

Annex 1

Price Control for Northern Ireland's Gas Transmission Networks - GT17

Real Price Effects and Frontier Shift

16 December 2016



About the Utility Regulator

The Utility Regulator is the independent non-ministerial government department responsible for regulating Northern Ireland's electricity, gas, water and sewerage industries, to promote the short and long-term interests of consumers.

We are not a policy-making department of government, but we make sure that the energy and water utility industries in Northern Ireland are regulated and developed within ministerial policy as set out in our statutory duties.

We are governed by a Board of Directors and are accountable to the Northern Ireland Assembly through financial and annual reporting obligations.

We are based at Queens House in the centre of Belfast. The Chief Executive leads a management team of directors representing each of the key functional areas in the organisation: Corporate Affairs; Electricity; Gas; Retail and Social; and Water. The staff team includes economists, engineers, accountants, utility specialists, legal advisors and administration professionals.

Our Mission

Value and sustainability in energy and water.

Our Vision

We will make a difference for consumers by listening, innovating and leading.

Our Values

Be a best practice regulator: transparent, consistent, proportional, accountable, and targeted.

Be a united team.

Be collaborative and co-operative.

Be professional.

Listen and explain.

Make a difference.

Act with integrity.

TABLE OF CONTENTS

1	Background.....	4
	Introduction	4
	Methodology	4
2	Real Price Effects	5
	Input Mix Weightings.....	5
	Input Prices - Labour.....	6
	Input Prices - Repex	7
	Input Prices - Maintenance	9
	Input Prices - Other.....	10
	Retail Price Index.....	10
	Conclusions	11
3	Productivity	13
	Regulatory Precedent	13
	Industry Analysis.....	14
4	Frontier Shift	16
	Conclusions	16

ACRONYMS AND GLOSSARY

BCIS	Building Cost Information Service
CJV	Contractual Joint Venture – Single market system operation for TSOs
CMA	Competition and Markets Authority (formerly known as the Competition Commission)
FOCOS	Resource cost index for infrastructure
GNI (UK)	TSO responsible for the North West and South North pipelines
GT17	Gas Transmission 17 – Price control for TSOs
I-OPI	Interim (construction) Output Price Indices
MEL	Mutual Energy Limited
NIE	Northern Ireland Electricity – now known as NIEN
NOCOS	Resource cost index for building (non-housing)
OBR	Office of Budget Responsibility
ONS	Office of National Statistics
Opex	Operating Expenditure
OPI - I	Output Price Index - Infrastructure
OPI - NC	Output Price Index – New Construction
PPI	Producer Price Index
Repex	Replacement Expenditure
RPEs	Real Price Effects
RPI	Retail Price Index
TSOs	Transmission System Operators
UR	Utility Regulator

1 Background

Introduction

- 1.1 This annex details the methodology and considerations of the Utility Regulator (UR) in relation to frontier shift for GT17.
- 1.2 The concept of frontier shift is wider than a simple productivity challenge. The analysis looks at changing industry costs expected for a gas TSO. When compared against inflation forecasts, this provides the real price effect (RPE) for the industry.
- 1.3 Combining RPEs with productivity assumptions results in what is known as ‘frontier shift’. This is separate from catch-up efficiency challenge. Any change in costs as a result of frontier shift would be expected of even the most efficient TSOs.

Methodology

- 1.4 The methodology employed aligns with the CMA determination for Northern Ireland Electricity (NIE) at their last price control. It follows regulatory precedent and is similar in approach to previous price controls undertaken by the UR (i.e. for NI Water and gas distribution companies).
- 1.5 The process combines nominal input price forecasts with productivity expectations and RPI inflation. Frontier shift in real terms can be represented in a simple way as follows:

$$\begin{aligned} \text{Frontier shift in real terms} &= \text{input price increase } \textit{minus} \\ &\quad \text{forecast RPI (measured inflation) } \textit{minus} \\ &\quad \text{productivity improvement} \end{aligned}$$

- 1.6 This report details how the conclusions around real price effects, productivity and frontier shift have been reached.

2 Real Price Effects

Input Mix Weightings

- 2.1 The price of a company's various inputs differ over time. Allowances in price controls are normally indexed by RPI or some other inflationary measure to account for broad changes.
- 2.2 Being a measure of general inflation, not all types of TSO costs will be reflected in the range of prices used in RPI. To account for this, it is common practice to calculate and make adjustments for the difference between particular input price changes for a company or industry and RPI. This is described as *real price effects* (RPEs) and can be either a positive or negative value.
- 2.3 In order to establish the RPEs for gas TSOs, we first need to separate costs into various categories. This is a necessary step as input prices will likely vary for each component of controllable opex.
- 2.4 Nominal price inflation for each category of cost is then forecast. This is weighted depending on the level of cost expected as a proportion of the total. The weighted average is then compared against RPI forecasts to establish the RPEs in each year of the price control.
- 2.5 For GT17, we considered the adoption of weights specific to each company based on spend in the price control period. Whilst a legitimate approach, we have decided not to adopt this methodology.
- 2.6 The principal objective of RPEs is to estimate the likely shift in *industry* cost. Application of TSO specific weights risks passing through inefficient costs if spend in certain areas is proportionally higher than the notional frontier company.
- 2.7 It is also important to note that company weights may change over time more readily than the broader approach of using notional weights. Precedent from other price controls would also point to industry average weights being used.
- 2.8 For the gas TSOs the controllable cost categories reflect their business plan reporting template. This identified a number of activities which mirror those identified by Oxera in their report on efficiency of Dutch TSOs.¹ These include:
 - Administration;
 - Grid construction or repex projects.
 - Network maintenance;
 - TSO physical system operations;
 - CJV market system operations; and
 - Labour cost.
- 2.9 The split by TSO and industry average is provided in Table 1Table 1.

¹ <https://www.acm.nl/nl/publicaties/publicatie/15537/Agendapunt-5-Study-on-ongoing-efficiency-for-Dutch-gas-and-electricity-TSOs/>

Table 1: Proportion of TSO controllable spend in GT17 by cost category

Cost Category	MEL - %	GNI (UK) - %	Industry Average - %
Labour	13.4	19.0	15.7
Administration	18.1	9.2	14.3
Repex	11.4	18.0	14.2
Maintenance	37.3	39.7	38.4
TSO System Ops	14.2	6.5	10.9
CJV system Ops	5.7	7.7	6.5
Total	100%	100%	100%

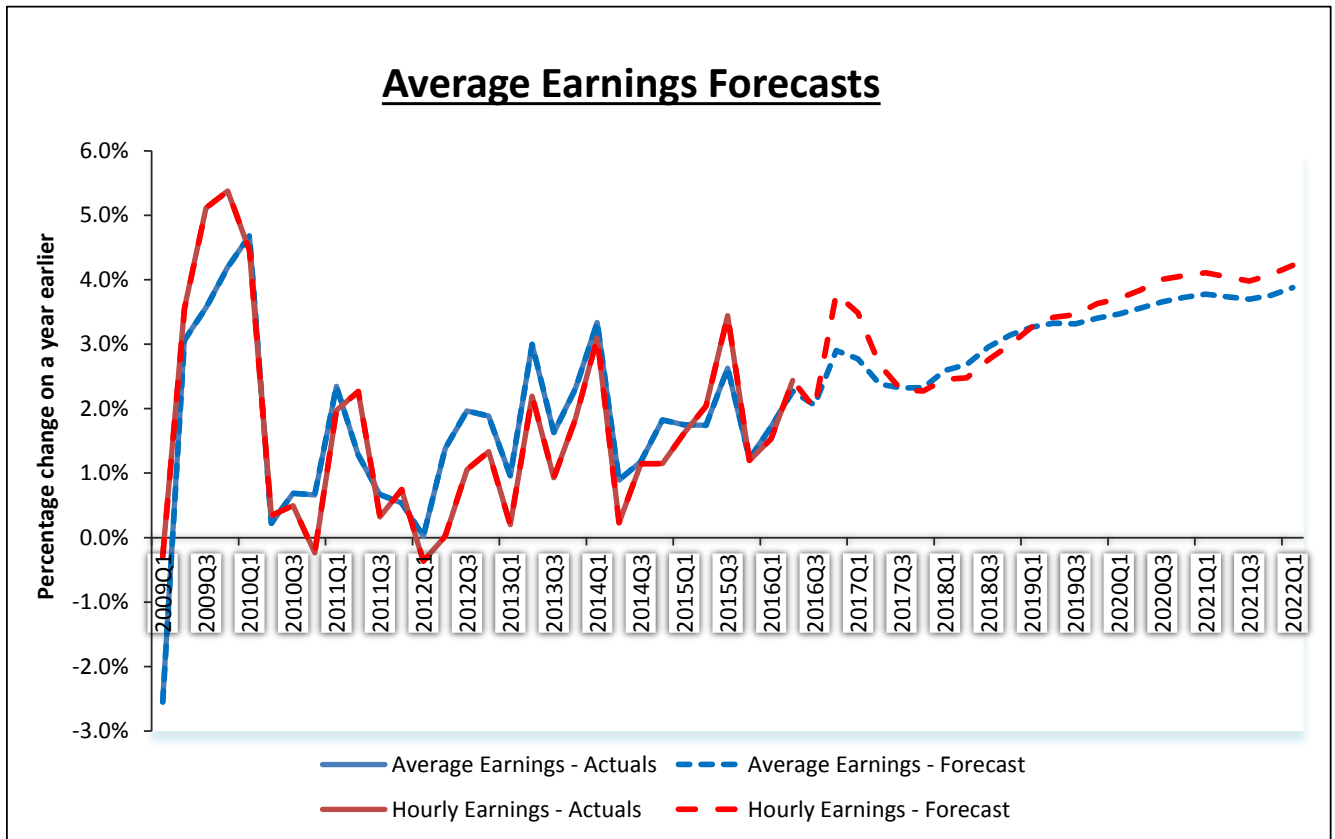
- 2.10 We are using the industry average as the basis for RPE and frontier shift calculations. Whilst the proportion of labour cost may look low compared to other industries, this can be explained in a number of ways. For instance:
- 1) Other industries may split their analysis by opex and capital expenditure. For the NI gas TSOs all spend is treated like opex, including repex and maintenance. Removing these activities would increase the labour proportion substantially.
 - 2) Within the maintenance cost line is a reasonable element of contracted labour cost which is not shown in the first line.

Input Prices - Labour

- 2.11 For our analysis of labour RPEs we have used data provided by the Office of Budget Responsibility (OBR). OBR is a body which is independent of government and provides analysis on a range of economic issues. Their forecasts are empirically based and take into account a number of factors including:
- 1) The continued prospect of economic recovery;
 - 2) The extent and timing thereof for the UK economy; and
 - 3) Other relevant issues such as unemployment rates.
- 2.12 OBR has recently produced forecasts for the economy, wages and earnings in the November 2016 economic outlook.² For GT17 we consider use of this data beneficial, and given the data source, reliable and consistent with our other data series.
- 2.13 We have employed the OBR data for both average earnings and average hourly earnings. This is a general wage rate forecast. However, it is considered to be a reasonable proxy for gas industry wages in the absence of better detail.
- 2.14 Results are provided in Figure 1.

² <http://budgetresponsibility.org.uk/efo/economic-and-fiscal-outlook-november-2016/>

Figure 1: OBR forecasts for earnings growth



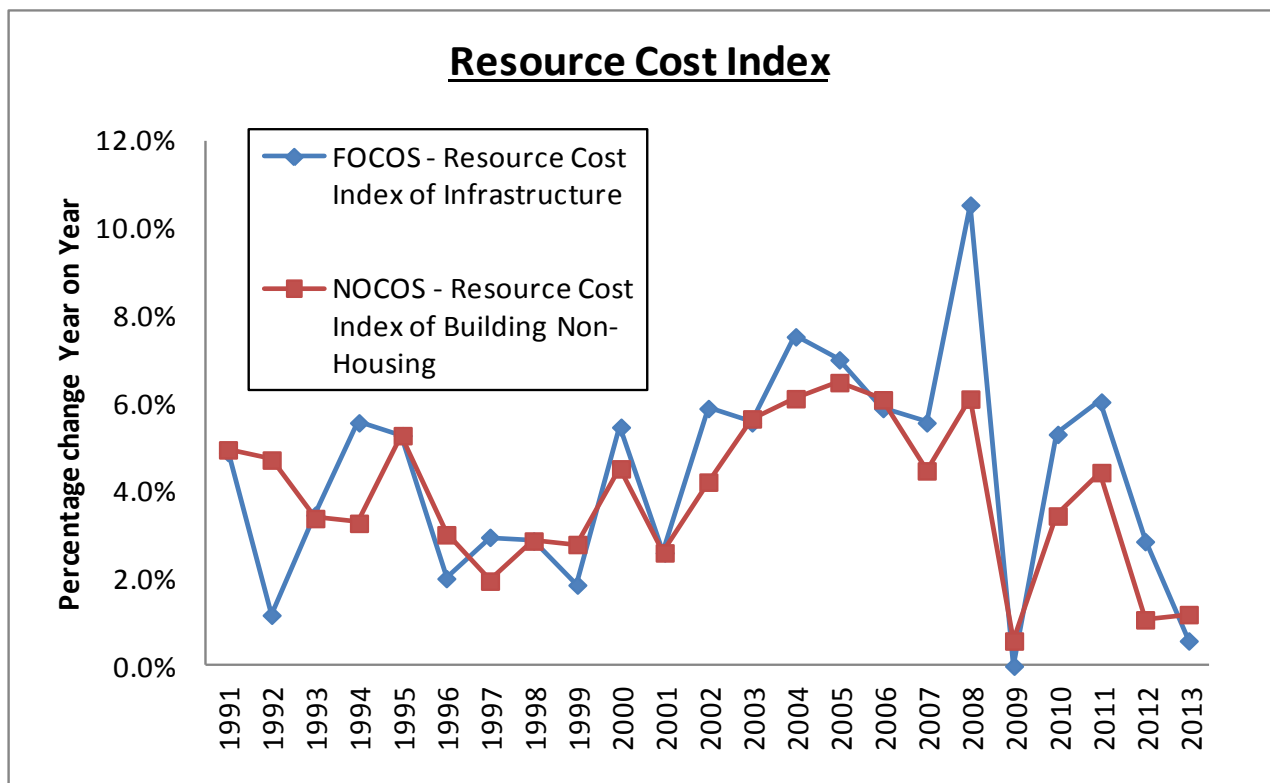
- 2.15 Since the economy entered recession around 2008, earnings growth has remained quite low. However, as economic output increases and the unemployment rate falls, the OBR are predicting a return to nominal earnings growth of between 3 and 4 per cent over the GT17 period.
- 2.16 As the forecasts generally outstrip inflation, this translates into a real terms increase in labour costs during GT17. As per the gas distribution price control, we have used the hourly earnings index as the chosen forecast. This avoids potential issues if TSOs have different working time levels.

Input Prices - Repex

- 2.17 Replacement expenditure (or repex) reflects relatively large construction projects which are required to maintain the operational capability of the network. The costs will tend to fluctuate as need arises, so can be difficult to predict.
- 2.18 We considered the indices available to estimate the price changes for this type of construction work. The Office of National Statistics (ONS) produce figures known as the interim construction Output Price Indices (I-OPIs). This replaced the now discontinued construction figures from BIS (Department of Business, Innovation & Skills).
- 2.19 However only two years of I-OPI data exists. This does not lend itself to the possibility of understanding long term trends and forecasting into GT17.

- 2.20 Our analysis has therefore focused on the BIS price indices. The analysis looked at the following:
- 1) FOCOS – Resource cost index for infrastructure.
 - 2) NOCOS – Resource cost index for building (non-housing)
 - 3) OPI-NC – Output price index for all new construction
 - 4) OPI-I – Output price index for infrastructure.
- 2.21 The first two relate to construction cost inputs, while the latter two relate to final prices for infrastructure and new construction projects. Whilst having been discontinued in 2013, they do still provide useful long term trend analysis.
- 2.22 We then estimated the level of material price inflation for the GT17 period using the data indices above. To do this we first took the current ‘snapshot’ of inflationary indications provided by the I-OPI. We then estimated possible growth scenarios which increase toward the long term average of the relevant indices.

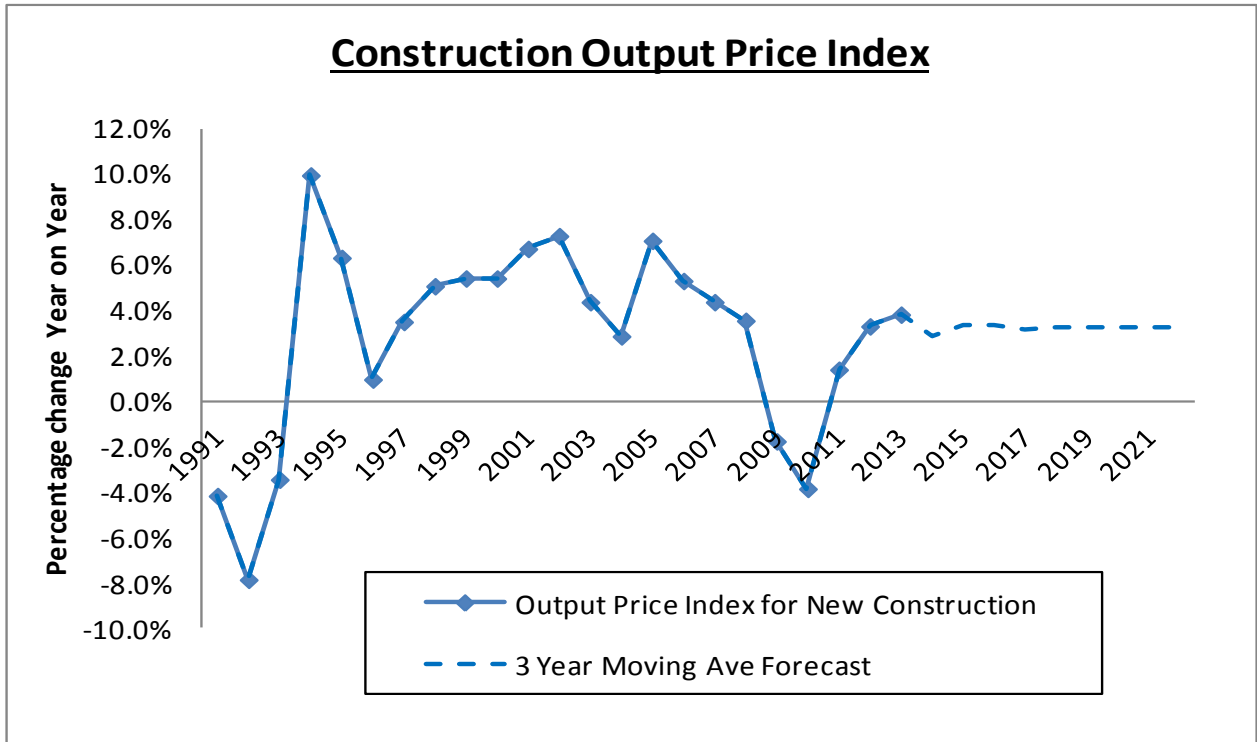
Figure 2: FOCOS and NOCOS annual growth figures



- 2.23 As the chart shows, input prices can be volatile and dependent on wider demand trends. The downturn in prices is noticeable post the 2008 recession. Over the period from 1991 the long term trend for FOCOS and NOCOS is 4.4% and 3.9% respectively.

2.24 We also considered the output price indices and forecast forward using a reversion to the 3 year moving average as a way to smooth the data. For all new construction prices, the results are as follows:

Figure 3: Annual growth figures and forecasts for OPI New Construction



2.25 The long term average for this index from 1991 to 2013 is 2.8%. Using the 3 year moving average results in forecasts of 3.3%, though this is very dependent upon the last years of actual data. Results for the infrastructure index are more volatile, with a period average of 2.3% and future forecast of 5.0%.

2.26 For GT17 forecasts, more emphasis has been placed on the output indices as the resource cost should feed into them. Our final position uses each of the data sets with a 30% / 70% split between the resource and output indices. The weighted long term average is used to calculate a forecast of 3.0% per annum for repex.

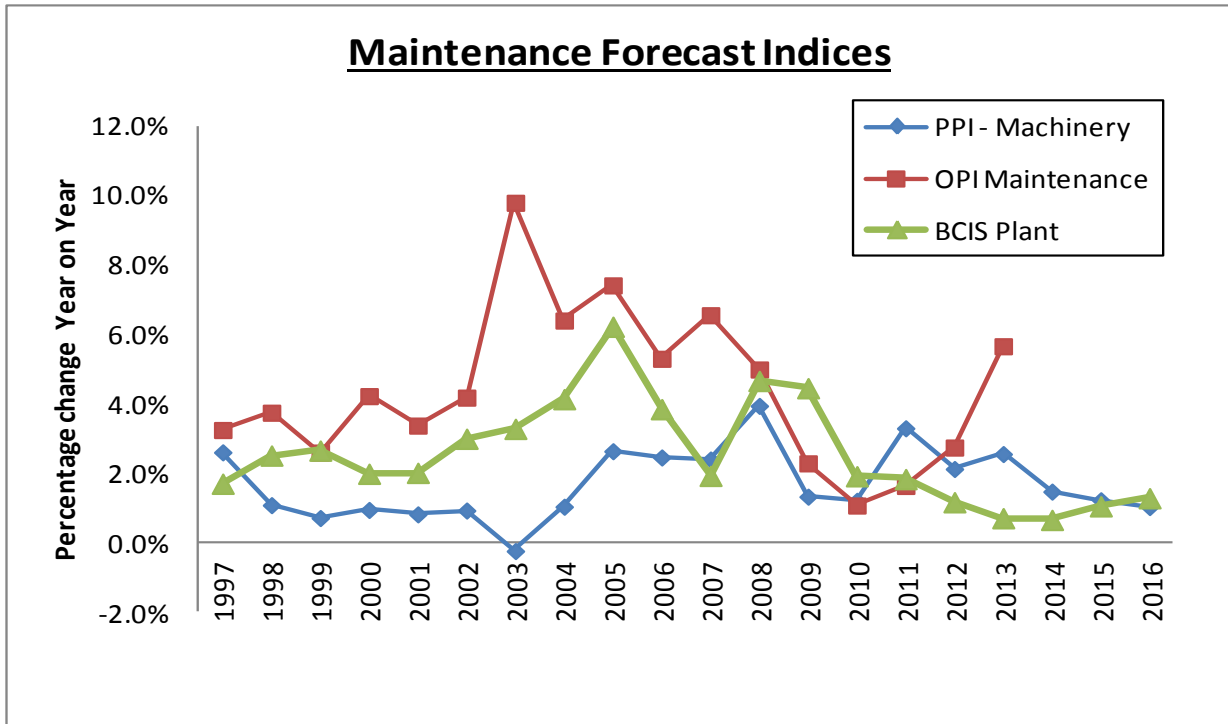
Input Prices - Maintenance

2.27 For maintenance spend we have used a variety of indicators to forecast cost growth in this area. Obviously such spend will be influenced by the costs of goods and equipment as well as labour expenses. Indices used include:

- 1) Producer price index (PPI) for machinery and equipment.
- 2) BCIS plant and road vehicles index.
- 3) OPI for repair and maintenance.

2.28 The historic trends of each index are presented below.

Figure 4: Annual growth figures for maintenance indices



2.29 The long term period average for each is:

- 1) PPI for machinery and equipment – 1.7%.
- 2) BCIS plant and vehicles – 2.5%.
- 3) OPI for all repair and maintenance – 4.4%.

2.30 Using the same weighted average approach and a 70% / 30% weighting in favour of the OPI, the result is a long term forecast for GT17 of 3.7% per annum.

Input Prices - Other

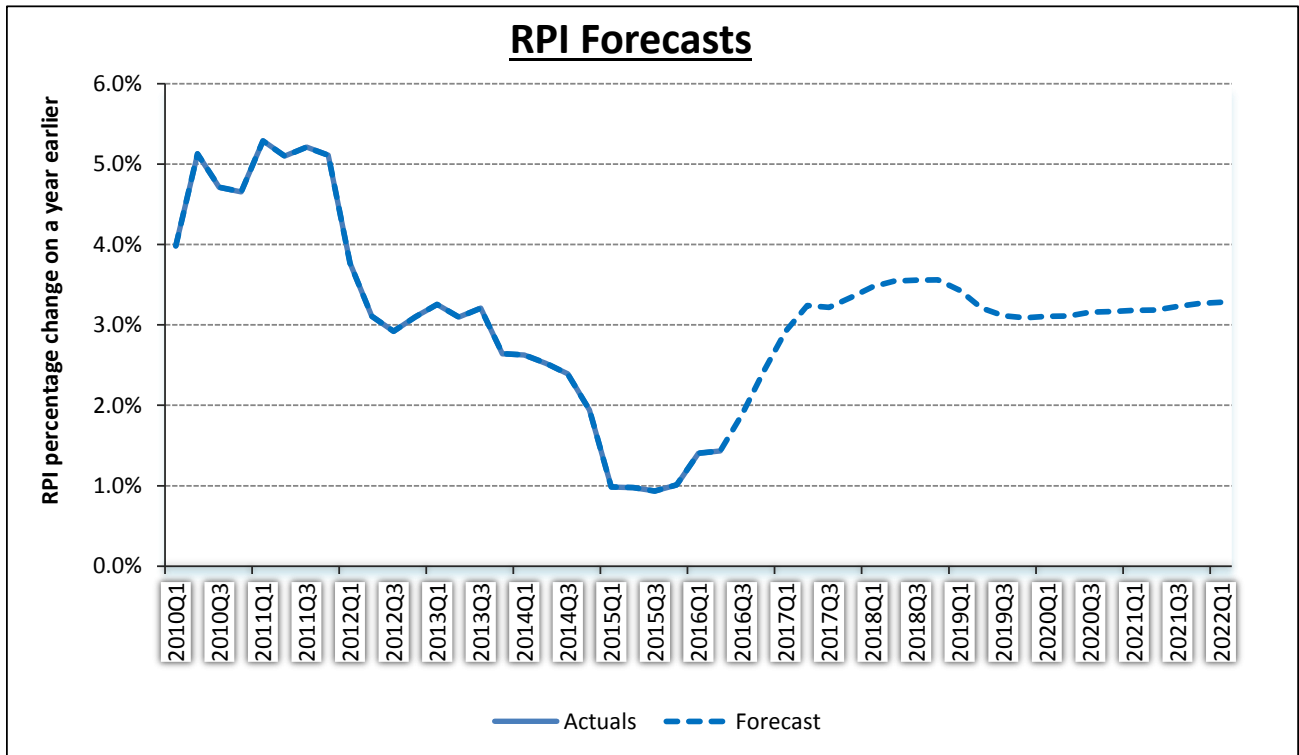
2.31 Forecasting for system and market operations as well as administration has proven difficult. In the absence of any better information, we have simply assumed that these costs will increase at the same rate as RPI.

Retail Price Index

2.32 As the input prices are in nominal terms, it is necessary to apply an RPI discount. This will transform the costs into real terms. In line with a number of recent price controls, we have based our RPI values on forecasts made by the OBR.

2.33 The latest OBR RPI data (November 2016) indicates an increase of expected inflationary pressure from the GT12 period. This is illustrated in the figure below.

Figure 5: OBR forecasts for RPI



2.34 Forecasts are around 3.5% per annum. As a sense check we have compared these against independent forecasts published by HM Treasury.³ Their medium term figures are similar though slightly lower than the OBR predictions.

2.35 For consistency purposes we will continue to use the OBR figures.

Conclusions

2.36 The weighted average of nominal input prices, RPI and the subsequent real price effect is presented below.

³https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/569316/PU797_Forecast_for_the_UK_Economy_Nov_2016_355.pdf

Table 2: Real price effects

Cost Category	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
Labour	3.5%	2.5%	3.3%	3.7%	4.1%	4.2%
Administration	2.5%	3.5%	3.4%	3.1%	3.2%	3.3%
Repex	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Maintenance	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%
TSO System Ops	2.5%	3.5%	3.4%	3.1%	3.2%	3.3%
CJV system Ops	2.5%	3.5%	3.4%	3.1%	3.2%	3.3%
Weighted Average	3.2%	3.3%	3.5%	3.4%	3.5%	3.6%
RPI	2.5%	3.5%	3.4%	3.1%	3.2%	3.3%
Real Price Effect	0.7%	-0.1%	0.0%	0.3%	0.3%	0.3%

2.37 The figures indicate that, for the most part, gas TSO costs are anticipated to rise slightly faster than RPI. This is mainly being driven by labour and maintenance costs. Allowance for these additional cost items is provided through the frontier shift approach.

3 Productivity

Regulatory Precedent

- 3.1 In addition to real price effects, it is necessary to apply a productivity assumption. This takes account of continuing efficiencies which industry can achieve over the price control period (for example with new technologies, new working practices or other means).
- 3.2 As part of the price control process, it is necessary to ascertain the level of productivity improvement likely to be achievable by the TSOs. To do this we consider various ways that we may establish a reasonable challenge. These include:
 - 1) Regulatory precedent.
 - 2) Industry analysis.
- 3.3 A barometer of potential productivity is that which has been observed in industries similar to gas networks or challenges imposed on other TSOs/utilities. The table below sets out recent regulatory precedent in this area.

Table 3: Recent regulatory assumption on opex productivity

Regulatory Decision	Opex Productivity Challenge
Utility Regulator – Water and Sewage	0.9%
Ofgem – GB Distribution Network Operators (DNOs)	1.0%
Ofgem – Transmission and Gas Distribution	1.0%
ORR – Network Rail, Maintenance	0.9%
ORR – Network Rail, Opex	0.2%
CMA – Northern Ireland Electricity, Opex	1.0%
CMA – Bristol Water PR14, Totex ⁴	1.0%
Utility Regulator – GD17, Opex	1.0%

- 3.4 From a regulatory perspective the challenges have been fairly consistent in recent years. Of particular relevance is the Ofgem decision for gas transmission.
- 3.5 Figures for capex improvements are something similar. Across a number of different decisions, targets ranged from 0.7% to 1.2% per annum. For NI gas TSOs with both opex and ‘capital type’ spend, a challenge of 1% per annum would appear to be standard.
- 3.6 Regulatory precedent should however be used as a ‘sense check’. Ideally productivity in the gas network should be assessed specifically. This can be done via an industry analysis.

⁴ Totex is total expenditure including opex and capex.

Industry Analysis

- 3.7 Productivity figures have been calculated for the UK by the EU KLEMS project.⁵ The latest release details Total Factor Productivity (TFP) changes on a yearly basis up to 2014.
- 3.8 Whilst gas transmission networks are not specifically measured, an estimate can be derived by looking at proxy activities. Oxera undertook such an analysis for the Dutch TSOs.⁶ They derived results similar to the following:

Table 4: Proxy industries for gas TSO activities

TSO Activity	Candidate Industries
Administration	<ul style="list-style-type: none"> Financial and insurance activities Professional, scientific, technical, administrative and support service activities
Repex (grid construction and planning)	<ul style="list-style-type: none"> Construction Professional, scientific, technical, administrative and support service activities
Maintenance	<ul style="list-style-type: none"> Construction Telecommunications Other manufacturing: repair and installation of machinery
TSO Network System Operations	<ul style="list-style-type: none"> IT and other information services Professional, scientific, technical, administrative and support service activities Telecommunications
CJV Market system Operations	<ul style="list-style-type: none"> IT and other information services Professional, scientific, technical, administrative and support service activities

- 3.9 By analysing the productivity of these proxy industries, we can get a view on the expected efficiency of gas transmission networks. From the EU KLEMS analysis we see the following sectoral productivity figures:
- 1) Financial and insurance activities = 0.12% per annum.
 - 2) Professional, scientific, technical, admin and support services = 1.23% p.a.
 - 3) Construction = 0.07% p.a.
 - 4) Telecommunications = 4.93% p.a.
 - 5) Other manufacturing: repair and installation of machinery = 0.99% p.a.
 - 6) IT and other information services = 2.53% p.a.

⁵ http://www.euklems.net/project_site.html

⁶ <https://www.acm.nl/nl/publicaties/publicatie/15537/Agendapunt-5-Study-on-ongoing-efficiency-for-Dutch-gas-and-electricity-TSOs/>, Table 4.1, p19.

3.10 Weighting the TSO activity by spend and making some assumptions around cost splits, the industry productivity analysis is as follows:

Table 5: Productivity of the gas transmission industry

Cost Category	Industry Average Spend - %	Productivity Growth using Proxy Industries - %	Weighted Average Productivity - %
Labour	15.7	0.0	0.0
Administration	14.3	0.7	0.1
Repex	14.2	0.3	0.0
Maintenance	38.4	1.3	0.5
TSO System Ops	10.9	2.9	0.3
CJV system Ops	6.5	1.9	0.1
Total	100%		1.1%

N.B. Figures may not sum due to rounding

- 3.11 The figures are open to sensitivity adjustments depending on the proportion of spend allocated to the proxy industry. The figures could also be considered conservative given that no productivity is assumed for labour.
- 3.12 What the analysis does suggest is that gas transmission systems should be subject to a productivity challenge in line with regulatory precedent.
- 3.13 Given the proximity of the findings, we have applied a simple 1% per annum productivity challenge to all controllable opex.

4 Frontier Shift

Conclusions

- 4.1 Frontier shift in real terms is calculated by applying the average annual productivity figure (1.0%) to the real price effects result. The real price effect figure is computed from discounting RPI from the weighted impact of nominal input prices.
- 4.2 In a simplified calculation however, frontier shift can be determined as follows:
- $$\text{Frontier shift in real terms} = \text{input price increase} \textit{ minus} \\ \text{forecast RPI (measured inflation)} \textit{ minus} \\ \text{productivity improvement}$$
- 4.3 The respective net impact of frontier shift for controllable opex is shown in the table below. Please note numbers may not sum due to rounding.

Table 6: Frontier shift efficiency targets

	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
Input Price Inflation	3.2%	3.3%	3.5%	3.4%	3.5%	3.6%
RPI	2.5%	3.5%	3.4%	3.1%	3.2%	3.3%
Real Price Effect	0.7%	-0.1%	0.0%	0.3%	0.3%	0.3%
Productivity	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Frontier Shift (p.a.)	-0.3%	-1.1%	-1.0%	-0.7%	-0.7%	-0.7%
Cumulative Challenge	-0.3%	-1.4%	-2.4%	-3.1%	-3.8%	-4.5%

N.B. A negative value for frontier shift represents a challenge to the company in terms of reduced cost allowance by the cumulative percentage stated.

- 4.4 For the GT17 draft determination we are assuming a cumulative frontier shift of 4.5% for controllable opex by the end of the period assessed.