

National Grid Electricity Transmission RIIO-T1: Initial Proposals consultation response Supplementary information – Strategic Spares

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Executive summary

- 1 Poyry's "RIIO-T1 Stage 4 NGET NLR capex final assessment report" states:

"8.2.7.4 Spares

One of the scheme papers in this area was analysed and it is a relatively generic document, with no details of equipment ordered, appearing to be a sanction facility to replenish stocks of items (predominantly associated with switchgear) as required. Whilst the merits of having a budget to order such items at short notice are understood, this is effectively therefore a contingency budget. Effectively this is for procurement on a rolling basis of spares *which will then go into capital schemes elsewhere (as opposed to a strategic increase in spares holding) and therefore could be considered as a potential double-count from a regulatory point of view. Our view therefore is to dis-allow this category entirely, unless further clarification can be given that this is not a double-count of activities allowed for elsewhere."*

- 2 The first half of this paragraph is correct, but we disagree with the conclusions of the remainder.
- 3 We hold strategic spares to react to failures on the network in a timely manner, purchasing long-lead items of equipment ahead of failure. The alternative is to purchase replacement equipment following failure, which would result in equipment being out of service for 6-18 months due to lead-times from manufacturers. This strategy is therefore essential to maintain network availability. Poyry state that "the merits of having a budget to order such items at short notice are understood".
- 4 History has shown that these spares are consumed, and therefore require replenishment. If these failures were to occur on assets planned for replacement and if it were possible to advance that replacement project, there might theoretically be a 'double-count' with the capex in our submission. However:
- (a) A significant percentage of faults and failures will be associated with lead assets with a Replacement Priority of 10+ years which are not covered by our submission¹.
 - (b) This strategic spares provision is not for 'lead assets', such as a complete bay of switchgear or a transformer, but instead covers items such as surge arresters, bushings and cable sealing ends. Even if failures occurred on lead assets planned for replacement, it is probable only a part of that lead asset would be replaced to fix the failure and return the circuit. Therefore, it is likely that a scheme to replace the lead asset in subsequent years would still be required and the deployed strategic spare would often be scrapped (few are recoverable).
 - (c) It would normally be more cost effective to deploy (and even scrap) a spare that costs thousands of pounds rather than advance a project that costs millions of pounds by a number of years.
- 5 Obviously, we cannot predict exactly what will fail over an eight-year period starting in 2013/14, and we therefore requested a total £31.7m over the RIIO-T1 period based on our historical experience of spend in this category. This covers two categories of spend:

¹ Table 4.6 of our 2012 annual Regulatory Reporting Pack presents data for failures in 2009, 2010 and 2011. Analysing the failures associated with lead assets (i.e. those with an Asset Health Index), the percentage of failures on Replacement Priority 10+ lead assets was 64%, 44% and 70% of the total number of failures for these three years.

- (a) Replenishment of existing strategic spares: this equates to an average of £1.85m per annum, or 0.006% of our Modern Equivalent Asset Value².
 - (b) Purchase of new strategic spares: Poyry did not reject the concept of a strategic increase in spares holding, and over half of the forecast (£2.1m p.a.) is for this category.
- 6 We believe that this category of spend is well justified and a proportionate forecast which should be funded in full, thus increasing our non-load related allowances by £31.7m.

² The calculated Modern Equivalent Asset Value in 2013/14 is approaching £29bn (in 2009/10 prices, please see table 4.1 of our March 2012 RIIO-T1 submission).

Introduction

- 7 A strategic spare is an item that has been specifically acquired and held on stock to reduce the controllable downtime following a failure. This does not include consumable items used for maintenance spares.
- 8 The holding of strategic spares is a key factor in maintaining an acceptable level of network availability. Strategic spares provide a means of reducing controllable downtime on circuits critical to bulk energy transmission to customers and reducing the likelihood of the network suffering concurrent failures following the failure of an asset with a long procurement lead-time. The alternative would be to purchase replacement equipment following a failure, which could result in equipment being out of service for 6-18 months due to lead times from manufacturers.
- 9 The cost of holding strategic spares is optimised to achieve an appropriate balance between cost, risk and performance. Our over-arching policy and process for identifying an appropriate target strategic spares holding for each equipment type is contained in PS(T)024 which is attached below for reference:

[attachment deleted]

- 10 As strategic spares are utilised, the holding requires replenishment. In addition, periodic policy reviews can trigger the need for new or more spares of a certain type. As we cannot reasonably predict exactly which assets are going to fail over an eight-year period nor what new stocks will be required, our submission contained a forecast of £31.7m³ over the RII0-T1 period based on our experience of historical spend in both these categories. Whilst accepting the merits of a strategic spares holding, Poyry have recommended (and Ofgem have implemented) the dis-allowance of this spend as a potential double-count.
- 11 As we do not understand why this difference in view has arisen on what seems to us to be an obvious part of an effective asset management strategy for a complex infrastructure network, the following paper reiterates the evidence supporting the need for this spend and the basis of our forecast.

³ This forecast was against two schemes: £14.8m for replenishment of existing spares (Z09999) and £16.8m for new strategic spares (14296).

Replenishment of existing strategic spares

- 12 Our response to 2012_NG_RT1-Ph3-154 explained that our forecast expenditure of £14.8m for scheme Z09999 'S1 Replenishment – Future Years' was based on historical stock replenishment volumes of Stock Class 1 (S1) Strategic Spares (those recognised as Fixed Assets) at National Stores. Historical spend totalled £7.4m over the four years from 2007/08 to 2010/11. This equates to an average of £1.85m p.a., which is exactly in line with our average annual forecast for the RIIO-T1 period. This scheme covers solely the purchase of assets and does not include installation which is instead covered by scheme SX191 'substation emergency replacement provision'. The exact annual cost, number and types of spares issued each year vary depending on the failures encountered.
- 13 This forecast of £1.85m p.a. can therefore be considered to be supporting our current asset base, which has a forecast Modern Equivalent Asset Value of approaching £29bn by 2013/14. Our forecast spend for spares replenishment equates to 0.006% of our asset base. This is the type of spend that Poyry have identified as a potential double-count from a regulatory point of view.
- 14 If these failures were to occur on assets planned for replacement and if it were possible to advance that replacement project, there might theoretically be a double-count with the capex in our submission. However, a significant percentage of faults and failures will occur on lead assets with a Replacement Priority of 10+ years which are not generally covered by our submission. In order to illustrate this point, table 4.6 of our 2012 annual Regulatory Reporting Pack presents data for failures in 2009, 2010 and 2011. Analysing the failures associated with lead assets (i.e. those with an Asset Health Index), the percentage of failures on Replacement Priority 10+ lead assets was 64%, 44% and 70% of the total number of failures for these three years.
- 15 Furthermore, this strategic spares provision is not for 'lead assets', such as a complete bay of switchgear or a transformer, but instead covers items such as surge arresters, bushings and cable sealing ends (the spreadsheet attached below was attached to our response to 2012_NG_RT1-Ph3-154 and details our S1 stock holding as of 12 April 2012). Therefore, it is probable that a scheme to replace the lead asset in subsequent years would still be required and the deployed strategic spare would often be scrapped (few are recoverable). As an example, cable faults are often due to a failure of the cable sealing end. The circuit can therefore be returned to service by replacing that cable sealing end. This will not change the Replacement Priority of the cable itself and, if this were planned for replacement, it would still require replacement in the same timescales.
- [attachment deleted]
- 16 Finally, it is more cost effective for consumers for a spare that costs thousands of pounds to be deployed (even if it subsequently has to be scrapped) rather than advance an asset replacement scheme that costs millions of pounds by a number of years.
- 17 It should be noted that we are exposed to the risk of faults and failures increasing above historical levels, and hence the cost of more strategic spares. This risk is asymmetric as the downside is collared at zero but the upside is unconstrained.

Case Study**Switchgear: ABB 400kV CPA Voltage Transformer (VT) failure at South Humber Bank substation**

On 9 May 2012, South Humber Bank Power Station reported excessive noise and arcing coming from the 400kV substation compound. After investigation the Killingholme - South Humber Bank circuit was faulted due to a sheared primary connection stub on the Yellow Phase CVT. It was an ABB 400kV CPA type commissioned in 1995.

Investigations identified the cause of the fault to be an incorrectly installed down dropper (the down dropper connects the CVT to the busbar). This resulted in mechanical stress upon the top cap connection as the down dropper and busbar both expand and contract as they varied in temperature (ambient temperature, loading, etc). This resulted in the top cap of the CVT essentially being pulled and pushed in four directions, eventually leading to failure.

A spare ABB CPA420 CVT was sourced from Didcot Stores enabling a return to service time of ~1 month instead of >6 months if a replacement was procured following failure. Funding is required to replenish our strategic stock as this CVT is not in our non-load related replacement plan due its relatively young age.

Purchase of new strategic spares

- 18 Our response to 2012_NG_RT1-Ph3-153 explained that scheme 14296 'Strategic spares policy implementation' is required to purchase new S1 spares as a result of changes to our strategic spares holding policies which arise from a variety of sources. Drivers for change include issues identified during routine condition assessment, feedback from fault and failure investigations, and revised strategic approaches.
- 19 A policy review would follow the process outlined in PS(T)024 (see attachment), using population sizes and disruptive failure scenarios to determine new stock holdings. Required strategic spares are then purchased under scheme 14296 and held at National Stores to cover all assets installed on the electricity network in England and Wales.
- 20 As this scheme (by definition) is intended to react to currently unknown issues, we cannot be specific regarding what this provision is intended to purchase for the RIIO-T1 years out to 2020/21. Forecast spend is therefore again based on historical spend.
- 21 To illustrate the types of equipment which might be purchased in future, an example of the investment to be undertaken in 2012/13 under scheme 14296 is Instrument Transformer assets being purchased as a result of the update and implementation of PS(T)041 'Instrument transformer strategic spares policy'. This covers Capacitor Voltage Transformers (CVTs), Wound Voltage Transformers (WVTs), Current Transformers (CTs) and combined Metering Transformers (CT/VTs). Total spend in 2012/13 is forecast to be £0.71m.

Case Study

Policy Review - Instrument Transformer Strategic Spare Policy

For like-for-like replacements, Didcot National Stores maintains a minimum stock level of each asset type. However, an analysis of our asset database indicated that the majority of the installed Instrument Transformer population was now obsolete. The policy for obsolete instrument transformers is therefore based on the ability to interchange assets from different manufacturers and the use of 'modern electrical equivalents' supported by a range of accessories which are necessary to accommodate physical differences in size and connection arrangements.

This change in policy resulted in the issue of Policy Statement PS(T)041 and the purchase of Instrument Transformers to bring stock levels up to the level stated in the policy.

[attachment deleted]

Conclusions

- 22 We cannot predict exactly which components of which lead assets will fail over an eight-year period starting in 2013/14, and therefore requested a total £31.7m over the RIIO-T1 period based on our historical experience of spend on strategic spares. This is to cover two aspects of our spares holding:
- (a) Replenishment of existing strategic spares: this equates to an average of £1.85m per annum, or 0.006% of our Modern Equivalent Asset Value. This is the element that Poyry identify as a potential double-count. However, in recent years nearly 60% of failures on lead assets are on those that are a low priority for replacement and would therefore not be covered by our non-load related submission. Furthermore, even if failures occurred on assets planned for replacement and it were possible to advance that project, we do not hold 'lead assets'. The strategic spares holding instead covers items such as surge arresters, bushings and cable sealing ends. Hence it is probable that a lead asset replacement scheme in subsequent years would still be required, and that it would be economic to deploy a strategic spare even if it had to be scrapped later.
 - (b) Purchase of new strategic spares: Poyry did not reject the concept of a strategic increase in spares holding, and over half of the forecast (£2.1m p.a.) is for spares in this category.
- 23 The alternative would be to purchase replacement equipment following a failure, which would result in equipment being out of service for 6-18 months due to lead times from manufacturers.
- 24 It should be noted that we are exposed to the risk of faults and failures increasing above historical levels, and hence the cost of more strategic spares. This risk is asymmetric as the downside is collared at zero but the upside is unconstrained.
- 25 We therefore believe that this category of spend is well justified and a proportionate forecast which should be funded in full, thus increasing our non-load related allowances by £31.7m.