sections below summarise the current forecast position of SHET then SPT under each mechanism across RIIO-ET1.

SHET

A1.14. Under SHET's baseline RIIO-ET1 package, it will seek to connect 1168MW of new generation that includes sole-use infrastructure elements. The baseline package provided an allowance of £98.8 million associated with the delivery of "typical" generation connections that have a unit cost of less than £150k/MW. Delivery of capacity in excess of the licence target (and 'atypical' connections with a unit cost greater than £150k/MW) will trigger additional allowances via the volume driver mechanism.

A1.15. The baseline package also provided SHET with a level of funding for the construction of shared-use infrastructure (£83 million) associated with the delivery of 'typical' schemes which have a unit cost of less than £83k/MW. Delivery of capacity in excess of the licence target (and 'atypical' connections with a unit cost greater than £183k/MW) will trigger additional allowances via the volume driver mechanism.

A1.16. In terms of the sole use mechanism, SHET currently forecasts underspending by £37 million[60] the current estimate of allowance it expects to receive across RIIO-ET1.

A1.17. Overall expenditure under the shared use infrastructure mechanism is currently forecast to be £254 million[65]. This forecast level of expenditure is £43 million (15%)

[59] "Sole Use" distinguishes between assets, which are for the use of a single customer (covered by transmission connection charges) and from assets, which are shared by other users of the transmission network (covered by transmission network use of system charges).
[60] Taking into account of the value of customer contributions and excluding expenditure on schemes where the output is anticipated to be delivered in T2.

below the funding SHET expects to receive across RIIO-ET1 taking into account the current estimate of customer contributions.

A1.18. The reasons for the differential is linked to the way that the parameters of the automatic funding mechanism were initially set up. The ex ante allowance and unit costs in each element of the volume driver mechanism were agreed as part of the settlement based on the best information (on projects deemed most certain to proceed) available at the time. The initial schemes were not funded explicitly, but rather were used as the illustrative of the likely types of investment required during the period.

A1.19. The initial list of projects has changed. Currently, of the original 21 developments identified in the sole-use mechanism, only six have proceeded (or are forecast to proceed) to construction within T1. The remainder have terminated, delayed or connected at lower voltage. In the shared use mechanism, of the eight schemes initially making up the 'basket' of representative investment likely to proceed, only two remain. One investment is now meeting the required outputs for both a load and non-load business case. (Fort Augustus to Fort William is incorporating increased network capacity to accommodate new renewable generation located across Moray). Another scheme has been recategorised from shared use to sole use.

SPT

A1.20. Under SPT's baseline RIIO-ET1 package it will seek to connect 2.5GW of new generation that includes sole-use elements within the RIIO-ET1 period. A baseline allowance of £93 million (including RPEs) was set to deliver this threshold target. A volume driver applies to the costs of sole use generation connections delivered by SPT during RIIO-ET1 in excess of the threshold.

A1.21. The baseline package also provided SPT with a level of funding for the construction of new shared-use infrastructure for generation connection works. SPT's baseline package contains an output target to deliver 1073MVA of capacity. An allowance of £147 million (including RPEs) was set to enable SPT to deliver this capacity. A volume driver is applicable for the delivery of shared-use connections infrastructure that exceeds the capacity threshold.

A1.22. SPT is currently expecting to connect 1.63GW of generation requiring sole-use elements across RIIO-ET1, at a cost of £67 million. This is below the baseline target level, so SPT anticipates a clawback of c.£53 million allowance through the operation of the volume driver mechanism (on the basis that the output target was set on the final year of the price control). As a result, SPT currently anticipates expenditure will be greater than allowance by c.£27m.

A1.23. In terms of the shared use mechanism, SPT is currently forecasting expenditure of £121m to deliver the target of 1073MVa; an underspend of £27 million against the baseline allowance.

A1.24. Under the shared-use mechanism the differential is largely attributable to changes to the initial list of projects as time has progressed. Currently, of the original ten developments identified in the shared-use mechanism, nine have changed capacity and the other scheme terminated. SPT currently anticipates that it will over-deliver on shared-use infrastructure outputs (2259MVa above baseline) and expects expenditure to exceed allowance by c.£45m.

Baseline wider works connections[61]

A1.25. Reinforcement works on the wider transmission system to accommodate existing and future generation and demand as projected in the TOs' business plans are known as Baseline Wider Works (BWW) outputs. BWW outputs (and Incremental) are measured in terms of the additional transfer capacity across system boundaries.[62]

A1.26. The electricity transmission licence sets out each reinforcement project, the boundary it will affect and the amount of additional transmission transfer capability (MW) agreed as part of the BWW output.

SHET

A1.27. SHET's electricity transmission licence sets out two BWW reinforcement schemes to provide additional boundary transfer capability in the north of Scotland. Both schemes (Beauly Blackhillock Kintore and the Beauly – Mossford substation)[63] were delivered in line with licence requirements during 2015-16.

A1.28. Across RIIO-ET1, SHET reports totex expenditure of £59 million in the delivery of the relevant BWW outputs. This is approximately £7 million below total allowance across the price control (see table below).

Table A1.4: SHET BWW forecast

2016-17 prices	Allowance	Expenditure	Performance
TOTAL	**65**	**59**	**-7**

Positive numbers in the performance column indicate overspend; negative numbers indicate underspend

[61] These are set out in Special Condition 6I of each licence.
[62] A system boundary splits the transmission network into two parts across which the capability to transfer electrical power can be assessed. For the avoidance of doubt, system boundaries are not network ownership boundaries and each TO's network could contain multiple system boundaries.
[63] The outputs associated with the Beauly-Dounreay and Beauly Mossford schemes were delivered in the previous price control and are not specified as a Baseline Wider Works scheme in special condition 6I. SHET reports the additional expenditure associated with each legacy scheme against LR13. The Beauly Mossford substation on its own does not provide a boundary increase, but is a sub component of b10 and is defined as a BWW project as it does provide further reinforcement to the wider system.

SPT

A1.29. SPT's electricity transmission licence details five BWW reinforcement schemes in the south of Scotland.

A1.30. SPT has delivered one BWW output through the energisation of the subsea cable link between Hunterston and Kintyre. The delivery plan of the other BWW outputs has been delayed due to uncertainty on timing of renewable generation and planning considerations.

A1.31. SPT currently expects fully to deliver two BWW outputs: the East-West upgrade (voltage uprating from 275kV to 400kV) and the Series and Shunt Compensation projects (installation of series capacitor units) during T1. Of the remaining two BWW schemes specified in SPT's electricity transmission licence:

- the Western HVDC link has a revised completion date of 2017-18 (delayed from 2016-17), and

- voltage support at Kilmarnock-South (K-S) is not anticipated to be delivered. SPT's review of its network in that area has led it to substitute the baseline output to install shunt reactive compensation equipment at several sites including K-S (to be delivered in 2020).[64]

A1.32. Across RIIO-ET1, SPT currently anticipates a totex expenditure of £535 million in the delivery of the relevant BWW outputs. This is approximately £87 million below SPT's current forecast of total allowance across the price control. This is summarised in the table below.

Table A1.5: SPT BWW forecast

Scheme name *£m, 2016-17 prices (excl RPEs)*	**Allowance**	**Expenditure**	**Performance**	**Net position K-S project only**
Scottish series and shunt compensation	104	60	**-43**	
East - West Upgrade	68	70	**2**	
Western HVDC	407	356	**-51**	
Hunterston Kintyre link	24	29	**6**	
Kilmarnock South (not a 'live' project)	19	8	**-11**	
Kilmarnock South Substitute	0	11	**11**	**0.3**
TOTAL	**622**	**535**	**-87**	

Positive numbers in the performance column indicate overspend; negative numbers indicate underspend

[64] Our MPR decision made the following statement "*our decision is to consider the output delivered if SPT manages voltage in a manner that delivers the greatest consumer value.*"

A1.33. SPT explains that this expected level of outperformance (£87 million) is largely the result of efficiencies in the programme of upgrade work – Series and Shunt compensation projects and Western HVDC account for c.£94m of expected underspend.

A1.34. Alongside the specific BWW projects, SPT is incurring cost by installing shunt compensation units ('MSCDN')[65]. The current forecast for these works is £8 million across the eight-year period against an allowance of £18 million. SPT explains that all savings have been achieved through the tendering and site management process.

A1.35. A final category in the area of 'wider works' includes the cost of pre-construction works incurred in relation to specific non-baseline projects. These projects are identified in special condition 3L of SPT's electricity licence and have a corresponding total T1 allowance of £26 million. The current forecast expenditure in this category is £25 million.

Ex-ante infrastructure

SHET

A1.36. SHET's baseline plan included the development of a single investment for new demand on the island of Shetland. An allowance of £38 million was agreed at the start of RIIO-ET1. The scheme has now been cancelled. SHET is currently reporting the costs incurred in three new reactor schemes against this allowance. The overall forecast is £8 million against an allowance of £38 million.

A1.37. LR3 provides for the recovery of costs associated with four potential offshore transmission connections. An allowance of £38m was agreed at settlement, based on SHET's best view of the likelihood of investment. Currently, SHET has confirmed that two projects are currently not included in its best view projection. As in other areas, the scope of works associated with the remaining projects is now substantially different, due to changes in customers' requirements and the NOA process. An underspend of £13m is currently expected across the RIIO period.

Strategic wider works

A1.38. In 2013-14 we approved three projects proposed by SHET: Kintyre-Hunterston (KH), Beauly-Mossford (BM) and Caithness-Moray (CM). Two projects (KH and BM) were successfully energised during 2015/16, ahead of schedule. SHET reports that it spent 84% of the allowance for the KH project and 86% of the allowance for the BM project. The main driver of underspend in relation to both projects was the ability of SHET's project team to deliver the project with reduced resource , improved burial techniques for cables, favourable weather, and productive relationships with landowners enabling access to sites.

[65] This work is categorised as 'Wider Works not subject to an Uncertainty Mechanism' in the RRP.

A1.39. SHET currently forecasts an outperformance of below c.£140 million in relation to all three SWW projects across the RIIO-ET1 period. It is recognised that the CM project is still under construction with remaining risks still to be managed.

A1.40. NGET and SPT currently do not have any approved SWW schemes.

Non-operational capex

SHET

A1.41. For SHET, non-operational capital expenditure is comparatively small, with a total allowance of £9 million across the RIIO-ET1 price control period.

A1.42. SHET is forecasting £32 million of costs in this area across the eight-year period; approximately £23 million above forecast allowance.

A1.43. SHET explains that the bulk of the additional costs it expects to incur in this category relate to its IT Transformation Project - a large programme of work to upgrade and replace the whole IT system environment of SHET and two Distribution Businesses. The programme of work has been now been confirmed and the initial implementation of the new work and asset management systems will occur during 2017/18, with additional phases and costs in 2018/19, as the full functionality of the system is implemented.

A1.44. The cost of the Transformation Project is being split between the three networks, based on the requirements and utilisation of each system. We will continue to monitor delivery and the TO's share of project costs (and efficiencies) over the remaining T1 period. We expect this Transformation Project to drive enhancements to the efficiency of future inspection and maintenance programmes and the overall regulatory reporting process. We expect SHET to demonstrate the benefits of this work in the coming years.

A1.45. The reasons for the overspend is that the extent and scale of the IT transformation (including networks mobility technology and equipment to front line staff and cyber security enhancements) was not envisaged at the time of business plan submission. The business plan assumed a small scale replacement of one of its systems (ENMAC). The development of the IT 'roadmap' occurred following the agreement of the business plan.

SPT

A1.46. For SPT, non-operational capital expenditure is a minor element of their activities with a total allowance of £9 million across the RIIO-ET1 price control period. SPT is forecasting £14 million of costs in this area across the eight-year period. A total overspend of £5 million is currently forecast.

A1.47. Forecast expenditure has increased, relative to the original business plan estimates, due to an increased number of IT projects (under the £1 million reporting threshold). The main project is a new Network Asset Management System. As with SHET, we expect the IT developments to drive efficiency improvements in future inspection and maintenance programmes and in the regulatory reporting process more generally.

Opex

A1.48. Opex is the costs attributable to the activities required to maintain and operate the transmission networks.

SHET

A1.49. The overall RIIO-ET1 operating cost forecast is £239 million, against an adjusted allowance of £242 million; a small underspend of £3 million. The main drivers of cost are a forecast rise in vegetation management, faults, and property through the price control as SHET's network grows and complexity increases (in line with allowances).

A1.50. We recognise that the vast majority of spend for SHET is in relation to capex, with only 8% deemed as controllable opex.

SPT

A1.51. Operating cost has a total forecast value of £259 million across the RIIO-ET1 price control period, which is £66 million higher than forecast allowance over the eight-year period (£193 million). As in previous years, the main driver for this is the change to accounting measurement made after the RIIO-ET1 bid, which led to a change in the allocation of indirect costs between capex and opex. The primary impact is on Business Support costs which appear to be adverse to allowance (c.£90 million). However, there will be a corresponding reduction in total capex project costs (lower by c.£60-£65 million over the RIIO-ET1 period).

A1.52. We recognise that the vast majority of spend for SPT is in relation to capex, with only 12% deemed as controllable opex.

Non-Load related expenditure

A1.53. Non-load related (NLR) capex is capital investment made by a TO to maintain its existing network. This investment relates mainly to replacement and refurbishment of assets but also includes other capital expenditure directly and indirectly related to maintaining a reliable network, such as investments to improve flood defences.

A1.54. NLR allowances are split into Asset Replacement Capex and Other Capex. However, our analysis considers these as a single category and compares actual and revised forecast expenditure against original allowances.

A1.55. For each TO over-spend or under-spend against allowances may be attributable to a combinations of factors. We have tried to identify and estimate the impact of as many of these as possible. In order to aid understanding of the reasons for over-spends and under-spends, when we have been able to do so, we have separated them into five broad categories. These categories are explained below. It should be noted that the values we provide are based on the information we currently have available and are therefore our best estimates at this stage. They are intended to give an indication of the magnitude of the factors that contribute to over-spend or underspend and in some cases are based on assumptions, which we would hope to improve as we we progress to the end of RIIO-T1. It should also be noted that in some cases, where we indicate year-on-year changes, that the value of the changes are to some extent driven by refinement in our assessment methodologies or updated data for the prior year.

- **Work volume changes**: changes in the total quantity of outputs for a given asset type that a company expects to deliver during the eight years of RIIO-ET1. In estimating the cost impact of work volume changes we calculated unit costs of carrying out the work implied by the companies' allowances (for each asset type) and assumed that the unit cost does not change over the course of the price control. The impact of any unit cost changes are reflected in the second category, 'work cost changes'.

- **Work cost changes**: changes to the cost of delivering like-for-like outputs. Decreases or increases in this category could be attributable to efficiencies / inefficiencies on the part of a company, or scope changes (eg. special engineering difficulties) or be due to external factors such as input price changes (as discussed in chapter 4), or a combination of the above.

- **Work type changes**: changes in the type of work used to deliver an output or desired benefit. For example if a company had been previously expecting to replace an asset and now discovers that the asset is no longer required and can be decommissioned, then the associated cost savings would fall within this category.

- **Work schedule changes**. Costs are included in this category if:

    a. at the time of the RIIO-ET1 business plan an output was planned for delivery either in TPCR4 or RIIO-ET2,

    b. there are changes to the timing of delivery but these timing changes do not impact RIIO-ET1 output volumes, or

c. timing changes impact RIIO-ET1 expenditure. For example, if a TO was forecasting to start replacing underground cables in RIIO-ET1 but to deliver the final outputs RIIO-ET2, and if replacement is subsequently delayed and no expenditure is incurred in RIIO-ET1 then the associated cost savings will be included in this category.

- **Other factors**: a balancing category and will include the impact of miscellaneous factors that do not fall into one of the above categories.

SHET

A1.56. SHET is forecasting an overall RIIO-ET1 overspend (of £106 million) against forecast allowance over the entire price control period.

A1.57. The expected profile across the eight-year period is illustrated in Figure A1.1 below and shows that SHET is forecasting to significantly increase expenditure over the remainder of RIIO-ET1. This contrasts with a cumulative underspend of £20 million in the first half of RIIO-ET1 and is expected, according to SHET's forecasts, to result in an overall overspend of £106 million over RIIO-ET1. The expenditure profiling change is driven to a large extent by delays and scope changes on a number of projects, including Fort William to Fort Augustus (FW-FA), Inverarary to Taynuilt (I-T) and Inveraray to Port Ann (I –PA) overhead line schemes (see paragraph A1.58 below).

Figure A1.1: Actual and forecast expenditure vs TO forecast NLR allowance

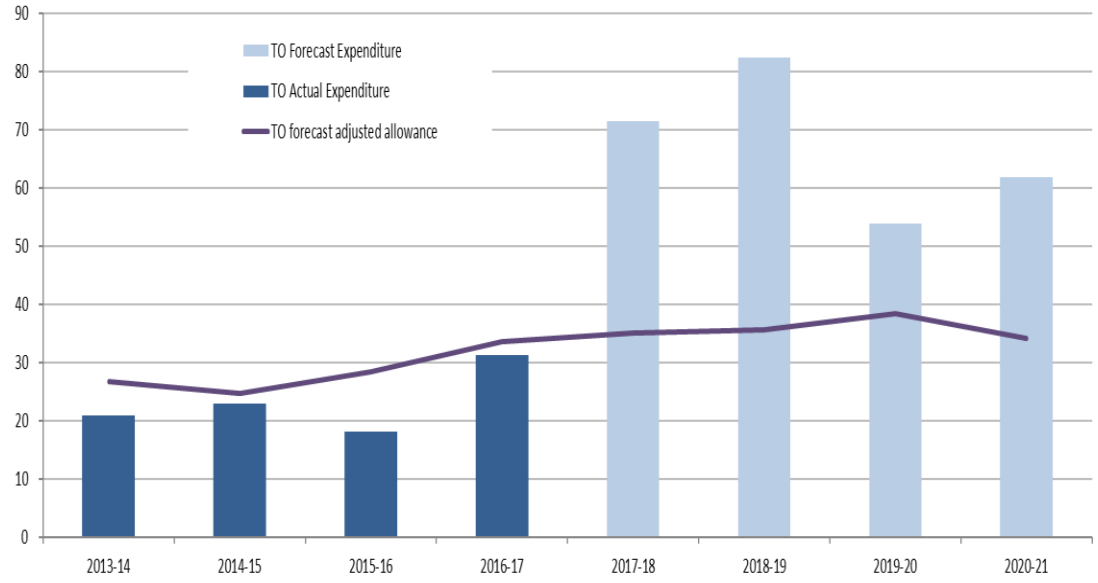


Table: A1.6: Factors contributing to RIIO-ET1 forecast position 2016RRP vs 2017RRP

Overspend/Underspend Category		2015/16[66]	2016/17	Year on Year Change
RIIO-T1 Allowance		**256.8**	**256.8**	**-**
Changes	Work volume changes	+4.7	+5.2	+0.4
	Work cost changes	-53.3	+67.3	+120.5
	Work type changes	-18.1	-0.2	+17.9
	Work schedule change			
	Other	+88.8	+33.8	-55.0
Forecast Expenditure		**278.9**	**362.8**	**+83.9**
Total RIIO-T1 Overspend, £m 2016/17 Prices		**+22.1**	**+106.0**	**+83.9**

A1.58. Consistent with last year's report, we have attempted to categorise[67] the reasons and the estimated costs associated with SHET's overall actual and forecast overspend in the above table. We have also provided more specific analysis on the drivers for the year on year increase in overspend (£84 million).

Work volume changes and Work cost changes

A1.59. We estimate the total impact of volume changes and associated work cost changes over RIIO-ET1 at £121 million. This estimate includes costs associated with replacing or refurbishing assets on which SHET claims it will achieve NOMs over-delivery. The bulk of the increase is due to expansion in scope for a number of large OHL schemes, specifically the FA-FW, I-T and I-PA schemes (total: £109 million). These schemes now require major upgrades or complete offline rebuild in contrast to the scope of requirements originally set out in the OBP (simple like-for-like conductor replacement).

A1.60. Additionally, nine reactors have been replaced or are planned for replacement due to an unforeseen type issue which has led to a number of early life failures. The cost of these reactor replacements is estimated at £11 million against no allowance for reactors. SHET is exploring options for recovery of those costs from the manufacturer. We therefore may see reversal of all or some of the costs associated with these specific reactor replacements in future regulatory reports.

Work type changes

A1.61. In last year's annual report we stated that SHET had identified savings by replacing only the conductor or the fittings on some OHL circuits where allowances assumed that both the conductor and the fittings would be replaced. This year's forecast costs have increased due to three like-for-like reconductoring schemes (FA-FW, I-T, and

[66] Some of the figures may not reconcile with last year's report due to updated assessment approaches or the use of updated or new data.
[67] Refer to Appendix 4: Non-Load related Expenditure: Overspend and Underspend categories for definitions of the each of the categories.

I-PA) that now require either major upgrades (i.e. increase of circuit capacity) or complete offline rebuild (i.e. replacement of conductors, fittings, and towers).

A1.62. SHET attributes the variance in the scope of activities that underpin the current T1 overspend to improvements in its asset management strategy and processes since the start of RIIO. Developments in asset recording as well as the implementation of a new IT platform and network management system have led to a more accurate asset catalogue and improvements in the quality of inspection and condition data from field-based staff. This, in some cases, has provided SHET with more accurate information on the condition of some assets, some of which have been found to be in worse condition than anticipated. This has driven SHET to extend the scope and scale of activities relative to its OBP.

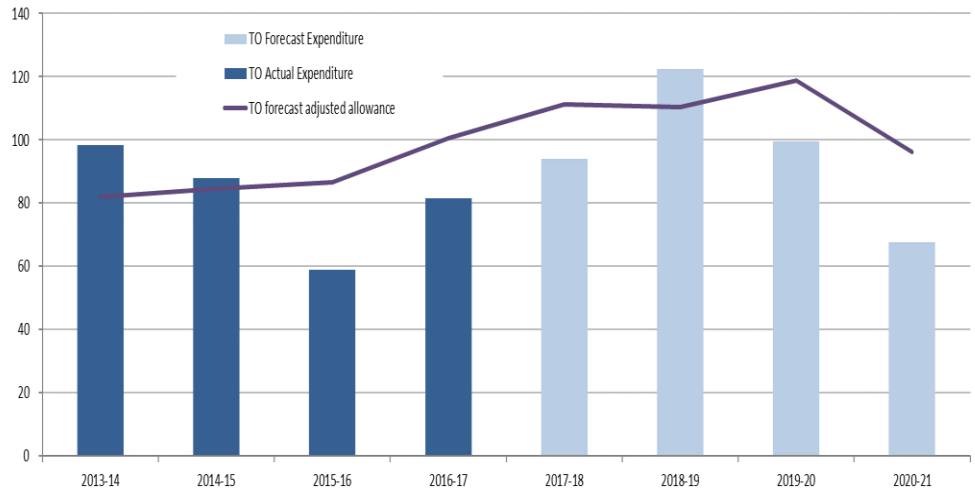
A1.63. The cost of refubishment (in relation to OHL schemes I-T and I-PA) will require additional work to remedy residual problems (lack of earth wire and the need to establish sufficient ground clearances) to enable activity to be undertaken. This, according to SHET, means that a new build is the optimal solution in these cases.

SPT

A1.64. SPT is forecasting an overall RIIO-ET1 underspend (£80 million) against forecast allowance over the entire price control period.

A1.65. The expected profile across the eight-year period is illustrated in Figure A1.2 below and shows that SPT is forecasting to retain a relatively steady expenditure profile over the remainder of RIIO-ET1.

Figure A1.2: Actual and forecast expenditure vs TO forecast NLR allowance: SPT



A1.66. The following section presents our analysis of the main factors that our analysis suggests are driving the forecast value of NLR RIIO-ET1 underspend (£80 million).

Table A1.7: Factors contributing to RIIO-ET1 forecast position 2016RRP vs 2017RRP

Overspend/Underspend Category		2015/16[68]	2016/17	Year on Year Change
RIIO-T1 Allowance		**790.5**	**790.5**	**-**
Changes	Work volume changes	+198.6	+316.1	+117.5
	Work cost changes	-626.2	-723.3	-97.1
	Work type changes	-0.2	-1.0	-0.8
	Work schedule change	+95.1	+133.5	+38.4
	Other	+244.4	+194.7	-49.8
Forecast Expenditure		**702.3**	**710.5**	**+8.2**
Total RIIO-T1 Overspend, £m 2016/17 Prices		**-88.3**	**-80.0**	**+8.2**

Work volume changes

A1.67. Revised condition assessments have led to increased volumes of transformers requiring replacement and a consequent £3 million increase in expenditure.

A1.68. Changes in load related programme have meant consequential changes for assets requiring replacement through NLR programmes. This has led to net increased requirement for NLR OHL work and decrease in circuit breakers. The net cost increase associated with this load related interaction is estimated at £103 million.

A1.69. Last year's forecasts included costs of £36 million related to replacement of the Kincardine-Currie (XD/XK/XM/XN) OHL routes[69]. During 2016/17, asset condition assessment highlighted that the replacement of the power carrying phase conductors is not necessary. SPT has therefore revised the project scope to include only replacement of existing earth-wires, insulators, fittings, and in some cases elements of tower steelwork replacement. This has reduced the forecast expenditure, which is now estimated at £7 million. This scheme is still in development (especially for the power carrying phase conductors) and SPT have indicated that the forecasts are likely to be revised in the 2017/18 RRP.

Work cost changes

A1.70. Changes in unit cost for replacement and refurbishment have led to a forecast saving of £723 million. All lead asset categories have decreased unit costs except for transformers, with overhead lines contributing the largest proportion of the savings with £622 million in total estimated savings over RIIO-ET1.

[68] Some of the figures may not reconcile with last year's report due to updated assessment approaches or the use of updated or new data.
[69] SPT treated the Kincardine-Currie OHL routes as Non-Load Related Works (SpC6H), and they were excluded from NOMs targets up to and during 2016 RRP. During MPR, SPT identified that these routes were part of the original NOMs targets under SpC2M, and the schemes for these OHL routes are now treated as NOMs schemes.

A1.71. SPT has increased the volume of its OHL replacement work since last year, and the unit cost of the work has come down. Despite the unit cost reduction, the substantial volume increase has led to an overall increased spend on OHL replacement over RIIO-ET1 compared to last year's forecasts.

Work schedule changes

A1.72. Projects that were due for delivery in the previous price control period but delayed to RIIO-ET1, due to consenting or operational issues, add £17 million to RIIO-ET1 costs. These include Bonnybridge 132kV switchgear replacement, Neilston to Windyhill OHL modernisation, and Kaimes to Whitehouse 275kV cable replacement schemes.

A1.73. Furthermore, SPT had no forecast expenditure for Non-Rechargeable Diversions (NRD)[70] in its OBP, due to the expected infrequent nature of NRD claims. However, the upturn in commercial and residential construction has led to an increase of those claims since 2015/16, which are estimated at £20.3 million over the RIIO-ET1 period.

[70] The raising or rerouting of a circuit on third party land can potentially lead to a claim from the landowner to be compensated for loss of land value associated with these works. In circumstances where the landowner terminates the wayleave agreement, seeks for enhanced payments for the electrical equipment, etc., the compensation cost will fall on the network company. This is known as a non-rechargeable diversion.

Appendix 2: NGET TO view of totex (company view)

A2.1. In this appendix we present some high level analysis of the drivers of the variation of NGET TOs' totex from their allowances from the price control agreement and assesses the TOs' performance on capital delivery against the TOs' view of adjusted allowance. The latter view is based on the baseline allowances, but with the changes applied through operation of the uncertainty mechanisms to reflect the current levels of outputs and the company's current forecast of future outputs in the remaining RIIO-ET1 period.

Table A2.1: NGET TO current view of T1 totex vs allowance (pre true-up)

Cost		*£m, 2009-10 Prices* Forecast allowance	Actual & forecast Expenditure	Performance
Load related	'Best View' (OBP 2012)	7,499		
	Baseline Final Proposals	4,860		
	Opening allowance 2016-17 (including MPR and voluntary deferral)	4,693		
	Additional Direct Funding (2016 AIP)	-604		
	TO view of UM adjustments	-834		
	Current T1 forecast	3,255	3,021	-234 (7%)
Non Load related	Baseline Final Proposals	4,659		
	Additional Direct Funding	+120		
	Voluntary deferral	-350		
	TO view of UM adjustments	+244		
	Current T1 forecast	4,673	3,732[71]	-941 (20%)
Non-op capex	Current forecast of T1 Non-op capex related allowances	148	226	78 (53%)
Opex	Baseline Final Proposals	1,624		
	Additional Direct Funding	+167		
	TO view of UM adjustments	0		
	Current T1 forecast	1791	1,721	-70 (4%)
Published RRP values (small rounding errors may exist)		**9867**[72]	**8,700**	**-1,167 (12%)**

LR figures do not include the impact of the "true up" and exclude Related Party Margins.

[71] This value includes an adjustment to account for the costs of the Deeside off-grid substation following clarification from NGET of an error in reporting on it.
[72] £9,387m excluding the value of the voluntary deferral.

Load-related expenditure

A2.2. LR capex is the investment on the network to accommodate changes in the level or pattern of electricity generation and demand. For NGET, this is split further into a number of funding mechanisms, the largest of which are for (i) connecting new electricity generation sources[73], (ii) connecting new demand sources[74], and (iii) incremental 'wider works' which are associated reinforcements that facilitate these connections whilst maintaining network integrity[75]. There are also mechanisms with provisions for undergrounding cables and for mitigating works on the electricity distribution systems (special licence condition 6K).

A2.3. In setting the load related elements of NGET TO's price control, we used a baseline allowance to reflect its business plan expectation of c.£4.5 billion of varying costs - that are able to flex depending on outputs actually required through various volume driver mechanisms - and c.£1.4 billion of non-variant costs - for works that are deemed to be needed but mostly without directly measurable output[76]. Both allowances were set based on a list of projects proposed by NGET in its original business plan.

A2.4. NGET TO's current view of the total load-related allowance across the RIIO-ET1 period is £3,255 million (£3,997 million in 16-17 prices). Further detail on NGET TO's current forecast of the main categories of LR expenditure across the entirety of the eight-year price control period is summarised below.

Baseline Wider Works

A2.5. NGET's electricity transmission licence details four reinforcement projects that were defined as Baseline Wider Works (BWW) schemes. It has delivered the required BWW output in three schemes in accordance with the delivery date specified in the licence and the associated ex-ante allowance has been released.

A2.6. The fourth BWW scheme is the Western HVDC (WHDVC) undersea cable link. This is a £1 billion link between Scotland and Wales, jointly developed by NGET and SPT, that will increase the capacity of the transmission system. The link was due to be delivered in 2016/17. The project has encountered technical problems with the cable manufacture process and the output is forecast to be delivered to a revised completion date within the

[73] Local enabling (entry to the system) - Generation Connection volume driver (special licence condition 6F).
[74] Local enabling (exit from the system) – Local Demand Volume driver (special licence condition 6L).
[75] Incremental wider work (special licence condition 6J). We measure outputs in terms of increases in the electricity transfer capability across system boundaries. Baseline Wider Works (special licence condition 6I) also contains details of scheduled delivery dates associated with specific projects that we hold the TOs to account for. Ex-ante allowances were set based on the delivery profile. The delivered boundary capacity of each 'baseline' wider work project is linked to the framework in special condition 6J.
[76] Only a small proportion of the non-variant allowance was explicitly specified as outputs in their own right in order to maintain flexibility of the sources of load expansion.

2017-18 financial year. This delay has been the subject of debate in the MPR parallel work.[77]

A2.7. NGET TO's current view is that a small over-spend will be achieved over the RIIO-ET1 period for all four schemes.

Table A2.2: NGET TO BWW forecast (inc WHVDC)

£m, 2016-17 prices	Allowance	Expenditure	Performance
TOTAL	**908**	**913**	**5**

Positive numbers in the performance column indicate overspend; negative numbers indicate underspend

A2.8. NGET TO currently estimates incurring significant costs (c.£460 million) in the construction of three potential SWW projects. The costs will be subject to a within period assessment by us and the TO will only receive funding for efficiently incurred costs. The current estimates of construction and pre-construction costs are summarised in the table below.

Table A2.3: NGET TO SWW forecast

£m, 2016-17 prices	Allowance	Expenditure
Construction	**457**[78]	**457**
Pre-construction	**56**[79]	**139**
TOTAL	**513**	**596**

Local Generation Connections (Entry)

A2.9. An allowance was originally set on the basis of a baseline of 33GW of new generation connecting over the RIIO-ET1 period.[80]

A2.10. Changes in the numbers of customers connecting to NGET's network drive a reduction in the associated allowance through the volume driver mechanism. NGET's current view is that the mechanism will reduce their allowance from c.£1.2bn to c.£0.4bn across the price control.

A2.11. As a result, NGET is currently forecasting to overspend against the adjusted totex allowance for entry connections across RIIO-ET1 by £161m.

[77] https://www.ofgem.gov.uk/system/files/docs/2017/07/mpr_parallel_work_decision-v3.pdf
[78] To overcome the uncertainty around the actual amount and timing of certain categories of expenditure over the price control period, the network companies agreed to populate the reporting pack by assuming a neutral performance. This means that the level of indicative allowance set by the company is the same as the level of forecast costs expects to incur.
[79] Licence special condition 3L: Pre-construction Engineering Outputs for prospective Strategic Wider Works.
[80] Licence special condition 6F, table 1.

A2.12. NGET's electricity licence also requires it to report annually on the number of kilometres of overhead line (OHL) installed. The baseline expected 215.4km to be built across the price control (associated with the baseline forecast of 33GW). NGET currently expects a significant reduction in the length of OHL to be commissioned across RIIO-ET1 from 215km to 41.4km (to be commissioned in 2020/21). The reduction in new OHL (route/circuit) is largely the result of a delay of works associated with delayed generation projects.

Table A2.4: NGET TO Generation connections

£m, 2016-17 prices	Allowance	Expenditure	Performance
TOTAL	**537**	**698**	**161 (30%)**

Local Demand Connections (Exit)

A2.13. NGET has seen a significant fall in terms of demand connections, reducing the number of supergrid transformers (SGTs) required across RIIO-ET1 from 72 to 52. This has been matched by a reduction in the length of OHL to provide local demand connections, from a length of 27km to 5.42km across RIIO-ET1 (all of which was commissioned by the end of 2015-16). NGET anticipates no new cable routes across RIIO-ET1 which is consistent with the business plan and forecast position.

A2.14. Overall expenditure is currently forecast by NGET to be £277m across the price control. NGET forecasts that the operation of the uncertainty mechanism will reduce its allowance by £228m to adjust for outputs in the RIIO-ET1 period that are no longer anticipated to be required by customers. NGET currently anticipates an overspend of 21%, or £49m, relative to NGET's forecast totex allowance across RIIO-ET1.

Table A2.5: NGET TO Demand connections

£m, 2016-17 prices	Allowance	Expenditure	Performance
TOTAL	**228**	**277**	**49 (21%)**

Incremental wider works[81]

A2.15. Incremental Wider Works (IWW) are transmission infrastructure works that deliver an increase in boundary transfer capability which NGET determines is required, in line with the implementation of its Network Development Policy (NDP).

A2.16. Baseline allowances were set on the basis of NGET's expected delivery of 23.1GW of boundary reinforcements over the RIIO-ET1 period. NGET is now forecasting a substantial fall in its IWW delivery against its baseline levels due to a fall in generation and demand connections. NGET's latest forecast is that only GW 9.9GW of boundary reinforcements will be required across the price control.

[81] Detailed in Special Condition 6J of NGET's licence.

A2.17. NGET anticipates that the licence mechanism will substantially reduce baseline allowances across the RIIO-ET1 period to take account of the outputs that are no longer required due to changes in customer requirements. As a result, NGET is currently forecasting to spend 40% below NGET's updated view of the RIIO-ET1 allowance of £899m.

A2.18. We will continue to work with NGET to keep under review both its forecasts and the implications these have through the revenue adjustment mechanisms in the licence.

Table A2.6: NGET TO Incremental Wider Works (excl TPWW[82])

£m, 2016-17 prices	Allowance	Expenditure	Performance
TOTAL	**899**	**541**	**-358 (40%)**

Undergrounding and DNO mitigation works[83]

A2.19. In its RIIO-ET1 business plan NGET TO was forecasting to start replacing underground cables in RIIO-ET1. This work has subsequently been delayed and currently only a fraction of original level of expenditure has been incurred in RIIO-ET1.

A2.20. NGET TO currently anticipate delivering 5.7km of underground cable (due to be commissioned in 2023/24) as part of providing the second Pentir - Trawsfynydd circuit. Similar to last year, there is practically zero DNO mitigation work currently incurring cost.

Table A2.7: NGET TO Underground cables and DNO mitigation

£m, 2016-17 prices	Allowance	Expenditure	Performance
TOTAL	**46**	**22**	**-24 (52%)**

Non-variant

A2.21. Non-variant allowances reflect envisaged general system reinforcement to facilitate the achievement of specific outputs, but were mostly not associated with the delivery of directly measureable outputs in their own right (such as MW).

A2.22. NGET TO is currently expecting to underspend against its forecast view of allowance across the entire RIIO-ET1 period.[84] This category includes the load related element of the voluntary deferral (£160 million) and the impact of the MPR decision on NGET TO (£47 million).

[82] NGET TO currently expects a T1 allowance of £27m in relation to TPWW and a spend of £2m.
[83] Detailed in Special Condition 6K of NGET's licence.
[84] Once the true-up is taken into account, NGET TO is currently expecting an overspend of c£100m.

Table A2.8 NGET TO Non-variant costs[85]

£m, 2016-17 prices	Allowance	Expenditure	Performance
TOTAL	896	800	-96 (10%)

Non-load related expenditure

A2.23. Non-load related (NLR) capex is capital investment made by a TO to maintain its existing network. This investment relates mainly to replacement and refurbishment of assets but also includes other capital expenditure directly and indirectly related to maintaining a reliable network, such as investments to improve flood defences.

A2.24. NLR allowances are split into Asset Replacement Capex and Other Capex. However, our analysis considers these as a single category and compares actual and revised forecast expenditure against original allowances.

A2.25. For each TO over-spend or under-spend against allowances may be attributable to a combinations of factors. We have tried to identify and estimate the impact of as many of these as possible. In order to aid understanding of the reasons for over-spends and under-spends, when we have been able to do so, we have separated them into five broad categories. These categories are explained below. It should be noted that the values we provide are based on the information we currently have available and are therefore our best estimates at this stage. They are intended to give an indication of the magnitude of the factors that contribute to over-spend or underspend and in some cases are based on assumptions, which we would hope to improve as we we progress to the end of RIIO-T1. It should also be noted that in some cases, where we indicate year-on-year changes, that the value of the changes are to some extent driven by refinement in our assessment methodologies or updated data for the prior year.

- **Work volume changes**: changes in the total quantity of outputs for a given asset type that a company expects to deliver during the eight years of RIIO-ET1. In estimating the cost impact of work volume changes we calculated unit costs of carrying out the work implied by the companies' allowances (for each asset type) and assumed that the unit cost does not change over the course of the price control. The impact of any unit cost changes are reflected in the second category, 'work cost changes'.

- **Work cost changes**: changes to the cost of delivering like-for-like outputs. Decreases or increases in this category could be attributable to efficiencies / inefficiencies on the part of a company or be due to external factors such as input price changes (as discussed in chapter 4), or a combination of both.

[85] In addition to the values in tables A2.1, A2.2, A2.3 and A2.4

- **Work type changes**: changes in the type of work used to deliver an output or desired benefit. For example if a company had been previously expecting to replace an asset and now discovers that the asset is no longer required and can be decommissioned, then the associated cost savings would fall within this category.

- **Work schedule changes**. Costs are included in this category if:

  - at the time of the RIIO-ET1 business plan an output was planned for delivery either in TPCR4 or RIIO-T2,

  - there are changes to the timing of delivery but these timing changes do not impact RIIO-ET1 output volumes, or

  - timing changes impact RIIO-ET1 expenditure. For example, if a TO was forecasting to start replacing underground cables in RIIO-ET1 but to deliver the final outputs RIIO-T2, and if replacement is subsequently delayed and no expenditure is incurred in RIIO-ET1 then the associated cost savings will be included in this category.

- **Other factors**: a balancing category and will include the impact of miscellaneous factors that do not fall into one of the above categories.

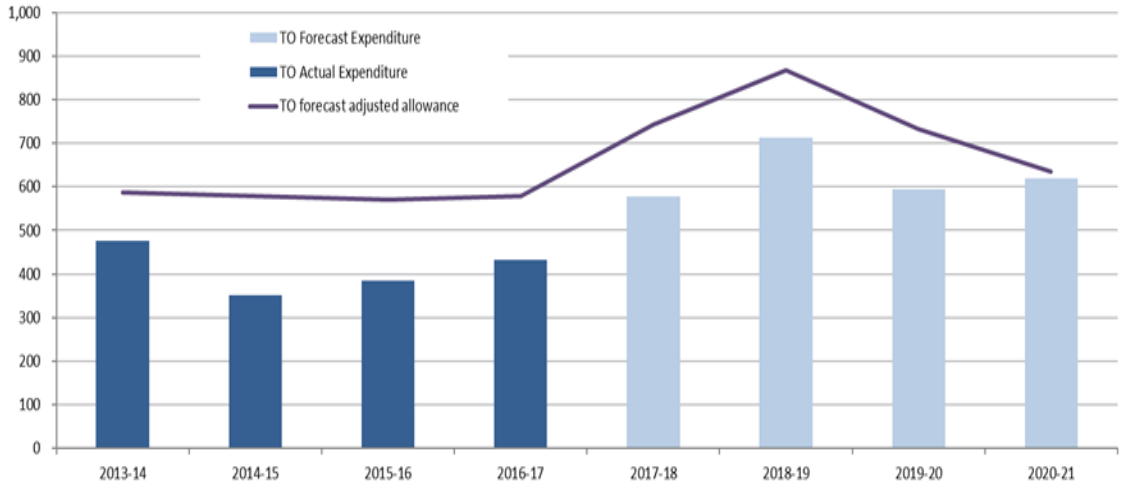
A2.26. In order to provide a like-for-like comparison between original regulatory agreement and current forecasts and to enable more accurate trend analysis, this section compares NGET's spend against its original allowances (i.e. before the voluntary deferral of £430m of NLR allowances are excluded). On this basis NGET TO is currently forecasting a 28% (£1.57 billion) underspend over the entire RIIO period, which is a £411m further reduction of spend compared to last year.

A2.27. As in last year's report, we have made adjustments to the non-load related, non-operational capex and opex cost categories to remove the impact of costs that we have not yet agreed[86] or we think are outside the scope of RIIO-ET1. We have not adopted the allowance recategorisations in the NLR category proposed by NGET[87].

A2.28. The expected profile across the eight-year period is highlighted in the chart below and indicates that NGET TO is forecasting to significantly increase expenditure over the remainder of RIIO-ET1.

[86] For example, assumptions of recovery for spend through allowances that will be the subject of a claim in a future reopener window.
[87] Optel & BT21 allowances recategorised from Asset Replacement Capex to Non Operational Capex, and Metering, Protection and Control, substation Other, Cable Tunnels and other non load related allowances recategorised from Asset replacement Capex to Other capex.

Figure A2.1: Actual and forecast expenditure vs TO forecast NLR allowance[88]



A2.29.The following section presents our analysis of the main factors that our analysis suggests are driving the forecast value of NLR RIIO-ET1 underspend (£1.57bn), applying the same categorisation described in paragraph A1.54.

Table A2.9: Factors contributing to RIIO-ET1 forecast position 2016RRP vs 2017RRP

Overspend/Underspend Category		2015/16[89]	2016/17	Year on Year Change
RIIO-T1 Allowance		**5,721.5**	**5,721.5**	**-**
Changes	Work volume changes	-23.1	-264.0	-241.0
	Work cost changes	-745.6	-499.2	+246.4
	Work type changes	-173.8	-201.8	-27.9
	Work schedule change	-336.7	-441.8	-105.1
	Other	+118.3	-165.8	-284.1
Forecast Expenditure		**4,560.6**	**4,149.0**	**-411.7**
Total RIIO-T1 Overspend, £m 2016/17 Prices		**-1,160.9**	**-1,572.5**	**-411.7**

A2.30. In alignment with last year's report, we have attempted to categorise the reasons and accompanying estimates associated with NGET's overall actual and forecast underspend in the table above. We have also provided more specific analysis of the drivers for the year on year increase in underspend (£411.7m).

Year on Year increase in underspend

A2.31. Our current estimates of the main reasons for the further £411m reduction in spend since last year are as follows:

[88] The TO forecast adjusted allowance figures for the chat are excluding the £430m of deferred NLR allowances
[89] Some of the figures may not reconcile with last year's report due to updated assessment approaches or the use of updated or new data.

- £40m of savings due to reuse of existing infrastructure ranging from concrete foundations in switchgear and transformer bays to replacement of only the obsolete parts of protection and control systems
- £260m of saving predominantly from the deferral of interventions beyond RIIO-ET1 due to revised view of condition including transformers, switchgear, OHL conductors and fittings as well as underground cables and tunnels
- £31m of savings from unit cost reductions on all lead asset categories except for reactors and circuit breakers
- £24m of savings from an increase in the volume of tower steelwork to be painted instead of being replaced
- £181m of savings from the proposed use of alternative routes on the Dinorwig-Pentir underground cable tunnel route and use of an existing tunnel instead of building a new one on the Beddington-Rowdown underground cable route
- £179m increase in actual and forecast spend including on schemes in London power Tunnels project, earlier start on tunnelling on the Hurst-Newcross-Wimbledon underground cable route, delays due to poor weather and site access issues on OHL as well as an overall increase in spend on substation other and other TO non-lead asset categories.
- Other savings, which may in part be attributable to revised project management or contracting strategies

A2.32. The following sections detail the main drivers of the overall actual and forecast underspend for the eight years of RIIO-ET1 along the categories in the above table.

Work volume changes

A2.33. Revised condition assessments of lead asset has led to a total forecast saving of £356m. These savings are attributable mainly to OHL (£80m saving) and to Transformers (37 unit reduction with £180m saving).

A2.34. Interaction with LR plan (where some assets which were expected to be replaced as part of a subsequently cancelled LR scheme now require replacement under NLR and conversely, replacement of other assets that were previously within NLR plan fall into scope of LR work) accounts for an increase in spend of £48m but a reduction of £14m compared to last year.

A2.35. As was the case last year deferral and scope changes to the CT/VTs has saved £41m. Of this total saving £11m has been confirmed to be part of NGET's voluntary allowance deferral.

Work cost changes

A2.36. The £499m underspend in this category is attributable to unit cost reductions for all lead asset categories with the exception of reactors. This is largely related to the real price effects discussed in Chapter 4, as well as some changes in the TO's procurement approach.

Work type changes

A2.37. We reported last year on savings that NGET has achieved through the use of enhanced paint coating system as an alternative to replacing tower steelwork. The savings attributable directly to the use of enhanced paint coating system (£198m) have not changed significantly. However, we are seeing significant changes in forecast volumes of tower steelwork replacement (30% decrease) for a cost increase of £3.7m. This equates to an overall 52% unit cost increase for tower steelwork replacement. NGET explains that the unit cost increase is due to improved forecasting as associated costs have become more certain on routes where condition assessments have identified a lower volume of steelwork in need of replacement. The unit cost increase is most pronounced in the final two years of RIIO-ET1. Since last year's report, forecasts for the final two years of RIIO-ET1 have steel work replacement reducing from 2,275 tonnes to 793 tonnes with costs increasing from £25m to £39m (c. 340% unit cost increase). This may be partly attributable to expenditure on schemes where the steelwork volumes will be delivered in RIIO-ET2. We intend to ask NGET to provide further explanation and/or a cost benefit analysis to support the higher unit cost investments on these schemes.

A2.38. NGET reported in its supporting narrative last year that 22 transformers and three reactors would be decommissioned instead of replaced with an associated saving of £118m. It has subsequently confirmed that this was an error and the correct figure for number of transformer decommissioning is 10. The revised NLR saving for both transformers and reactors is approximately half of what was reported last year. We estimate the revised decommissioning costs (reported under opex) to be approximately £2m.

Work schedule changes

A2.39. NGET's NLR allowances included approximately £1,008m of allowances to cover RIIO-ET1 expenditure on schemes expected to deliver final outputs in RIIO-T2. There are therefore no RIIO-ET1 outputs to which these allowances can be linked. A number of these schemes have subsequently been either cancelled or fully deferred beyond RIIO-ET1. Current estimate of the value of cost savings attributable to these deferrals is £290m. The bulk of these savings are on underground cable and cable tunnel schemes (e.g. £217m on two UC/Tunnels schemes: Tottenham-Redbridge and Dinorwig-Pentir).

Non-operational capex

A2.40. The latest forecast for Non Operational capex over the RIIO-ET1 period is £232m which is higher than the allowances of £182m. The forecast overspend across the entire RIIO-ET1 period is £50m (27%).[90]

A2.41. Expenditure in this category is largely driven by IT investments to facilitate ongoing business and performance improvement (£174m). The majority of the IT investment is driven by the 'Technology Change Roadmap'[91] programme. This accounted for 41% (£48m) of all IT costs incurred to date (£116m) and is forecast to account for 24% (£14m) of ongoing IT costs over the remaining T1 period (£58m). We will continue to monitor progress in the delivery of IT systems to determine the level of outturn costs incurred and identify the scale of efficiencies being realised.

Opex

A2.42. The overall RIIO-ET1 operating cost forecast is £2,113m, against an adjusted allowance of £1,994m: an overspend of £119m (6%). The main driver for this is higher pension costs, higher business support costs - as a consequence of the ETO growing in size relative to other business areas - and the result of a review of allocations between ESO and ETO resulting in much of the SO allocation moving to the TO.

[90] The expenditure excludes cost associated with work to renew the OPTEL network and the BT21 Mitigation project. The associated expenditure has been deducted from the category of non-operational capex and classified as non-load related.

[91] This programme delivers the data and technology changes required to enable the successful implementation of the Asset, Maintenance Planning & Delivery transformation project within NGET TO.

Appendix 3: Ofgem assessment of NGET TO totex (post true-up)

A3.1. As noted in chapter 4, there is significant uncertainty with some investment included in the price control information received from the TOs. The most notable example is the Strategic Wider Works (SWW) process for the approval of future major investments that were neither in the baseline nor captured by the volume drivers. These schemes are subject to a within-period determination by the Authority.[92]

A3.2. To overcome the uncertainty around the actual amount and timing of certain categories of expenditure over the price control period, the network companies agreed to populate the reporting pack by assuming a neutral performance. This means that the level of indicative allowance reported by the company is the same as the level of forecast costs expects to incur.

A3.3. It is therefore possible to remove the impact of costs that we have not yet assessed or agreed from the performance analysis.

A3.4. Further adjustments can also be made to exclude expenditure in areas where we think it is unlikely that the conditions required to trigger the additional allowances will be met and/or where funding is likely to be available through another route (e.g. NOMs).

A3.5. The text below provides a high level explanation of the adjustments made to NGET TO's reporting information. It is important to note that by removing such costs from our analysis we are not indicating that the company values submitted as part of the reporting pack are not an accurate forecast of the required activities or suggest that the activities they are associated with are inefficient. The adjustments have been made only to reflect the uncertain nature of these costs and the associated within period assessment that has yet to take place or has not yet concluded. It also seeks to provide an additional level of transparency and understanding of drivers of the current forecast of under- and over-spend across the RIIO-ET1 period.

Load related category: uncertain costs

A3.6. We have made adjustments to the totex allowance and expenditure values to remove the impact of works that have not yet been assessed or the assessment has to be concluded in two areas: (i) construction costs associated with SWW projects 'not yet

[92] The costs will be subject to a within period assessment and the TO will only receive funding for efficiently incurred costs. This is of particular relevance to NGET TO as it currently estimates incurring significant costs (c.£460m) in the construction of three potential SWW projects.

approved', and (ii) the licence term TPWW (this licence term is applicable to NGET TO only).

A3.7. In terms of TPWW, NGET has submitted a claim for the Hackney - Tottenham - Waltham Cross uprating scheme. This project is detailed along with the other baseline schemes in Special Condition 6J. In November 2013 the National Development Plan (NDP) analysis signalled the investment is not now in consumers' interest to proceed and the investment has been delayed indefinitely. NGET is currently seeking to recover the costs of works incurred as a result of the output not being delivered. The total TPWW claim is currently £27m. This claim is currently being analysed to understand if it was efficiently incurred as well as whether it is reusable to deliver a different output.

Non-load related category

A3.8. We have made further adjustments under the costs categories of non-load related, non-operational capex and opex to remove the impact of costs that we have not yet agreed or we think are outside the scope of RIIO-ET1.

A3.9. The adjustments made in the category of non-load related expenditure reflect our general analytical approach that considers Asset Replacement Capex and Other Capex together.

A3.10. We have not adopted the allowance recategorisations in the NLR category proposed by NGET as part of a 're-stated' submission. However, we have moved the associated expenditure from Non-operational capex to Other Capex and removed the impact of the capex spend and forecast costs for visual impact projects (Other capex). NGET's NLR expenditure has also been adjusted to reflect other exceptional items associated with specific legal costs.

A3.11. Minor adjustments have been made to the submissions of SPT and SHET – these are detailed in table A3.2 and A3.3, respectively (and for completeness).

A3.12. The impact on NGET TO's allowed totex and expenditure is highlighted in the table below. The values presented are adjusted to reflect the current estimated impact of the end of period (i.e. post "true up"). For the avoidance of doubt, the approach applied in our assessment is a snapshot based on current information and is not a conclusion on the form and scope of the end of period "true up". Separate discussions will continue between Ofgem and the network companies on the parameters of the "true up" to be applied at the end of the RIIO-ET1 period.

Table A3.1: eight-year position post our assessment of "True up" – NGET TO

Category (£m, 16-17 prices)	Forecast allowance	Forecast expenditure	Performance
T1 Load related	3,318	3,251	-67
T1 NLR Load related	5,292	4,149	-1,143
T1 Non operational capex	181	232	50
T1 controllable opex	1,994	2,113	119
TOTEX	**10,785**	**9,744**	**-1041 (-10%)**

Table A3.2: eight-year position post our assessment of "True up" - SPT

Category (£m, 16-17 prices)	Forecast allowance	Forecast expenditure	Performance
T1 Load related	1,177	1,108	-69
T1 NLR Load related	805	710	-95
T1 Non operational capex	9	14	5
T1 controllable opex	192	259	67
TOTEX	**2,183**	**2,091**	**-93 (4%)**

Table A3.3: eight-year position post our assessment of "True up" - SHET

Category (£m, 16-17 prices)	Forecast allowance	Forecast expenditure	Performance
T1 Load related	2,488	2,343	-145
T1 NLR Load related	257	363	106
T1 Non operational capex	9	32	23
T1 controllable opex	242	239	-3
TOTEX	**2,996**	**2,977**	**-19 (-1%)**

Phasing of investment

A3.13. This section provides further insight into NGET TO's current expectations of the phasing of LR expenditure and expectations of the provision of allowance over the eight-year price control period and beyond.

A3.14. Our analysis is presented for information only and the values discussed are not reflected in the adjustments that form the basis of assessment of RoRE summarised in chapter 2.

Expenditure on schemes that will deliver outputs up to 31 March 2023

A3.15. NGET's Final Proposals document acknowledged that NGET TO may incur costs to deliver outputs beyond RIIO-ET1 in advance of funding. The parameters of the RIIO-ET1 revenue drivers applicable to NGET TO were developed to allow NGET TO to trigger an allowance adjustment towards the end of the price control period for outputs delivered in the first two years of RIIO-ET2 only (2021/22 and 2022/23, referred to as 'T1+2').

A3.16. The reporting information provided by NGET TO reflects their current expectations of the level of allowance adjustment to take account of the costs incurred (actual and forecast) in the delivery of outputs in the T1+2 timescales.

A3.17. Based on the current information, NGET TO is currently expecting to incur a cost of £142m (09-10 prices) linked to the developments of schemes within T1+2 timescales. NGET TO is currently expecting a corresponding allowance of £472m across the range of revenue drivers linked to the delivery of expected outputs over this two year period.

Expenditure on schemes that will deliver outputs beyond 31 March 2023

A3.18. We are aware that NGET TO is incurring (or is projecting to incur) significant costs on schemes that are forecast to complete far into the next price control period. No funding allowances were included in the T1 settlement for expenditure linked to the development of schemes that are currently expected to complete beyond March 2023.

A3.19. These projects are expected to deliver outputs (eg. connecting additional generation) and would, if completed during T1+2 timescales, have resulted in an adjustment via the applicable revenue driver mechanism to take account for this additional spend. However, since the outputs are yet to be delivered, and no framework exists to provide funding, there is no commensurate change in allowance.

A3.20. Based on the current information, NGET TO is currently expecting to incur costs of approximately £370m (09-10 prices) in the delivery of outputs beyond March 2023. It is not appropriate for this to be categorised as "overspend". As such, we have isolated it within our analysis, see table 3.4.

Table A3.4: Phasing of forecast expenditure and allowance – NGET TO

2009-10 prices	*Current RIIO-ET1 company forecast totex view (company adjustments applied)*											
	T1 only				*T1+2*				*Beyond March 2023*			
	All.	Exp.	Diff.		All.	Exp.	Diff.		All.	Exp.	Diff.	
			£m	%			£m	%			£m	%
Total	772	786	+15	+2	472	142	-331	-70	0	376	376	100

A3.21. It is important to note that by identifying the phasing of expenditure and expectations of the corresponding allowance provision in the T1 and T1+2 periods we are not indicating that the values submitted are not an accurate forecast of the required activities. Equally, our analysis does not suggest that the activities they are associated with are inefficient. The table only serves to highlight that NGET TO is incurring capex on the delivery of outputs that are intended to be delivered beyond March 2023 and there is currently no framework to provide a commensurate increase in allowance.

A3.22. NGET TO's RIIO framework contains revenue drivers where the parameters of the mechanism include a provision to fund NGET TO for works required in RIIO-ET1 for delivery in RIIO-ET1+2 timescales. These are listed below.

- Generation connections volume driver (special condition 6F)
- Demand connections volume driver (special condition 6L)
- Wider works volume driver (special condition 6I)

A3.23. The next section provides further detail on each revenue driver mechanism that includes provision for allowances within T1+2 timescales.[93]

Generation connections

A3.24. NGET TO currently expects a total allowance value of £318m to deliver close to 10GW of new generating capacity across the RIIO-ET1 period and a further 10GW capacity in the first two years of the RIIO-ET2 period.[94] The total forecast expenditure across this ten-year period is currently £565m (including de minimus), see table A3.5.

Table A3.5: Generation connection; allowance and expenditure analysis

2009/10 price base	Output (GW)	Allowance (£m)	Forecast Expenditure (£m)	over (+)/ underspend (-) (£m)
2013-2021	10.5	125[95]	286	161
T1+2	10.4	200	95	-105
Total	**21**	**325[96]**	**381**	**57**
Beyond 2023	N/A[97]	0	162	162
Other	N/A	0	22	22
Total	N/A	**325**	**565**	**240**

A3.25. Our assessment indicates that approximately two-thirds (£200m) of the forecast allowance is related to schemes expected to deliver outputs within 2022/23 or 2023/24 (the T1+2 period). Based on current information, NGET currently anticipates incurring close to £100m of expenditure on schemes linked to the delivery of these outputs.

A3.26. The remainder of the forecast allowance (£125m) relates to activity on schemes expected to deliver outputs within the eight-year price control period (2013-2021). NGET TO currently expects to incur £286m of costs to complete these projects and deliver the

[93] Special condition 6K also has similar provisions but is not considered further due to the very low levels of expenditure currently forecast.
[94] This also includes delivery of 44 circuit kms of overhead line over the ten-year period.
[95] This allowance does not fully reflect the full cost of the delivery of 10GW. It excludes expenditure incurred prior to the start of RIIO.
[96] £318.4 excluding licence term "TPG"
[97] NGET anticipates delivery of a further 39GW beyond 2023. However, the expenditure reported is only reflecting the expenditure incurred until March 2023.

associated capacity. This expenditure is primarily driven by the connection of large, capital intensive investment projects located in offshore waters.

A3.27. We estimate that £162m of forecast expenditure is related to schemes delivering outputs beyond 2023, for which there is currently no allowance.

Wider Works (including baseline wider works projects but excluding WHVDC)

A3.28 NGET TO currently expects a total allowance value of £768m (including the completion of three Baseline Wider Works projects) to enable additional transfer capacity of 10GW by the end of RIIO-ET1 and a further 6.7 within the first two years of the RIIO-ET2 period. The total forecast expenditure across the RIIO-ET1 and the T1+2 period is £581m (including de minimus).

Table A3.6: IWW and baseline WW; allowance and expenditure analysis

2009-10 price base	output (GW)	allowance (£m)	expenditure (£m)	over/ underspend (£m)
RIIO-1	10.0	499	337	-162
RIIO-1 +2	6.7	269	47	-222
Total	**17**	**768**	**383**	**-385**
Beyond 2023	N/A[98]	0	182	182
Other	N/A	0	16	16[99]
Total	**N/A**	**768**	**581**	**-187**

A3.29. Our assessment indicates that approximately one third (£269m) of the forecast allowance is linked to schemes delivering outputs within the T1+2 period, while only £47m of costs is expected to be incurred in the delivery of these outputs.

A3.30. The remainder of the forecast allowance (£499m) relates to activity on schemes expected to deliver outputs within the current eight-year price control period (2013-2021). NGET TO currently expects to incur £337m of costs to complete these projects and deliver the associated increase in transfer capability.

A3.31. A total expenditure of £182m was reported by NGET in relation to the delivery of outputs that do not currently have any funding provision.

[98] NGET anticipates delivery of a further 22GW beyond March 2023. However, the expenditure reported in the table is only reflecting the expenditure incurred until 31 March 2023.
[99] Terminated schemes (TPWW) (Hackney Tottenham) and other schemes subject to potential TPWW currently account for an expenditure of ~16m.

Demand connections

A3.32. NGET TO currently expects a total allowance value of £152m across the RIIO-ET1 period and in the first two years of the RIIO-ET2 period.[100] The total forecast expenditure across this ten-year period is currently £164m (including de minimus), see table A3.7.

Table A3.7: demand connections - allowance and expenditure analysis

2009-10 prices	allowance (£m)	expenditure (£m)	over / underspend (£m)
RIIO-1	148	164	16
RIIO-1 +2	4	0	-4
Total	**152**	**164**	**12**
Beyond 2023	0	32	32
Other	0	0	0
Total	**152**	**195**	**44**

A3.33. Based on the current information available, NGET TO currently expects to incur £32m in relation to the delivery of outputs beyond March 2023, for which there is currently no allowance.

Areas of further work

A3.34. While it is appropriate to provide an allowance in RIIO-ET1 for the delivery of such outputs, there are some drawbacks to this. Firstly there is a risk that the allowance does not adequately reflect the actual outputs being delivered. The unforeseen level of change in the energy background since the beginning of RIIO-ET1 indicates the potential level of variability between now and the first two years of RIIO-ET2. As a result the outputs reflected in the allowances provided could differ from those that will actually be delivered.

A3.35. Secondly should a project identified by NGET TO connect earlier than envisaged (ie. not in T1+2 timescales as originally envisaged but within the eight-year RIIO-ET1 period), there is currently scope for allowances to be provided twice for the delivery of the same output. There is a need to develop the reporting structures to ensure that information is accurately reported and to examine the licence framework to ensure it is appropriately calibrated.

A3.36. We will be taking forward discussions with NGET on how these risks can be mitigated, including any potential clarifications to the licence to ensure that allowances always reflect the most up to date information. The arrangements will adhere to the central RIIO principle; allowances will only reflect efficient investment for the customer-driven outputs delivered.

[100] This also includes delivery of five circuit kms of overhead line over the ten-year period.

[blank page]