

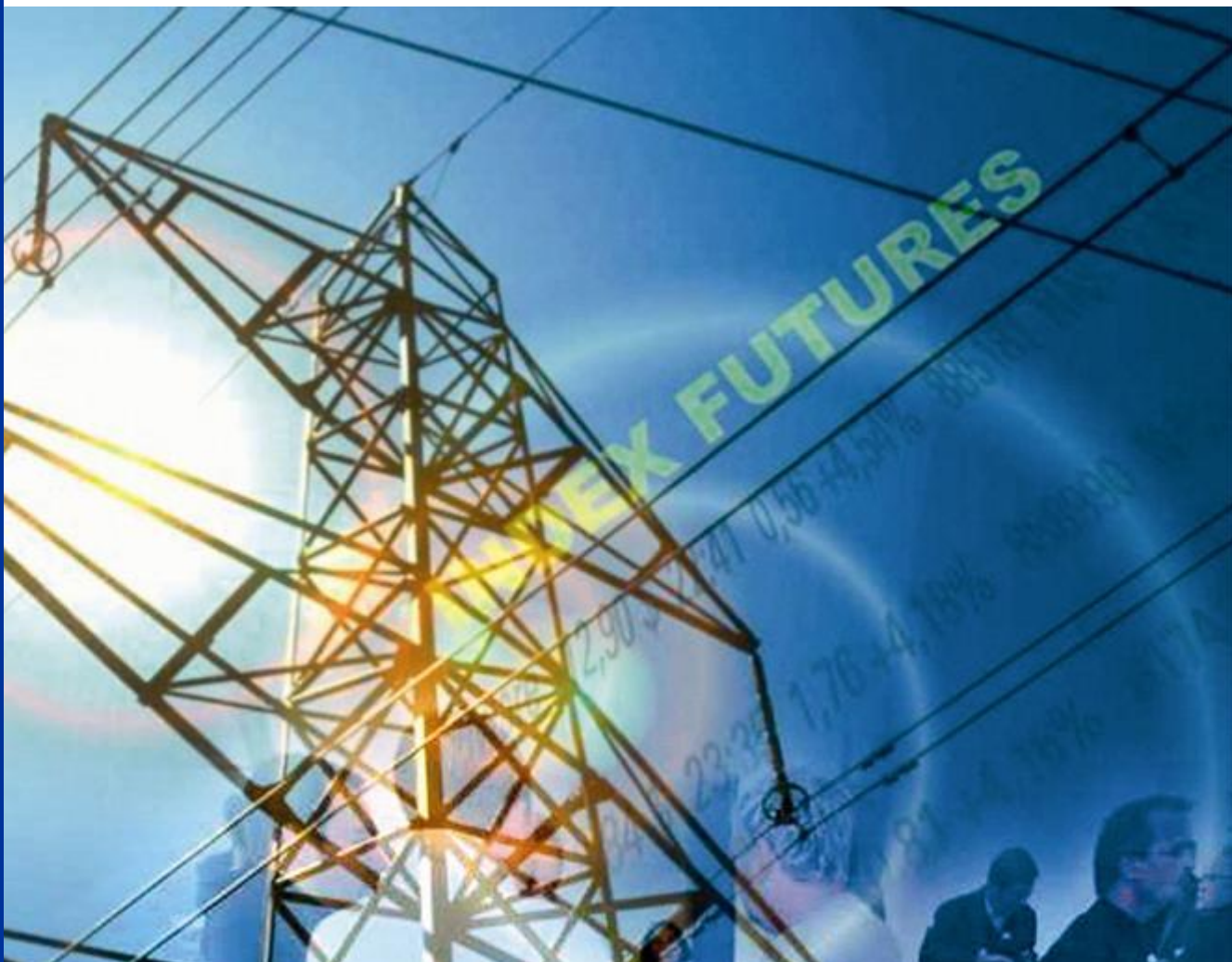


## RIIO-T1 SUMMARY REPORT – GAS

A report to the Office of Gas and Electricity  
Markets

July 2012

RIIO-T1 SUMMARY REPORT - GAS



## Contact details

Name	Email	Telephone
Angus Paxton	angus.paxton@poyry.com	01865 812263

Pöyry is a global consulting and engineering firm. Our in-depth expertise extends across the fields of energy, industry, urban & mobility and water & environment.

Pöyry has about 7,000 experts and a local office network in about 50 countries. Pöyry's net sales in 2011 were EUR 796 million and the company's shares are quoted on NASDAQ OMX Helsinki (Pöyry PLC: POY1V).

Pöyry Management Consulting provides leading-edge consulting and advisory services covering the whole value chain in energy, forest and other process industries. Our energy practice is the leading provider of strategic, commercial, regulatory and policy advice to Europe's energy markets. Our energy team of 200 specialists, located across 14 European offices in 12 countries, offers unparalleled expertise in the rapidly changing energy sector.

### Copyright © 2012 Pöyry Management Consulting (UK) Ltd

All rights reserved

No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means electronic, mechanical, photocopying, recording or otherwise without the prior written permission of Pöyry Management Consulting (UK) Ltd ("Pöyry").

This report is provided to the legal entity identified on the front cover for its internal use only. This report may not be provided, in whole or in part, to any other party without the prior written permission of an authorised representative of Pöyry. In such circumstances additional fees may be applicable and the other party may be required to enter into either a Release and Non-Reliance Agreement or a Reliance Agreement with Pöyry.

### Disclaimer

While Pöyry considers that the information and opinions given in this work are sound, all parties must rely upon their own skill and judgement when making use of it. Pöyry does not make any representation or warranty, expressed or implied, as to the accuracy or completeness of the information contained in this report and assumes no responsibility for the accuracy or completeness of such information. Pöyry will not assume any liability to anyone for any loss or damage arising out of the provision of this report.

## TABLE OF CONTENTS

<b>1.</b>	<b>INTRODUCTION</b>	<b>5</b>
	1.1 Context and scope	5
	1.2 Overview of our assessment	5
	1.3 Conventions	7
<b>2.</b>	<b>OVERVIEW</b>	<b>9</b>
	2.1 NGG submission	9
	2.2 Breakdown of expenditure	10
	2.3 Scope of our review	11
<b>3.</b>	<b>UNIT COSTS</b>	<b>13</b>
	3.1 Pipelines	13
	3.2 Compressors	14
<b>4.</b>	<b>LOAD RELATED CAPEX</b>	<b>15</b>
	4.1 Ex-ante network flexibility requirements	15
	4.2 Avonmouth replacement	16
<b>5.</b>	<b>NON-LOAD RELATED CAPEX</b>	<b>17</b>
	5.1 Emissions	17
	5.2 Asset health	18
<b>6.</b>	<b>OPERATING COSTS AND NON OPERATING CAPEX</b>	<b>23</b>
	6.1 Efficiencies	23
	6.2 Direct costs	23
	6.3 Closely associated indirect costs	25
	6.4 RPEs	27

[This page is intentionally blank]

# 1. INTRODUCTION

## 1.1 Context and scope

Ofgem has a significant challenge to meet the expectations of government, industry and customers. The impact of incorrect regulatory settlements are severe, imbalance in either direction can lead to significantly inefficient outcomes for consumers and the wider economy.

RIIO is a fundamentally new approach to undertaking periodical reviews of Britain's regulated energy networks. RIIO introduces a number of innovative ways of working, most strikingly an 8 year review period, the focus on outputs and value, and the adoption of light-touch regulation where light-touch regulation is warranted, consistent with the principles of Better Regulation. RIIO-T1 is the first review of the electricity and gas transmission assets under the RIIO framework.

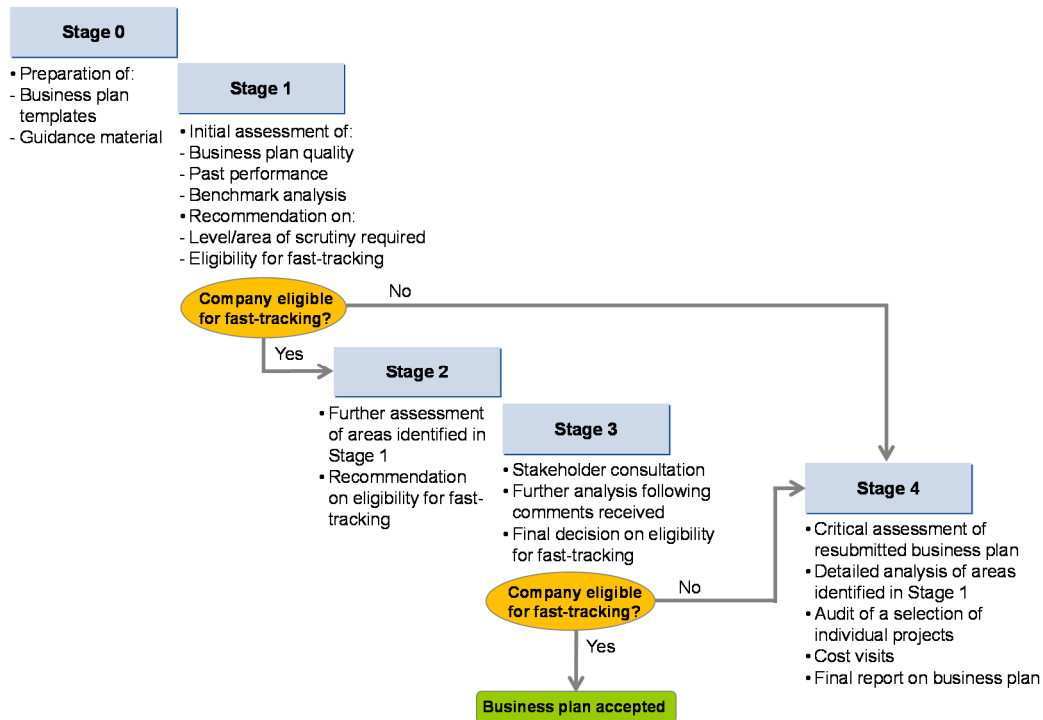
RIIO-T1 takes place within a period of unprecedented uncertainty for Britain's transmission networks. The 8 year period which RIIO-T1 encompasses will see dramatic changes to GB fuel sources, the GB generation mix, energy demand behaviour and technologies/services available for network investment and operations. It is important that the new system is robust because the timely delivery and efficiency performance of our energy network infrastructure is crucial to achieving the government's energy policy targets.

A consortium of engineering consultants comprising Pöyry Management Consulting and GL Noble Denton (Pöyry/GL) has reviewed the National Grid Gas (NGG) business plan submission made in March 2012. This report provides Pöyry/GL's opinions on various elements of NGG's submission, and provides suggestions of allowances to Ofgem.

## 1.2 Overview of our assessment

A key new aspect of the RIIO assessment process is the ability to fast track companies for which the quality of the business plan submitted allows a speedy evaluation. The process is broken down in stages under which the assessment of business plans is undertaken in more or less detail. Figure 1 shows the different stages of the RIIO assessment process and the different paths for companies depending on their eligibility for fast tracking.

**Figure 1 – RIIO Stages**



**1.2.1 Stage 1 assessment**

An initial review was undertaken primarily focussed on the network flexibility element of capex and was based on the overview, detailed plan and table narratives documents. It also included consideration of the risk/uncertainty and forecast elements of the submission. The purpose of this initial review was to see how sophisticated the underlying justification of network flexibility was to see if it appeared well-justified, so that an initial view could be provided to Ofgem management. This also afforded the opportunity to comment on the organisation of the plan as well as its stakeholder engagement elements.

Pöyry/GL then completed a series of ‘task reports’ examining the business plan in greater detail and providing initial views as to whether NGG should be considered for fast-tracking. Subsequent to this, Ofgem have produced a series of ‘working papers’ which Pöyry have examined and passed comment back where appropriate.

Stage 1 of RIIO-T1, Ofgem’s initial assessment of the business plans and accompanying narratives led to two electricity TOs being selected to go through the fast-tracking process. NGG was not fast-tracked.

**1.2.2 Stage 4 assessment**

The stage 4 assessment has comprised the following steps:

- a review of the resubmission to understand the changes from the initial business plan submission; this was aided by an NGG seminar to explain the changes from last time;
- conference calls with Ofgem to discuss and review key issues within the plan;

- submission of questions to NGG to clarify the plan; and
- cost visits to NGG to probe further on the plan contents.

### 1.3 Conventions

All monetary values quoted in this report are quoted directly from the NGG submission and are therefore 2009/10 prices for proposals, or out-turns for historical, unless otherwise stated. Real price effects (RPEs) might be included in these costs: reference to the original source material should be made in the event that there is any ambiguity.

Annual data relates to the basis years contained within the submission (either year commencing 1st April, or year ending 31st March). Reference to the original source material should be made in the event that there is any ambiguity.

Unless otherwise attributed the source for all tables, figures and charts is Pöyry Management Consulting.

[This page is intentionally blank]



## 2. OVERVIEW

### 2.1 NGG submission

National Grid Gas's final submission of its business plan was in March 2012. The submission has been organised into several documents covering the following elements.

- Overview
- Detailed plan
- Stakeholder engagement process
- Outputs
- How we will deliver
- Innovation strategy
- Efficiency and value for money
- Managing risk and uncertainty
- Workforce renewal and growth
- European context
- Critical Network Infrastructure (CNI) update
- IS strategy
- RPE update
- Future of Energy
- Finance
- Financial model
- Pensions
- Data tables
- IS investment descriptions
- Table narratives
- TPCR4<sup>1</sup> review
- Assumptions/glossary
- Asset guide

NGG has updated the plan from its July 2011 plan to include the following amendments:

- justification of investment proposals to ensure Industrial Emissions Directive (IED) compliance;
- further details of compressor investment;
- further detail on unit costs;
- further detail on asset health;
- additional opex/capex section in detailed plan;
- updating “asset health” to include substantiation of the removal of Feeder 1;
- updating “system operation” to explain linkage between drivers and process changes, and further information on European-led changes;
- updating “system operation” section to reflect the outcome of Ofgem’s review of xoserve funding, ownership and governance;
- additional detail on SO and closely associated indirect opex movements;
- further detail on data centre strategy;
- further information on connections and capacity;

---

<sup>1</sup> The 4<sup>th</sup> Transmission Price Control Review

- updating network flexibility section;
- updating South west LNG section; and
- correction of a material error on asset health investment increasing this by £72m.

Our analysis explored several elements of the business plan. Where there was a lack of clarity further information was sought from NGG through cost visits and formal questions submitted to NGG. The plan was assessed against various external metrics and indicators, as well as against our industrial intelligence and intellectual capital. This report summarises our findings of the adequacy of NGG’s revised plan.

## 2.2 Breakdown of expenditure

NGG’s ‘Overview’ document provides a useful summary of the envisaged expenditure over the RIIO period at page 32. An extract of this summary is provided in Table 1 below. The table highlights that:

- half of the expenditure envisaged by NGG will be covered through uncertainty mechanisms, i.e. it will not require explicit ex-ante funding; and
- of the ex-ante funded expenditure, non-load related activities form the largest set of expenditures.

**Table 1 – Summary of expenditure**

<i>(£m 2009/10 including RPE)</i>	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Load-related – baseline capital expenditure	24	17	6	6	11	6	1	0	71
Load-related – uncertainty mechanisms	117	232	450	560	831	854	278	16	3338
Load-related – revenue drivers from historical price controls	16	28	75	116	75	23	1	1	335
Non load-related capital expenditure	155	223	200	229	285	238	181	165	1676
SO capital expenditure	75	34	28	30	30	26	23	19	265
<b>Total capital expenditure</b>	<b>387</b>	<b>534</b>	<b>758</b>	<b>942</b>	<b>1,233</b>	<b>1,147</b>	<b>483</b>	<b>201</b>	<b>5685</b>
TO controllable operational costs	92	92	105	96	97	98	100	101	781
SO controllable operational costs	40	43	43	41	42	43	44	45	341
Network Innovation Allowance costs	7	7	8	8	10	10	10	9	69
<b>Total operating expenditure</b>	<b>139</b>	<b>142</b>	<b>156</b>	<b>146</b>	<b>149</b>	<b>151</b>	<b>153</b>	<b>155</b>	<b>1191</b>
<b>Total expenditure</b>	<b>526</b>	<b>675</b>	<b>914</b>	<b>1,088</b>	<b>1,382</b>	<b>1,298</b>	<b>637</b>	<b>355</b>	<b>6875</b> 100%
Total funded - baseline	381	405	373	390	453	402	343	324	3071 45%
Total funded – uncertainty mechanisms	117	232	450	560	830	854	278	16	3337 49%
Funded separately	28	39	91	138	99	42	16	15	468 7%

Source: NGG. Note: figures include RPEs which are accounted for separately within the detailed submission.

There are three load-related uncertainty mechanisms: entry capacity, exit capacity and network flexibility. Entry and exit capacity uncertainty mechanisms are already in operation having been established in previous price control reviews. The Network Flexibility uncertainty mechanism has been introduced by NGG to fund investment that might be driven by changes in their customers’ behaviour which is increasingly unpredictable.

Non-load related expenditure is dominated by the impact of the implementation of the Industrial Emissions Directive<sup>2</sup> (IED). NGG envisage that the transposition of the IED will require them to replace a large part of their current gas network compressor fleet.

The majority of expenditure envisaged by NGG relates to investment in new or replacement pipelines and compressors. Most of the investment requirements have been derived using unit cost assumptions, and so the expenditure envisaged is sensitive to these assumptions.

### 2.3 Scope of our review

Our review has focussed primarily on the larger ex-ante requirements set out in the business plan. In respect of the unit cost assumptions that underpin the majority of the envisaged expenditure, we have reviewed both pipeline and compressor unit costs. However we are aware that a review of compressor unit costs has been undertaken internally by Ofgem, in parallel, which has followed verbal consultation with us.

Our review, which is summarised within this document, has therefore covered:

- unit costs;
- ex-ante load-related capex requirements:
  - network flexibility;
  - the replacement of Avonmouth LNG facilities;
- non-load related capex requirements:
  - IED related concepts;
  - asset health expenditure;
- opex and non-operational capex requirements:
  - efficiencies;
  - direct costs;
  - closely associated indirect costs;
  - RPEs;
- some of the proposed uncertainty mechanisms:
  - RPEs;
  - entry and exit capacity;
  - network flexibility; and
  - asset health.

We have also reviewed the concept of and NGG's proposals in respect of network flexibility.

---

<sup>2</sup> 2010/75/EU

[This page is intentionally blank]

### 3. UNIT COSTS

#### 3.1 Pipelines

From publically available information obtained at the time the review was undertaken it was not possible to identify any pipeline costs comparable to NGG’s. Therefore, a comparison has been carried out with pipeline cost data as prepared by GL Noble Denton for an overseas client which include technical considerations similar to those addressed by UK practice.

The associated feasibility study comprised nine pipeline sections totalling 280km, and several pipe sizes ranging from 500mm to 1200mm were evaluated for each section. The levels of construction difficulty included: farmland, hills, roads, railways, rivers and urban areas. The adopted pipeline routing code was ASME B31.8 except where infrastructure design requirements were not sufficiently covered, and then relevant IGE/TD/1 recommendations were used.

Pipeline costs were initially prepared at 2007 UK prices at a detail level similar to that identified by NGG. The pipeline costs have been inflated to 2009 costs by using both a simple RPI inflator, and using the 8% inflator used by NGG. These are shown in Table 2 below. These suggest that NGG’s proposed pipeline unit costs are between 12% (for ‘normal’ 1200mm pipeline with NGG’s RPE assumptions) and 53% (for ‘normal’ 600mm pipeline without RPEs applied) overvalued.

**Table 2 – NGG and GL pipeline unit costs compared (2009/10 prices)**

[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

We have not applied these observations on unit costs to the projects included within NGG’s business plan to produce recommended allowances because of the need to consider them alongside similar observations in respect of compressor unit costs being made independently by Ofgem. We note that the main impact of applying different pipeline unit costs will be on investment that is already contained within uncertainty mechanisms.

## 3.2 Compressors

From publically available information it has not been possible to identify any compressor costs which we consider to be comparable to NGG's and no other industry sources have been identified.

We have reviewed the unit costs historically assumed by NGG and have noted that there is a substantial change to the unit costs assumed under RIIO-T1. Whilst we acknowledge that a significantly different methodology has been employed to generate more recent unit costs, we have not been convinced that the new methodology produces a greater degree of accuracy.

We have not applied these observations on unit costs to the projects included within NGG's business plan because of the parallel work undertaken by Ofgem. Unlike pipeline unit costs, we note that a significant proportion of ex-ante funding (i.e. IED related investment), would be impacted by changes to compressor unit costs.

## 4. LOAD RELATED CAPEX

The load-related (LR) capex element of the business plan has largely been handled through treatment in the uncertainty mechanisms. There are three categories of spend: entry capacity, exit capacity and network flexibility. The entry and exit capacity concepts are continuations of previous approaches, with some relatively minor changes proposed. Network flexibility is newly introduced, and is now largely included in an uncertainty mechanism (the July 2011 submission proposed that network flexibility should be ex-ante funded.)

It is important to note that any capex that is based on pipeline and compressor unit costs may be subject to modification if different unit costs are adopted. As noted in chapter 3, we have not modified the capex figures assumed by NGG.

Our work to assess the detail of the LR plans has focussed on four areas:

- the network flexibility concept;
- ex-ante network flexibility requirements;
- Avonmouth replacement; and
- the specific projects funded via uncertainty mechanisms.

Within this summary document we have not included discussion regarding:

- the network flexibility concept: our review has put forward the view that it is inappropriate to treat network flexibility in the same way as 'strategic wider works' – a concept similar to network flexibility that forms an uncertainty mechanism in electricity transmission price controls – and that NGG's proposed uncertainty mechanism seems appropriate; or
- the specific projects funded via uncertainty mechanisms: our review considered that the likelihood of receiving user signals to trigger the expected levels of expenditure was low, noted that the associated costs appeared high and urged Ofgem to consider any subsequently proposed revenue drivers carefully.

We discuss each of the other elements in separate sections below.

### 4.1 Ex-ante network flexibility requirements

The business plan includes [REDACTED] (over the RIIO-T1 period) in three distinct proposals for expenditure to be funded on an ex-ante basis:

- £22.3m for Scottish capacity support following the decline in supplies from the North;
- [REDACTED] for Lockerley compressor station reinforcement following supply pattern changes; and
- £9.3m for 'seedcorn' investment to facilitate the speedier development of less certain reinforcements.

We have considered each of these three areas of investment proposals in detail, concluding, at a high level, that we:

- Broadly support the proposed Scottish capacity investment – whilst elements of NGG's supporting analysis are weak, we agree with the logic applied by NGG which

can be drawn from general stipulations made by NGG and we consider that the investment proposed appears to be efficient.

- Disagree that the case has been made for allowing the Lockerley investments on an ex-ante basis – the problem appears to be an intermittent and/or emergent issue, and appears to be at least partly mitigated by other investments (the Avonmouth replacement project, discussed in section 4.2 below). It is therefore not clear whether or when the investment might be required and therefore is perhaps better managed via the relevant uncertainty mechanism. We therefore propose that it is disallowed (██████████).
- Consider that the ‘seedcorn’ investment concept offers some merit, but that it requires careful consideration to limit potentially inefficient speculative costs: a detailed case for each potential project has not been provided. However, if a problem were to materialise, the on-going costs of commercial management could be significant and could introduce significant distortions in the gas market. We have considered each proposed project in turn, and have recommended that some of the ‘seedcorn’ investment is disallowed. In particular we recommend that ‘seedcorn’ investment for:
  - East-West/West-East flows is specifically allowed (£5.9m); and
  - Asselby compressor is disallowed (██████████).

Because it is a relatively small level of expenditure, we have not reviewed other proposed RIIO-T1 ‘seedcorn’ investments so do not propose that the expenditure is disallowed.

We therefore propose ██████████ of the proposed ██████████ ex-ante funding is disallowed.

## 4.2 Avonmouth replacement

In our review of the July 2011 business plan we noted that the Avonmouth replacement project proposals “appear to be well justified, with a clear articulation of the problem, exploration of a number of alternative solutions, and a meaningful analysis of these alternatives to identify the proposed investment. The infrastructure identified also appears to make ‘logical sense’”. The proposals were to replace the procurement of services at Avonmouth from National Grid LNG Storage (NGLNGS) with pipeline reinforcement of part of the NTS; NGG assumed that NGLNGS would require NGG to cover the full costs of the asset replacements necessary to maintain the service.

In the March 2012 business plan, additional analysis was included to explore the ramifications of Scotia Gas Networks (SGN) continuing to use Avonmouth for supplying the Scottish Independent Undertakings (SIUs). NGG has assumed that, for as long as SGN are intending to use Avonmouth, this lowers the costs to them of maintaining services at Avonmouth. We note that costs would be incurred by different sets of users (assuming SGN SIU costs are targeted at SIU users who are not impacted by NGG’s costs), so this appears to be an appropriate assumption.

Notwithstanding the unit costs that NGG has used for estimating the pipeline costs, we continue to believe that the proposals for Avonmouth seem sensible.



## 5. NON-LOAD RELATED CAPEX

### 5.1 Emissions

We have not provided an opinion on whether the proposed IED investments should be allowed or disallowed. We have provided the following observations to Ofgem.

#### 5.1.1 Emissions – other transmission operators

The NetConnect Germany document “Assessment of the long-term transmission capacity requirements, 2011” gives some details of compressors which are to be modified or replaced in order to meet requirements of the Large Combustion Plant Directive (LCPD). On p55 of that document some thirty seven compressor units are listed along with the proposed remedial actions to bring them into compliance. The remedial actions range from retrofitting individual components through upgrading the combustion system to the total replacement of the drive. Eight of the units require “machine train replacement” but the types of replacement units are not identified. The remaining twenty-nine units are to remain gas powered, whether modified or replaced. No costs are available but upgrades must be complete by October 2015.

Information regarding planned IED compliance works has been received from an anonymous European transmission system operator who currently operates gas turbine drives on its compressors. That operator is adopting a different strategy from NGG and intends to replace all its current gas drives with electric and will retain no gas driven compressors. However, to ensure resilience in electric supply the operating strategy will require the use of gas turbine powered generation on all sites. No costs are available but technology review is anticipated to start during 2013 with the design work to be completed in 2017.

#### 5.1.2 Emissions – technology choices

NGG recognises that technologies will continue to evolve and the ‘Best Available Technique’ (BAT) to limit the emissions from any particular site will not be known until the design studies are complete. However, NGG has identified its investment strategy for compressors within its Detailed Plan document. The obligations to adopt BAT for emissions limitation and to provide operational resilience for the loss of any one compressor unit and/or HV electrical supply, has led to a planning assumption that each site should generally contain compressor units powered by alternative fuels. Normally, on sites with two compressor units the lead unit would have an electric drive while the standby unit would have a gas turbine drive.

There are no local emissions of CO or NO<sub>x</sub> resulting from the use of electric motor drives.

All modern gas turbines come with an option for dry low emissions (DLE) combustion control. Abatement of NO<sub>x</sub> emission to a level of less than 50mg/Nm<sup>3</sup> (15%O<sub>2</sub>;dry) is readily achievable for the typical sizes of gas turbine utilised by National Grid (over at least part of the operating range, typically 70-100% rated power).

Overall, the planning assumption made by NGG for one electric variable speed drive (VSD) along with one DLE gas turbine drive provides an attractive solution which addresses emissions control, overall thermal efficiency and site resilience; however it remains unclear whether it will be required under the transposition of IED.

## 5.2 Asset health

As well as routine asset health investment (investing to ensure the continued reliability of existing assets), NGG's proposals for asset health include a significant level of expenditure associated with replacing part of 'Feeder 9' – a pipeline that provides the majority of the entry capacity at Easington – because the existing section crossing the river Humber is deteriorating.

The Feeder 9 replacement project represents approximately [REDACTED] of asset health expenditure. Other asset health expenditure is can be categorised for pipelines (approx. 30%) and compressors (approx. 25%). Pipelines and compressors (a categorisation known as the 'primary asset group') collectively comprise the vast majority of residual asset health investment planned for the RIIO-T1 period, and these assets have been the main focus of our review of forecast expenditures. We have examined the proposed expenditure at a detailed level, known as the 'secondary asset group'.

### 5.2.1 Feeder 9 replacement

NGG has outlined problems with the Feeder 9 crossing of the Humber. The concern is over erosion which has caused exposure of the pipe crown and there is potential for further loss of cover. NGG is progressing unproven remedial action to protect the exposed crown. Also, a longer term solution requiring a replacement pipeline section is under development as detailed in the plan.

The remedial action is an unproven technique so therefore carries the risk of being unsuccessful or insufficient; however it has been estimated as having the potential to last for ten years.

There is also a risk that the current landlord refuses to renew the lease in 2016, because of a failure to 'repair and maintain the asset', and for specific breach of the lease covenants which includes a minimum burial depth of six feet. Should the lease not be renewed ([REDACTED]), then the matter would be subject to legal proceedings with an unpredictable outcome.

We have considered whether the replacement project should be funded through an uncertainty mechanism, which would be triggered in the event that the remedial action proves unsuccessful or that the lease is not renewed. However, the proposed options for replacing the crossing are all challenging engineering problems and the impact on the market, in the event of failure of the crossing, would be catastrophic (the GB market would lose a significant amount of capacity to access the Rough storage facility and the Langede importation facility, amongst other crucial supplies, presenting a potentially significant security of supply problem).

There is no relevant cost detail in the public domain with which to compare the tunnel costs, so we are unable to comment on their accuracy although we note that they have been prepared by a specialist consultant.

We consider that the investment should be allowed as proposed by NGG ([REDACTED]), but subject to stage reviews to be agreed with Ofgem.

### 5.2.2 Primary asset investments

NGG's investment plans for primary assets is based on a forecast of asset condition and predicted utilisation over the RIIO-T1 period and beyond, with higher levels of certainty in the earlier years, typically 3 to 4 years, but becoming less certain further into the future.

The pipelines and compressors primary asset groups collectively comprise the majority of the forecast asset health investment (excluding Feeder 9 replacement) planned for the RIIO-T1 period.

Our review has focussed at the more detailed level of the secondary asset grouping.

### 5.2.3 Secondary asset investments

This section summarises our recommendations with regard to NGG’s forecast asset health investment for secondary (and ultimately, primary) assets for the RIIO-T1 period.

#### *Below ground pipe and coating*

- ■ no. annual in-line inspection (ILI) and cathodic protection (CP) interventions at a unit cost of ■ per intervention plus staff growth of £0.5m giving an allowance of £5.3m per annum and a total of £42.4m over the period.
- Removal of ■ block valve installations at an allowance of £20m.
- Removal of £500k provision for failed, or failing, stopple fittings.

This results in a total recommended allowance of £62.4m for below ground pipe and coating and for block valve rationalisation, a reduction of £16.7m, or 21%, on NGG’s forecast of £79.1m.

#### *River crossings*

- A refurbishment allowance of £12m based on ■ no. refurbishments per annum at a unit cost of ■ per refurbishment.
- An allowance for pipeline diversions of £28m based on ■ per annum at a unit cost of ■

This results in a total recommended allowance of £40m for river crossings, a reduction of £10m, or 20%, on NGG’s forecast of £50m.

#### *Unit control system*

- ■ no. replacement unit control systems at a unit cost ■ to give an allowance of £32.5m over the RIIO-T1 period.
- ■ no. refurbishments of existing control systems at a unit cost of ■ to give an allowance of £9.5m over the RIIO-T1 period.

This results in a total recommended allowance of £39.0m for unit control systems, a reduction of £2.3m, or 6%, on NGG’s forecast of £41.3m.

#### *Impact protection*

- ■ no. nitrogen sleeve refurbishments per annum at a unit cost of ■ per sleeve. This gives a RIIO-T1 total of ■ sleeves (equivalent to ■% of NGG’s population of NTS nitrogen sleeves).

This results in a total recommended allowance of £16m for impact protection, a reduction of £7.1m, or 31%, on NGG’s forecast of £23.1m.

#### *Civil assets (access)*

- Refurbishment of ■ ladders at a total cost of £350k.

- Replacement of road barriers at a total cost of £1.0m.
- Refurbishment of ■ lifting beams (£300k) plus lifting beam extensions (£4.3m).
- An allowance of £8.4m for the refurbishment of access roads to AGI sites.

This results in a total recommended allowance of £14.35m for civil assets (access), a reduction of £5.65m, or 28%, on the NGG forecast of £20.0m.

#### *Gas generator*

- Overhaul of ■ gas generators at a unit cost of ■■■■ to give an allowance of £14.4m over the RIIO-T1 period.
- Minor refurbishment of ■ gas generators at a unit cost of ■■■■ to give an allowance of £1.8m over the RIIO-T1 period.

These result in a total recommended allowance of £16.2m for gas generators, and no reduction in NGG's forecast.

#### *Gas analyser*

- Installation of ■ new solid/liquid detection systems at a unit cost of ■■■■ to give an allowance of £7.5m over the RIIO-T1 period.
- Replacement of ■ gas analysers at a unit cost of ■■■■ to give an allowance of £8.1m over the RIIO-T1 period.

This results in a total recommended allowance of £15.6m for gas analysers, and no reduction in NGG's forecast.

#### *Locally actuated and remote isolation valves*

- An allowance of £15.4m for the refurbishment and replacement of locally actuated (LA) valves; and
- an allowance of £11.5m for the replacement and refurbishment of remote isolation (RI) valves.

This results in a total recommended allowance of £26.9m for LA and RI valves, and no reduction on NGG's forecast.

#### *Security*

- The replacement of the security systems at:
  - ■ smaller sites at ■■■■ per site = £6m.
  - ■ medium-sized sites at ■■■■ per site = £1m.
  - ■ larger sites at ■■■■ per site = £3.2m.
- The refurbishment of an additional ■ sites at ■■■■ per site = £2m.

This results in a total recommended allowance of £12.2m for security, a reduction of £3m, or 20%, on the NGG forecast of £15.2m.

#### *Electrical (including standby generators)*

- Replacement of ■ standby generators at a unit cost of ■■■■ to give an allowance of £2.4m over the RIIO-T1 period.

- Replacement of ■ low voltage switchboards at a unit cost of ■ to give an allowance of £2.4m over the RIIO-T1 period.
- Replacement of ■ minor electrical systems at a unit cost of ■ to give an allowance of £5.7m over the RIIO-T1 period.

This results in a total recommended allowance of £10.5m for electrical including standby generators, a reduction of £0.5m, or 5%, on the NGG forecast of £11.0m.

#### *Exhausts*

- Replacement of ■ exhaust stacks at a unit cost of ■ to give an allowance of £10.5m over the RIIO-T1 period.
- Repair of ■ exhaust stacks at a unit cost of ■ to give an allowance of £1.2m over the RIIO-T1 period.
- An allowance of £1.0m to deal with any asbestos issues.

This results in a total recommended allowance of £12.7m for exhaust stacks, a reduction of £0.6m, or 5%, on NGG's forecast of £13.3m.

#### *Power turbines*

- Overhaul of ■ power turbines at a unit cost of ■ to give an allowance of £13.0m over the RIIO-T1 period.

This results in a total recommended allowance of £13.0m for power turbines, and no reduction in NGG's forecast.

#### *Preheaters*

- Replacement of ■ large heating systems at a unit cost of ■ to give an allowance of £8.0m over the RIIO-T1 period.
- Replacement of ■ medium heating systems at a unit cost of ■ to give an allowance of £2.0m over the RIIO-T1 period.
- Replacement of ■ small heating systems at a unit cost of ■ to give an allowance of £0.8m over the RIIO-T1 period.
- Partial refurbishment of ■ heating systems at a unit cost of ■ to give an allowance of £1.4m over the RIIO-T1 period.

This results in a total recommended allowance of £12.2m for preheaters, and no reduction in NGG's forecast.

#### *Other*

Where forecast asset health investment for any particular asset group is <£10m over the RIIO-T1 period, then as agreed with Ofgem the NGG submission does not provide the make-up of the investment proposal. Therefore, it is not possible to objectively assess this 'other' asset health expenditure.

However, based on the analyses carried out on the quantified elements of asset health investment as identified in NGG's business plan, we assume that NGG has overestimated its 'other' asset health expenditure by a similar overall proportion of 14%. Therefore we propose that a reduction of 14% is applied to "other" asset health expenditure.

This results in a total recommended allowance of £121.4m for ‘other’ asset health items, a reduction of £19.2m, or 14%, on NGG’s forecast of £140.6m.

**Summary**

Table 3 summarises the proposed allowances at the secondary asset grouping.

<b>Table 3 – Asset health allowances</b>				
<b>Secondary Asset</b>	<b>NGG Proposal (£m)</b>	<b>GL Proposal (£m)</b>	<b>Difference (£m)</b>	<b>Difference (%)</b>
<b>Below ground pipe and coating</b>	79.1	62.4	- 16.7	-21%
<b>River crossings</b>	50.0	40.0	- 10.0	-20%
<b>Unit control systems</b>	41.3	39.0	-2.3	-6%
<b>Impact protection</b>	23.1	16.0	- 7.1	-31%
<b>Civil assets (access)</b>	20.0	14.3	- 5.7	-29%
<b>Gas generators</b>	16.2	16.2	0.0	0%
<b>Gas analysers</b>	15.6	15.6	0.0	0%
<b>LA valves</b>	15.4	15.4	0.0	0%
<b>RI valves</b>	11.5	11.5	0.0	0%
<b>Security</b>	15.2	12.2	- 3.0	-20%
<b>Electrical</b>	11.0	10.5	-0.5	-5%
<b>Exhausts</b>	13.3	12.7	-0.6	-5%
<b>Power turbines</b>	13.0	13.0	0.0	0%
<b>Preheaters</b>	12.2	12.2	0.0	0%
<b>Other</b>	140.6	120.8	-19.8	-14%
<b>Totals</b>	<b>477.5</b>	<b>411.8</b>	<b>-65.7</b>	<b>-14%</b>

## 6. OPERATING COSTS AND NON OPERATING CAPEX

### 6.1 Efficiencies

This section describes the long term efficiency savings that NGG should be making.

NGG in their submission propose that they should be able to achieve 1.3% average annual efficiencies. NGG comments that “a focus in our efficiency is embedded in our culture”. NGG however provides little detail for the efficiencies to be made except that they will “be delivered via labour productivity improvements, procurement activities and continuous improvement”. The justification for 1.3% is by comparison to other industries rather than by identification of specific efficiencies.

We have reviewed the various data sets used by NGG to justify the 1.3% figure. This has involved examining efficiencies discussed by:

- EU KLEMS;
- DPCR5;
- GDNs; and
- ONS;
- Water industry;
- the Juran report.

Also of note is that NGET is offering 1.6% per annum efficiency and that NGG has achieved around 2% annual efficiencies in TPCR4. Furthermore, NGG is asking for a substantial increase in its innovation funding from 0.5% to 1% of revenue per year costing £7m per year. This innovation expenditure would only be worth funding if it delivered over £7m worth of additional benefits. Although some of this would be in capex and safety or customer service, this expenditure would also be expected to achieve operating cost savings. Additionally, NGG is asking for £55m in RIIO-T1 for IS expenditure and this would be expected to deliver additional efficiency savings.

Overall, we believe that the 1.3% annual efficiency saving proposed by NGG is not nearly ambitious enough, in particular:

- GDNs achieved 5% per annum following sale;
- water companies have been targeted with an average close to 1.5% per annum after 20 years of competitive benchmarking; and
- NGG achieved 2% efficiencies per year in TPCR4.

Taking all this evidence into account, we believe that 2% per annum efficiency target is achievable and should be set as the target for NGG.

### 6.2 Direct costs

#### 6.2.1 *Planned inspections & maintenance and Fault repairs*

NGG’s gas transmission assets are identified against three principal asset groups; pipelines, compressors and other installations. Direct opex for each asset group is presented in two main categories; Inspection & Maintenance (I&M) and Repair, each of these categories being further split into sub-categories of Staff, Non-staff and Outsourced. The overall cost of these activities is shown to rises from £27.2M in 2010/11 to £29.6M in 2020/21.



*Coal tar enamel*

NGG identifies its principal concern to be coal tar enamel (CTE) coated pipe comprising some 57% of the total network length. Following a review of relevant literature we believe NGG’s assumptions in respect of the level of CTE remediation to be pessimistic.

With this in mind our view is that an appropriate allowance for ILI and CP interventions during RIIO-T1 should be the average of that for the TPCR4 period, corresponding to [REDACTED] interventions per year at an average cost of [REDACTED] as proposed by NGG. This would result in an average annual cost of £4.8m rather than £6.9m, a reduction of £2.1m in each year in RIIO-T1.

*Income*

NGG have identified a potential loss of income to the Pipeline Maintenance Centre as independent gas distribution networks establish their own capability.

We believe that NGG can take measures to avoid the loss of revenue and should also actively be identifying opportunities to replace this revenue. For 2015/16 and 2016/17 the projected 2017/18 level of income should be achievable and this would provide an additional [REDACTED]: [REDACTED] in 15/16 and [REDACTED] in 16/17.

*Summary*

In summary, fault repairs are adjusted by £2.1m each year (for ILI/CP costs) and by an additional [REDACTED] in 2015/16 (for compressor decommissioning). The net impact is shown in Table 4.

**Table 4 – Fault repairs**

	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
<b>NGG Fault repairs</b>	7.60	7.07	15.68	6.91	7.11	7.15	7.08	6.98
<b>Adjust for compressor</b>	7.60	7.07	7.78	6.91	7.11	7.15	7.08	6.98
<b>Adjust for ILI/CP</b>	5.50	4.97	5.68	4.81	5.01	5.05	4.98	4.88
<b>Adjust for efficiency</b>	5.39	4.83	5.48	4.61	4.77	4.77	4.67	4.54

Table 5 shows Pöyry’s recommendations for I&M costs having adjusted for the higher income we believe NGG can achieve and for the larger efficiency challenge.

**Table 5 – I&M**

	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
<b>NGG I&amp;M</b>	22.20	22.22	24.57	23.67	23.32	22.91	22.88	22.57
<b>Adjust for income</b>	22.20	22.22	23.32	23.18	23.32	22.91	22.88	22.57
<b>Adjust for efficiency</b>	21.73	21.59	22.50	22.21	22.19	21.64	21.46	21.02



### 6.2.2 Operational property management

National Grid assumes that property costs will continue to increase by 1% real per annum. NGG provides no justification for this figure other than historical changes in property costs. Given the current economic situation we see no basis for this assumption. The Royal Institute of Chartered Surveyors in its latest commercial market survey (Q1 2012) notes that: “rent expectations remain negative”.

Accordingly we have adjusted NGG’s proposals on operational property costs downwards by 1% per annum as well as adjusting them to deliver 0.7% more efficiencies per year than NGG’s proposals. The impact is shown in Table 6.

**Table 6 – Property management costs**

	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
<b>NGG</b>	5.21	5.13	4.97	4.81	4.77	4.73	4.65	4.56
<b>Pöyry</b>	5.03	4.87	4.64	4.41	4.30	4.19	4.05	3.91

### 6.2.3 Innovation costs

As discussed in section 6.4 of Pöyry’s cost report, NGG is asking for an increase in the network innovation allowance (NIA) from 0.5% of revenue to 1% of revenue per year but our recommendation is to maintain the IFI allowance at 0.5% of revenue. We recognise that innovation is an important element of RIIO-T1 but we also note that, not only will NGG be able to fund innovation through the NIA scheme but also that it can apply for additional funding through the NIC and IRM. As noted in the Pöyry cost report, the inability of NGG to justify their innovation proposal through efficiency savings has led to our view that the increase cannot be substantiated.

Accordingly we recommend that NGG’s proposed IFI spend is halved, maintaining the percentage allowed in TPCR4. The impact is shown in the table below.

**Table 7 – Innovation costs**

	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
<b>NGG</b>	7.37	7.47	7.75	8.43	10.04	10.43	9.65	9.23
<b>Pöyry</b>	3.69	3.68	3.87	4.22	5.02	5.22	4.83	4.61

### 6.3 Closely associated indirect costs

NGG’s closely associated indirect (CAI) opex is largely driven by capital & maintenance support, operational training, operational IT and gas drawings.

Capital and maintenance support incorporates the CAI Transmission Operations opex outside of gas drawings, operational training and IT including:

- network design and engineering – system design work and strategic planning of the future transmission system;

- engineering management – office based activities including network performance monitoring, KPI completion and upkeep of asset inventories;
- network policy – development and upkeep of technical and engineering policies;
- health, safety and environment – promotion of health and safety of employees and the public and monitoring environmental impacts of the network;
- vehicles and transport – managing, operating and maintaining the vehicle fleet used by the NGG field force;
- market facilitation – information provision to the industry and network code development; and
- network planning – outage planning and facilitating system access.

The basis of NGG's forecast expenditure on capital and maintenance support is to ensure that strategic requirements to operate and develop the network can continue to be adequately implemented. For most of the contributory elements there is little variation from TPCR4 and for RIIO-T1 we support the proposed average level of investment of £10.2m.

We are in agreement with the proposed allowance for Capital and Maintenance support as the costs are to be held stable despite a substantial increase in the asset base. Consequently, we recommend that NGG be allowed the Capital and Maintenance Support opex as identified in its plan apart from the adjustment to efficiencies achieved.

The basis of NGG's forecast expenditure on operational training is to ensure continuing availability of the needed engineering skills. This requires continuing recruitment and the subsequent training of the recruits. Also, existing staff must be developed in order to realise the benefits from new tools and techniques and undergo refresher training at appropriate intervals. We are in agreement with the proposed allowance for operational training, in particular to ensure a continuing level of competent resource during a period of increasing asset base and associated implementation of new techniques. For RIIO-T1 we support the proposed average level of investment of £2.5m. We recommend that NGG be allowed the Operational Training opex as identified in its plan apart from the challenge to efficiency achievable.

Operational IT relates to the support costs for NGG's Transmission Operations IT systems which are integral to network assets. Costs in this area are linked to IT capex associated with Transmission Front Office (TFO) and Strategic Asset Management (SAM). The basis of NGG's forecast expenditure on Operational IT is to ensure that new IT systems are adequately supported following implementation and we support this investment. Also, should new IT systems not be implemented then we consider that requirements to maintain existing systems would probably increase and hence the associated Operational IT costs would not reduce. We agree with the proposed allowance for operational it and telecoms, in particular to enable the operational benefits arising from new IT systems to be fully realised. We recommend that NGG be allowed the Operational IT opex as identified in its plan apart from the increased efficiency challenge.

We have summarised NGG proposed allowances and the effect of applying the efficiencies in Table 8.

**Table 8 – Capital and maintenance support summary**

2009/10 £m	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
<b>NGG</b>	14.49	14.94	15.28	15.1	15.21	15.06	15.00	14.99
<b>Pöyry</b>	14.18	14.51	14.75	14.5	14.46	14.22	14.06	13.96

## 6.4 RPEs

Our review has considered manpower, materials and electricity RPEs.

### *Manpower*

We do not agree with NGG’s interpretation of the data it has collated as precedents for labour RPEs, so we do not agree with its conclusions on manpower RPEs. In its conclusions NGG assumes that 50% of staff and 25% of managers are specialists without justifying these percentages. We are also sceptical of the First Economics<sup>3</sup> conclusion that specialist salaries will continue to grow more rapidly than those of general staff as it is unclear why the differential will continue to increase rather than be maintained between specialist and generalist staff. We recommend a low and a high option to provide a range for Ofgem in setting labour RPE. The low option uses First Economics’ projections for generalist staff. The high option blends First Economics’ projections for specialist and generalist staff assuming a 25:75 mix.

### *Materials*

The report by First Economics proposed material RPEs for electricity that were substantially lower than NGG’s proposals. In addition, it is not clear how the Experian report which NGG have used to support their assumptions regarding oil prices is related to the NGG forecasts – it appears to be substantially lower. On the basis of First Economics’ report together with the likelihood of continuing global slowdown and hence demand for materials lower than expected, we have suggested an RPE of 1% per annum from 2012/13 for material costs. However, we also recommend that Ofgem obtains independent expert forecasts.

### *Electricity*

Our latest standard central scenario<sup>4</sup> shows a little over half the amount of growth that NGG is proposing in electricity prices. Again, we would recommend that Ofgem obtains independent expert forecasts for electricity RPEs but on the basis of the available evidence we would suggest an RPE of 4% per annum for electricity.

<sup>3</sup> Report commissioned by the electricity transmission companies. See SHETL, Supporting document 07, ‘Determining our revenue allowance’.

<sup>4</sup> These are contained within our Ilex Energy Report, ‘Projections of the price of wholesale Electricity in Great Britain’.

## Summary

We have recalculated the NGG RPEs using these recommendations and suggestions. The manpower proposals were presented as a “high” and a “low”. To calculate our recommendations for allowances we have taken a midpoint of the manpower recommendations. We have replaced NGG’s assumptions with ours in the relevant section of NGG’s financial plan. The result is show in Table 9.

**Table 9 – RPE proposals**

RPEs	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
<b>NGG TO</b>	1.4	2.0	4.8	5.9	7.4	9.0	10.8	12.5
<b>Pöyry TO</b>	(1.7)	(0.6)	0.3	0.9	2.1	3.2	4.3	5.6
<b>NGG SO</b>	0.2	0.7	1.2	1.7	.2	2.7	3.3	3.8
<b>Pöyry SO</b>	(0.6)	(0.4)	(0.2)	0.1	0.4	0.8	1.1	1.4

Note that the reason for negative RPEs in the early years is the 2.8% fall in real manpower costs in 2010/11 and the 0.75% fall in real manpower costs in 2012/13

## QUALITY AND DOCUMENT CONTROL

### Quality control

 Report's unique identifier: **2012/355**

Role	Name	Date
Author(s):	Angus Paxton	24 July 2012
Approved by:	Gareth Davies	24 July 2012
QC review by:	Beverly King	24 July 2012

### Document control

Version no.	Unique id.	Principal changes	Date
v1_0	2012/APA3	Initial version	11 July 2012
V2_0	2012/355	Final version	24 July 2012

Pöyry is a global consulting and engineering firm.

Our in-depth expertise extends across the fields of energy, industry, transportation, water, environment and real estate.

Pöyry plc has c.7000 experts operating in 50 countries and net sales of EUR 796 million (2011). The company's shares are quoted on NASDAQ OMX Helsinki (Pöyry PLC: POY1V).

Pöyry Management Consulting provides leading-edge consulting and advisory services covering the whole value chain in energy, forest and other process industries. Our energy practice is the leading provider of strategic, commercial, regulatory and policy advice to Europe's energy markets. Our energy team of 200 specialists, located across 14 European offices in 12 countries, offers unparalleled expertise in the rapidly changing energy sector.



### **Pöyry Management Consulting**

King Charles House  
Park End Street  
Oxford, OX1 1JD  
UK

Tel: +44 (0)1865 722660  
Fax: +44 (0)1865 722988  
[www.poyry.co.uk](http://www.poyry.co.uk)

E-mail: [consulting.energy.uk@poyry.com](mailto:consulting.energy.uk@poyry.com)

