Annex C

Frontier Shift:

Real Price Effects & Productivity

RP6

Final Determination

30 June 2017



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 Introduction

1.1 In this Annex we provide our analysis and considerations under the areas of *real price effects* and *frontier shift*. This includes analysis conducted for our draft determination, any data updates since then and the content of the responses we received to our draft determination. We respond to key points from the responses that are relevant to this Annex and to more detailed points in Annex Q and Annex R.

1.2 The concept of frontier shift is wider than simple productivity assumptions. Within this report, we have adopted the methodology we first introduced at PC13 for NI Water[1]. This aligns closely with the Competition Commission (CC) determination for Northern Ireland Electricity at RP5 and later Competition and Markets Authority (CMA) decisions. More recently, our approach to GD17[2] aligned with the same methodology.

1.3 Accounting for general inflation in this area may be done as a part of the estimation of (real) input cost categories. Alternatively it may be accounted for in a separate step where first nominal input cost inflation is estimated then adjusted by a separate estimation of future RPI.

1.4 The 2 step method is consistent with the approach employed for the relevant publications from the Office of Budget Responsibility (OBR). The OBR provide forecast inflation measures of CPI and RPI and their additional forecasts are in nominal terms. We also applied the nominal estimate, adjusted by RPI at GD17.

1.5 Using the multiple steps to calculate real input inflation also allows for a degree of independent movement between RPI and input prices. That is, while there may be varying degrees of relationship between general inflation and specific inputs, they are not necessarily synchronous. A move in RPI does not necessarily cause an automatic change in (nominal) earnings for instance.

1.6 Using this method allows for use of indices and forecasts to be adjusted for RPI inflation data that is from a consistent and reputable source subject to the expected analytical rigour.

1.7 Rates of inflation quoted in this Annex are nominal unless indicated otherwise in the text.

1.8 In summary, the frontier shift process combines nominal input price forecasts with productivity expectations and RPI inflation. The frontier shift in real terms can be represented in a simple way as follows:

Frontier shift in real terms	=	input price increase	minus
		forecast RPI (measured inflation)	minus
		productivity increase	

[1] http://www.uregni.gov.uk/uploads/publications/ANNEX_D_-_Rate_of_Frontier_Shift_-_PC13_FD.pdf
[2] https://www.uregni.gov.uk/gd17

2 Real Price Effects

2.1 The price of a company's various inputs may differ over time. Price controls have normally been indexed by the Retail Prices Index (RPI) to account for broad changes in prices. However, being a measure of general inflation, not all types of cost changes may be reflected in the range of prices used to calculate the RPI.

2.2 To account for this it has become common practice to calculate and make adjustments for the difference, either positive or negative, between particular input price changes for a company or industry and the general (RPI) measure of inflation. This adjustment is described as *real price effects* (RPEs).

2.3 RPEs are designed not to be straight pass through of costs but rather a proxy of cost pressures expected. They also sit within the context of the wider efficiency challenge of the company subject to price control.

2.4 In their detailed business plan submissions, NIE Networks provided their estimates of RPEs. This was accompanied by more detailed background information in a report on 'Real Price Effects and Productivity Growth' by NIE Networks' advisors, NERA.

2.5 We published our gas price control final determination (GD17) in September 2016. Subsequently an addendum to the RPEs element of the original NERA RP6 report was provided. This additional submission reflected upon the approach we used at GD17 to estimate RPEs in light of the RP6 price control. In doing so the supplemental report presented a critique of our GD17 approach to RPEs estimation. It also presented a revised approach for estimating RPEs during RP6 that used elements of our GD17 approach which NERA were not in 'material disagreement' with.

2.6 The reports reference recent regulatory decisions and methods used for RPEs calculations. They also set out indices that NERA considered for each cost category and those they ultimately selected for further analysis. This was accompanied by estimated RPEs for each cost category specified in the business plan submission.

2.7 The original report set out an 'ARIMA' time series modelling approach to estimating RPEs over the RP6 period. In the addendum report, while maintaining preference for the ARIMA method, the use of long term average growth rates to set RPEs was discussed as an alternative.

2.8 As part of our commitment to ongoing engagement we held working level meetings with NIE Networks on RPEs and frontier shift. These proved useful and allowed both parties to share and discuss respective positions. It also afforded an opportunity to share early calculations and updates of data and calculation results by both parties as they became available.

2.9 In summary, accounting for post-business plan submission updates, the NERA analysis expects NIE Networks RPEs to be above RPI for general/specialist labour by 0.4%/1.2% respectively on average each year. While materials are estimated as increasing each year above RPI by 0.3% on average. Plant and equipment costs are estimated to increase by less than RPI; an average of 0.6% below RPI each year. For the detailed yearly breakdown of the NIE Networks/NERA estimates, please see Annex 8.1 of the NIE Networks response to our draft determination.

Weights

2.10 To estimate RPEs we first separate a company's costs into various categories of opex and capex. This is a necessary step as input prices in different cost categories may vary for different components of expenditure.

2.11 Nominal price inflation for each category of cost is then calculated. Finally, accounting for RPI and applying weights to each cost category we calculate an overall value, or weighted average, of RPEs in each year of the price control.

2.12 As part of their business plan submission, NIE Networks were asked to propose what they thought were appropriate cost category weights for both opex and capex.

2.13 We placed suggested weights in our business plan template documents and left some flexibility in the relevant spreadsheet for the company to include further categories if necessary.

2.14 Below in Table 1 we set out the RP6 cost categories and their attributed weights proposed by NIE Networks. For comparison we also include additional tables showing those used for RP5, RIIO T1/GD1 and GD17.

2.15 While at first glance the broad cost categories and weightings are comparable to those used by the CC at RP5, there are different subdivisions within the categories. The distinction between 'general' and 'specialised' *materials* used by the CC at RP5 is not proposed by NIE Networks for RP6. And the distinction the CC declined to use at RP5 between 'general' and 'specialist' labour is proposed for RP6[3] by NERA.

2.16 The broad cost categories submitted by NIE Networks for RP6 were:

a) *labour*, which was split between 'specialised' and 'general'

b) materials

c) plant and equipment

d) other

Table 1: NIE Networks proposed RP6 cost categories and weightings for opex and capex

Cost category	Opex	Capex
Labour– general	13.1%	9.0%
Labour – specialised	64.2%	43.8%
Materials	7.7%	30.2%
Equipment/plant	0.0%	5.9%
Other	15.0%	11.1%

Source: NIE Networks RP6 business plan (Benchmarking reporting workbook)

2.17 The input costs may be apportioned differently by different companies or via different resource methodologies for instance. Different weights may be used for the cost categories when calculating RPEs.

2.18 The CC considered the options available and adopted weights that are broadly in line with those proposed by NIE Networks for RP5[4] [5] (though not with the same sub-divisions). These are reproduced below in Table 2.

[3] https://assets.publishing.service.gov.uk/media/5329de0440f0b60a7600023a/131112_main_report.pdf#page=408
[4] https://assets.publishing.service.gov.uk/media/5329de0ee5274a226800023f/130510_nie_statement_of_case.pdf#page=220
[5] See Table 11.5 in the CC RP5 final determination
https://assets.publishing.service.gov.uk/media/535a5768ed915d0fdb000003/NIE_Final_determination.pdf#page=334

Table 2: CC RP5 cost categories and weightings for opex and capex

Cost category	Opex	Capex
Labour	77.3%	52.8%
Materials – general	7.7%	11.6%
Materials – specialist	0%	18.6%
Equipment/plant	0%	5.9%
Other	15%	11.1%

Source: CC final determination for NIE at RP5

2.19 During the GD17 price control[6] we adopted the weights used by Ofgem for their notional GDN structure in their RIIO T1-GD1 price control review. These are shown below in Table 3.

Table 3: RIIO T1-GD1 and GD17 cost categories and weightings

Cost category	Opex	Capex
Labour	52%	56%
Materials	6%	19%
Equipment/plant	1%	4%
Other	41%	21%

Source: UR, Ofgem (RIIO T1/GD1 price control)

2.20 For the current GB electricity distribution price control ('RIIO ED1'), Ofgem weighted the input indices using a notional structure of an electricity distribution network operator (DNO). This was "*to prevent DNOs benefiting from an inefficient structure or inflating RPEs for cost areas that represent a large proportion of [costs]*"[7] [8].

2.21 The approaches used for previous price controls and by other regulatory decision makers, help to inform our approach to RP6 (see Table 4 below on labour and materials for example). From these we can observe there is no definitive approach to cost category and weight selections. There is however a general trend to account for how the inflation rate for: labour; materials; equipment/plant and 'other' costs differ from general inflation.

Table 4: Use of General and Specialist sub-division

General and Specialist sub-division	Labour	Materials
Ofgem RIIO-ED1 and RP5 - NIAUR	Yes	Yes
RP5 Competition Commission	No	Yes
GD17 / PC15 - NIAUR	No	No
RP6 NERA - NIE Networks' consultant	Yes	No
Proposed RP6	No	No

Source: UR

2.22 With this range of information in mind we consider the cost categories proposed by NIE Networks, set out at Table 1 above. There appears no agreed or common approach by regulatory bodies, with precedent for and against distinguishing between different types

[6] https://www.uregni.gov.uk/gd17

[7] https://www.ofgem.gov.uk/sites/default/files/docs/2014/07/riio_ed1_draft_determination_overview_30072014.pdf#page=28

[8] https://www.ofgem.gov.uk/sites/default/files/docs/2014/07/riio-ed1_draft_determination_expenditure_assessment.pdf

of labour in setting RPEs. For example Ofgem's DPCR5, the CC's RP5 and more recently our GD17 price control illustrate the variance of approach.

2.23 At a high level we use the broad cost categories identified above for RP6. This allows us to maintain a measure of consistency across our price controls and towards the Ofgem RIIO regime.

2.24 There is however the question of further sub division within cost categories, noted above in the various tables.

2.25 The company explained their reasoning for inclusion of a separate cost category for 'specialised' labour and associated specific indices in written submissions and during engagement discussions. NIE Networks subsequently provided a formal written response to our draft determination. This included a section on RPEs and productivity incorporating an annex by their advisors, NERA.

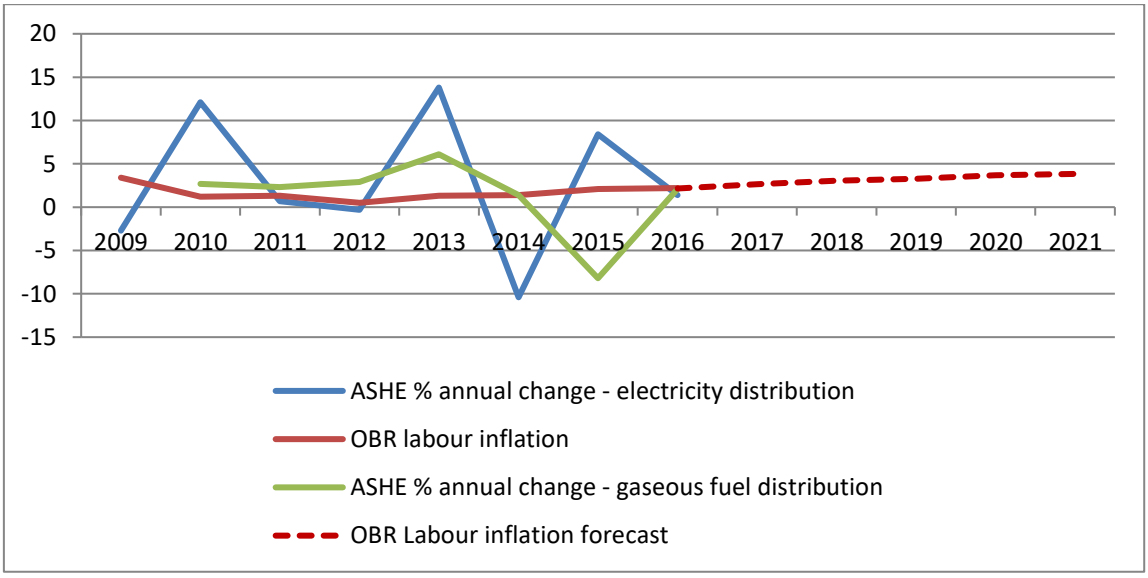
2.26 In addition NIE Networks said that while we referenced GD17 as a precedent for our analysis in places, the GD17 price control is for gas rather than electricity network companies. Furthermore the company argue that gas 'specialised' labour rises at a similar rate to average earnings. Whereas its electricity network experiences different labour cost pressures to that of gas network employers.

2.27 This position is established from analysis of the rates of growth of indices used and/or proposed as proxies for gas and electricity labour costs. To examine this point further prior to draft determination, we obtained data to give a closer view of the two respective types of company (gas and electricity distribution) at their industry level. In doing so we sought to take a view from analysis that was not driven by the inclusion or otherwise of various possible individual indices.

2.28 To do this we turned to the Office of National Statistics' Annual Survey of Hours and Earnings data set, at Industry level (ONS ASHE).

2.29 We took ASHE earnings growth data for the industry categories 'distribution of electricity' and 'distribution of gaseous fuels through mains'. The rates of change over time were compared against each other and against the OBR's forecast for labour inflation. The results obtained for draft determination are reproduced in Figure 1 below.

Figure 1: Labour cost annual change (%)



Source: ONS ASHE, 2016: Table 16, OBR Economic and Fiscal Outlook, March 2017

2.30 At draft determination we observed from the ONS data both industries show variation of growth and contraction in annual labour costs over time. And, when compared against the OBRs forecasts the data for electricity and gas broadly appear to oscillate about the OBR line. Looking across the data from historic actual to forecast, the OBR labour inflation data appears to present as a somewhat central position relative to the separate industry data plots.

2.31 NIE Networks in their draft determination response were of the opinion that the ASHE data was not appropriate, indeed flawed, as evidence for our provisional conclusions, particularly our comments in the preceding paragraph (2.30). Rather they submitted it supported their view of the differences of labour between gas and electricity industries. That is while a distinction for specialist labour may not be appropriate for gas, the electricity specialist labour was different and required a distinction (and so required a premium within the RPEs calculation).

2.32 For clarity, our high level observations on the ASHE data, as compared to the OBR data should be viewed in context. That is, each individual piece of the information presented should be viewed as part of the wider picture of information available, and not in isolation. As indicated in the draft determination, RPEs are not meant to act as a pass through of costs but rather provide a proxy for future costs based on an estimation of the pressure they may experience. Regarding the OBR data, in light of the ASHE data, we are of the opinion that it provides helpful and relevant forward look for an efficient notional electricity distribution network's labour costs.

2.33 And, as indicated at draft determination, the CC's conclusions on a distinction between 'general' and 'specialist' labour[9] provides useful wider context to the consideration. The CC did not find that the distinction helped them make a more accurate estimate of NIE Network's labour inflation during the RP5 price control.

2.34 NIE Networks in their draft determination response said that the CC's RP5 determination should not be considered relevant for RP6 because the concerns of the CC are no longer applicable.

2.35 The CC stated in their final determination:[10]

> *"11.36 However, we did not find that the distinction between specialist and generalist labour was helpful. This was because these are very broad categories involving employees with different types of skills who could be subject to quite different labour supply and demand conditions.*
>
> *11.37 We did not believe that by using these categories we would be able to make a more precise estimate of NIE's labour inflation and we considered that in many instances the distinction between the two categories would be arbitrary"*

2.36 In this regard NIE Networks helpfully submitted further analysis on their workforce and each member's status in regards being specialist or not[11]. This comprised a spreadsheet, appropriately anonymised, listing NIE Network's employees, their title and whether they are considered specialist or not.

2.37 At a high level, there are a range of titles of staff identified in the additional analysis by NIE Networks as specialist. These include: various types of engineer, managers, various technicians, students, planners, surveyors, multiple types of trainee, wayleave staff, analysts, supervisors, electricians, contract management, inspectors, tree cutters, apprentices, jointers and cartographers.

[9] https://assets.publishing.service.gov.uk/media/535a5768ed915d0fdb000003/NIE_Final_determination.pdf#page=331
[10] https://assets.publishing.service.gov.uk/media/535a5768ed915d0fdb000003/NIE_Final_determination.pdf#page=331
[11] 10 March 2017

2.38 With the breadth of skill types represented in the specialist category for RP6, it is not clear how the RP5 determination should not be considered relevant or applicable to RP6.

2.39 We note that the proportion of staff NIE Networks consider specialist has increased from RP5. The weights allocated by NIE Networks for specialist labour in opex/capex was 54%/33% at RP5[12]. At RP6 this is revised to opex/capex 64%/43%, with a corresponding reduction in the proportion of labour considered general.

2.40 NIE Networks told us in their draft determination response that we hadn't discussed in our draft determination the applicability of labour cost trends across the economy to specialist electrical engineering labour. While the discussion and information provided in the draft determination was aimed at all of NIE Networks labour costs, we take the opportunity to specifically address the indices NIE Networks propose as being supportive of a specialist wage premium within the Indices section below.

2.41 The concerns that surround adopting a company's exact cost structure for calculating RPEs and frontier shift are summarised above at 2.20 in reference to Ofgem's RIIO ED1 decision. We indicated our concerns at GD17 and continue to be mindful of them in price control decisions.

2.42 Considering the updated data and previous RP5 approach we are minded to adopt a less complex approach of broad cost categories and to not adopt the sub divisions proposed as at draft determination.

2.43 However, while we are not minded to adopt NIE Network's cost categories, sub-categories and weights exactly as proposed; we still propose to apply weights that are comparable at a high level.

2.44 This approach has the advantage of being mindful of reported cost data, while being simpler and not encouraging any particular company structure. This approach has to advantage of: avoiding any unintended influence on input cost decisions; not providing any potential form of pass through of company costs and ensuring we would not reward potential inefficiencies in structure. This is in keeping with our approach to the extent reasonable of using the 'notional company' construct for price control determinations.

Table 5: RP6 chosen cost categories and weightings for opex and capex

Cost category	Opex	Capex
Labour	77.3%	52.8%
Materials	7.7%	30.2%
Equipment/plant	0%	5.9%
Other	15%	11.1%

Source: UR

Indices

2.45 For each input cost category we identified suitable indices for use in estimating price inflation. We reviewed the indices available, previously used in regulatory decisions and relevant to the cost categories being assessed. In addition we also reviewed and considered the various draft determination responses received.

[12] Table 8.3 NIE Statement of Case, RP5
https://assets.publishing.service.gov.uk/media/5329de0ee5274a226800023f/130510_nie_statement_of_case.pdf#page=220

Input prices – Labour

2.46 The cost category of labour makes up a majority share of NIE Networks input costs. It is important that the estimates used for these input prices are both robust and reasonable.

2.47 As part of their business plan submission NIE Networks provided estimates of how they expect their labour costs to change over the RP6 period.

2.48 The NIE Networks business plan documentation included submissions from their advisors, NERA. NERA set out their analysis including comparability considerations, available data and indices, recent regulatory decisions (including GD17) and forecast cost inflation used for the RP6 business plan.

2.49 Labour cost inflation was presented with sub-categories – 'general' and 'specialised'. The general labour cost estimated a relatively sharp increase in the cost of labour in the short-term and then a settling back around trend in the medium term. At a high level the company's business plan estimate for general labour category inflation averages 4.0% per year across the RP6 period.

2.50 'Specialised' labour inflation was estimated from selected indices that were considered more appropriate than those for more 'general' labour. NIE Networks' forecast is for rising costs in this category at a higher rate than that of general labour. The specialised labour estimate has a broadly similar profile to general labour inflation (albeit at a higher overall level). Towards the end of RP6 there is a considerable widening of the expected differential however. The company's estimate for their specialised labour category inflation averages 5.2% per year across the RP6 period.

2.51 In arriving at their estimations for NIE Networks, NERA initially conducted ARIMA modelling analysis which incorporates significant mean reverting behaviour within the modelled time series. Subsequently an OLS time series approach was adopted.

2.52 In response to our draft determination NIE Networks provided updated estimates for their forecasts by NERA. This set out the detail of the latest input inflation estimates, updating previous forecasts provided.

2.53 We find it a useful check to contrast NIE Networks' proposal of a premium for what they consider 'specialised' labour against the latest available expectations on wage growth from reliable bodies. The latest estimate provided for NIE Networks proposals on specialist labour equates to an average increase of 4.5% per year.

2.54 For instance when considering what pressures may be realised on wages over RP6 we find the Bank of England's (BoE) latest view informative. In the 2017 Q2 update of their "Agent's Summary of Business Conditions"[13] the BoE sets out research results and data on labour costs and private sector pay settlements. They report:

> "*growth in total labour costs had remained subdued across sectors, despite the tightening labour market*" with "*the majority of pay settlements remained clustered around 2% to 2.5%*".

2.55 The Monetary Policy Committee of the BoE also notes in their February 2017 Inflation Report similar sentiments. They state:

> "*taken together, some degree of remaining slack in the economy and only modest productivity growth are projected to keep wage growth relatively subdued in the near term, as the drag from past low inflation wanes*."

2.56 The update in the May report projects wage growth to remain "modest" in the near term, before recovering "further ahead".

[13] http://www.bankofengland.co.uk/publications/Documents/agentssummary/2017/q2.pdf

2.57 In terms of data for our estimation of labour RPEs in RP6 we consider continued use of Office of Budget Responsibility (OBR). OBR is a body which is independent of government that provides authoritative analysis on a range of economic issues. Given the data source, availability and consistent publication alongside other data series we consider its continued use beneficial. Likewise we also propose use of ONS data as a suitable initial start point of the estimated labour RPEs trajectory.

2.58 Our estimation is calculated by taking an initial number drawn from actual data. A suitable forecast is then adopted to as far ahead as available. If necessary this is then lifted toward the long term average of the chosen index/indices for remaining years. Finally if after these steps there are further years to estimate beyond when long term average is reached, we assume a continuation of the same figure. This roll forward of the long term average is used as an acceptable forecast of those periods given uncertainty around index trajectory at that point on.

2.59 As referenced above, NERA used selected modelling techniques – ARIMA and subsequently OLS analysis. On balance our preference remains for the more holistic approach anchored on OBR sentiment rather than the more mechanistic/deterministic approach of ARIMA. Our choice of OBR analysis will also be empirically based. OBR's analysis is anchored on the OBR view of GDP and wider economic circumstance over the period of forecast they provide.

2.60 That is to say, OBR will take into account expected prospects of economic recovery, the extent and timing thereof for the UK economy, as part of their macroeconomic view.

2.61 From OBR we use *hourly* earnings to help control for the impact of underlying changes in hours worked upon changes in wage inflation (as we did for GD17). The latest data from the OBR can be viewed in Figure 3 below.

2.62 While we use of a mix of private sector/economy wide data, this approach has been used previously by Ofgem at RIIO and by us at GD17. In any event we draw estimates from actual data, then forecast data when either or both are available and from reputable sources.

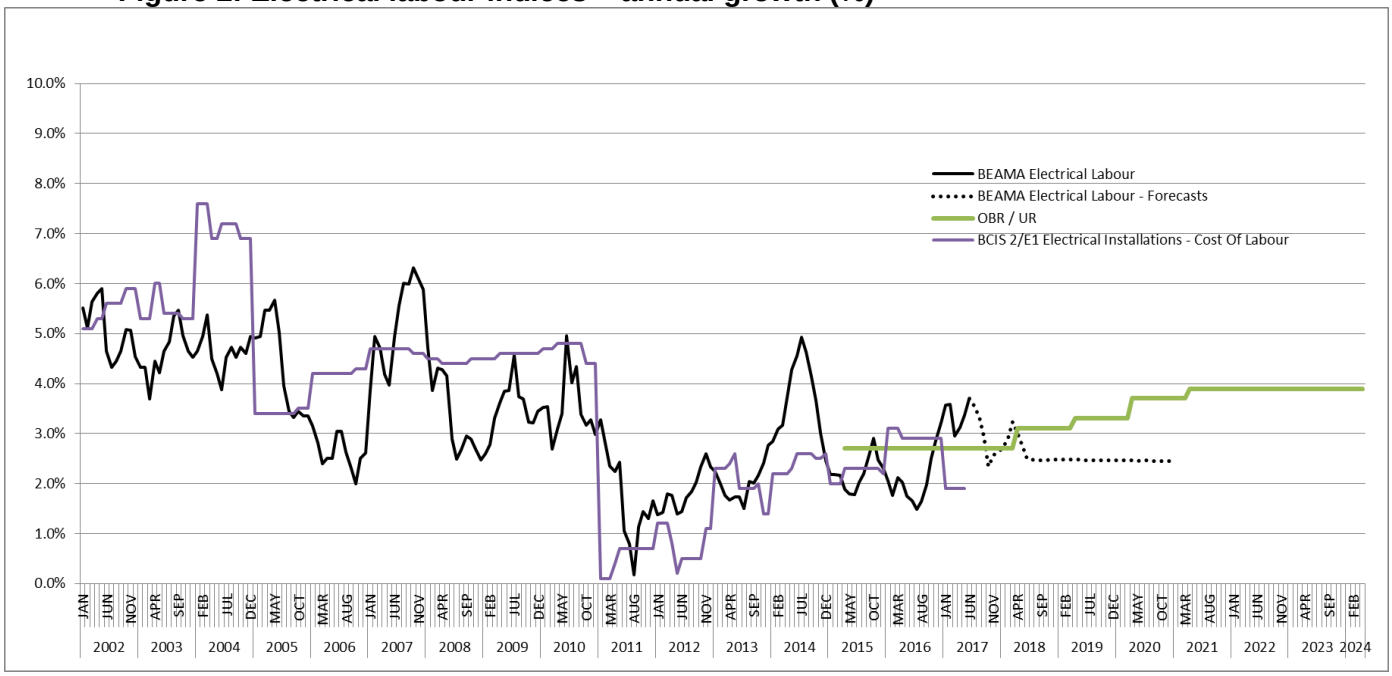
2.63 Beyond the 2021-22 OBR forecast point and given the uncertainty at that point we adopt the last available year's forecast as a suitable estimate for the remaining 2 years of RP6.

2.64 NIE Networks and indeed other respondents' positions on specialist labour and its need for a premium can be assessed against the relevant indices data. In the context of NIE Networks and specialist labour this has generally presented as BEAMA and BCIS indices. Namely BEAMA CPA/4 electrical and BCIS Electrical Installations – Cost of Labour (2/E1).

2.65 To determine what the data was indicating we compared the BCIS and BEAMA indices against the OBR forecasts for labour inflation used in our draft determination calculations.

2.66 This is illustrated by the plot in Figure 2 below. From the chart we can see that the OBR forecast is not out of place against neither the actual historic data from BEAMA and BCIS nor the forecast from BEAMA. Rather it fits reasonably to the data plots that precede it. In light of previously cited data and precedent and the basis these indices do not present compelling information to materially shift our position we have decided not to amend our draft determination position of not making a distinction/premium uplift for specialist labour in our final determination.

Figure 2: Electrical labour indices – annual growth (%)

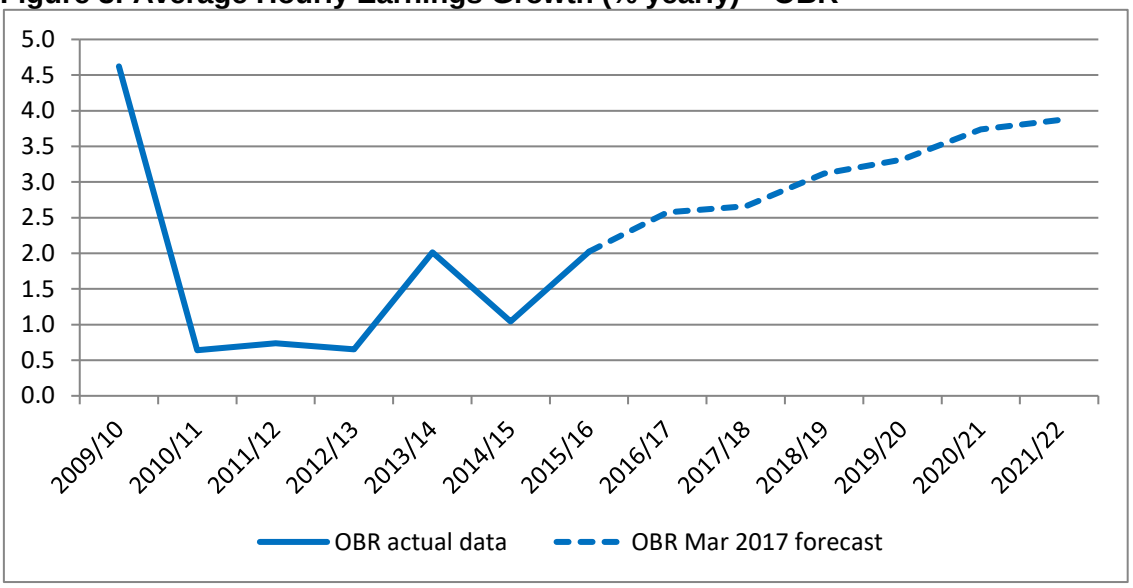


2.67 For illustration of the various positions and for context to the scale of labour cost increase NIE Networks is setting out see Table 6. This table compares our labour RPEs with those of NERA and jointly against the OBR's own average earnings forecasts. Our latest estimates for labour RPEs (using OBR average hourly earnings) can be seen arriving close to the OBRs average earnings expected real labour inflation view.

Table 6: Comparison of labour real price effects

% (real)	RP6						
	2017/18	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**2022/23**	**2023/24**
Labour RPE - UR	-1.3	-0.3	0.2	0.6	0.7	0.7	0.7
Labour RPE - general NERA	-0.6	0.0	0.6	0.8	0.7	0.6	0.6
Labour RPE - specialist NERA	0.1	0.7	1.3	1.5	1.5	1.7	1.7
Labour RPE - OBR	-1.4	-0.6	-0.1	0.4	0.5	0.5	0.5
RPI - OBR	3.9	3.4	3.1	3.1	3.2	3.2	3.2
Average earnings - OBR (nominal)	2.6	2.8	3.0	3.5	3.7	3.7	3.7

Figure 3: Average Hourly Earnings Growth (% yearly) – OBR



Source: OBR Economic and Fiscal Outlook: Economy supplementary Table 1.6, March 2017.

Table 7: Economic and Fiscal Outlook – Labour Market

Labour market	Percentage change on a year earlier, unless otherwise stated						
	Out turn	Forecast					
	2015	2016	2017	2018	2019	2020	2021
Employment (millions)	31.3	31.7	31.9	32.1	32.2	32.3	32.5
Productivity per hour	0.8	0.5	1.6	1.5	1.7	1.8	1.9
Wages and salaries	3.9	3.2	3.0	3.0	3.3	3.7	3.9
Average earnings	1.9	2.2	2.6	2.7	3.0	3.4	3.6
LFS unemployment (% rate)	5.4	4.9	4.9	5.1	5.2	5.2	5.1
Claimant count (millions)	0.80	0.78	0.83	0.86	0.87	0.88	0.88

Source: OBR Economic and Fiscal Outlook, Table 3.8 March 2017

Private sector labour

2.68 NIE Networks maintain their argument for an additional increase in wage growth estimates on account of them being a private sector employer (as opposed to using economy wide wage growth estimates).

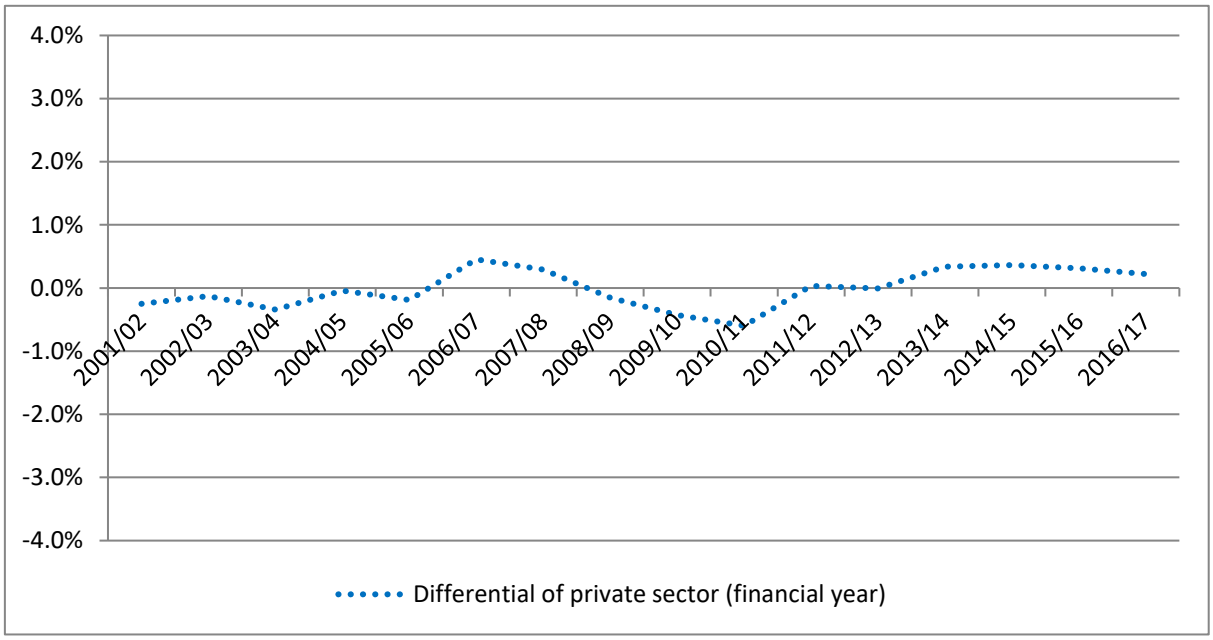
2.69 We have reviewed this again in light of other recent regulatory decisions and positions. For instance Ofgem made an adjustment in their calculation of RPEs at RIIO-ED1 in this respect. However upon closer inspection the adjustment was made for the 2015-16

year only[14]. The route to this one-off adjustment is not clear from the published documentation. However in any event, Ofgem's position on the historical difference between private sector and whole economy wage growth was that there was no difference[15].

2.70 More recently at GD17 we used AWE private sector actual data and then OBR forecast data. This gives some scope of regulatory decisions to draw from. At draft determination to gain further insight on private/whole economy wage growth we turned to the ONS data available on wage growth.

2.71 We took the ONS AWE data for the whole economy and the private sector and calculated the difference between them over the data set available. Figure 4 below plots the difference in year on year from 2001-02 onward. From this dataset the yearly differentials average to -0.01% across the observations.

Figure 4: Differential of private sector wage growth to whole economy



Source: ONS Average Weekly Earnings, EARN01, 14 June 2017

2.72 The company's query on using data specific to the private sector is viewed in light of the information available from ONS on private/public sector wages including differentials from historical data.

2.73 As such from the data above it is not clear that any uplift is necessary for NIE Networks in respect of private sector wages forecast.

2.74 We have assessed the various pieces of information to form an overall picture of the potential future of labour cost pressures. With our final proposals we seek to balance the views and to maintain an anchor to the OBR outlook for the economy. As at draft determination with this in view we have decided to remain with ONS AWE private sector data to the point it is available and thereafter to use OBR forecasts for wage growth.

[14] https://www.ofgem.gov.uk/sites/default/files/docs/2014/11/riio-ed1_final_determination_overview_-_updated_front_cover_0.pdf#page=32
[15] https://www.ofgem.gov.uk/sites/default/files/docs/2014/07/riio-ed1_draft_determination_expenditure_assessment.pdf#page=114

Input Prices – Materials

2.75 The next category we assess is materials, which make up around 30% of capex costs and almost 8% of opex costs.

2.76 NIE Networks provided business plan forecasts for material prices that show negative growth in the opening year followed by a relatively strong increase throughout the RP6 period thereafter.

2.77 We considered indices available to estimate the price changes for materials during the RP6 period. During our most recent analysis of material price inflation for GD17 we estimated future price inflation for materials.

2.78 As a starting point for RP6 we reviewed these estimates and considered them against subsequent data updates. Our analysis for this cost category also draws from price indices and reported commodity market developments.

2.79 For materials indices we used data published by the Department for Business Innovation & Skills (BIS). First we took the Resource Cost Index of Building Non-housing materials - NOCOS[16]. And second Resource Cost Index for Infrastructure Materials - FOCOS[17] We also draw from the interim construction Output Price Indices (OPIs) from ONS.

2.80 We draw upon the published Bloomberg Commodity Index to take a broad view of commodities prices. Commodities can be subject to volatility however they seem to have recovered some of the ground lost compared to the year previous. While upward pressure is being experienced, it is not on the level of sustained price growth from previous peak periods or even to the scale of 2 years previous[18].

2.81 Regarding the BIS indices used there is out turn data available for the NOCOS and FOCOS series as far as 2014. Thereafter we have out turn data available from the ONS series.

2.82 Taken together the information and available actual data gives us a view of current inflationary pressures. This helps set an initial view of materials price inflation using actual data as far as it's available.

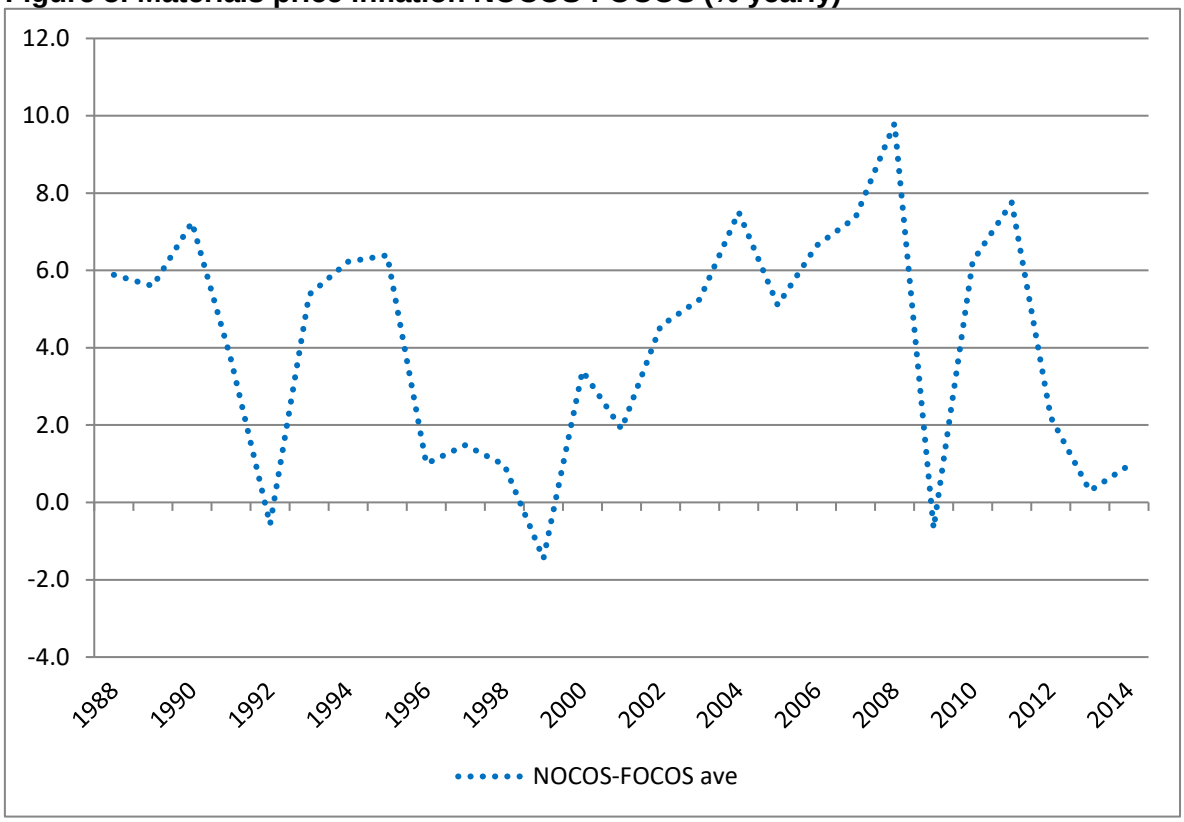
2.83 We are mindful of the combination of upward movement indicated by the data and market information. While pick up is emerging the growth remains below long term average. Inflation prospects generally are expecting an initially bigger increase for years 1-2 of RP6 then some levelling off in growth. This is reflected in the OBR forecasts and forms part of the stated underlying assumptions used by the BoE for their "key judgements" and "conditioning assumptions" in their economic publications[19]. Notably this includes a judgement that upward pressure from import prices will diminish beyond 2017.

2.84 On consideration we suggest price growth to continue at its present level and, subject to economic conditions providing some upward pressure, revert to trend. A return to the long term average of the data set is proposed as a reasonable approximation of future materials price inflation. The simple glide path (by year) for reaching the long term average is shown in the full results of RPEs and frontier shift – Table 11 and Table 12.

[16] i.e. 'NOCOS' - Resource Cost Index of Building Non-Housing, See §14.21
http://www.uregni.gov.uk/uploads/publications/2013-12-20_GD14_Price_Control_for_NI_GDNs_2014-2016_Final_Determination.pdf#page=166&zoom=90,69,770
[17] i.e. 'FOCOS' Resource Cost Index for Infrastructure, Materials. See §14.21
http://www.uregni.gov.uk/uploads/publications/2013-12-20_GD14_Price_Control_for_NI_GDNs_2014-2016_Final_Determination.pdf#page=166&zoom=90,69,770
[18] https://markets.ft.com/data/indices/tearsheet/summary?s=BCOM:IOM
[19] Conditioning assumptions, MPC key judgements, and indicative projections February 2017:
http://www.bankofengland.co.uk/publications/Documents/inflationreport/2017/febca.pdf

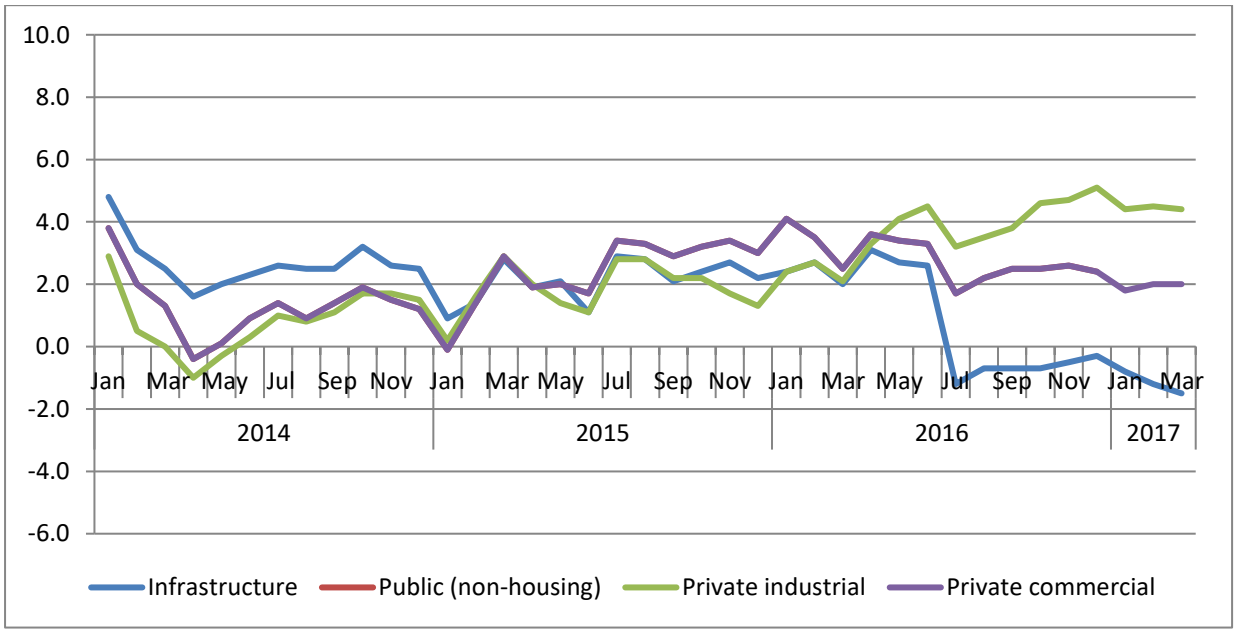
2.85 This scenario provides for positive growth, draws on recently regulatory practice and increases towards the long term average (3.9%) by mid RP6 in light of current market conditions.

Figure 5: Materials price inflation NOCOS-FOCOS (% yearly)



Source: BIS Construction Resource Indices: NOCOS' - Resource Cost Index of Building Non-Housing, Material and 'FOCOS' Resource Cost Index for Infrastructure, Materials

Figure 6: ONS Interim Construction Output Price Indices (% change over 12 months)



Source: ONS Interim Construction Output Price Indices (OPIs), Table 2, 16th May 2017 (Public obscured by other data)

Input Prices – Equipment & Plant

2.86 In terms of impact the plant and equipment category has a relatively small weighting for both opex and capex (0.0% and 5.9% respectively). Nevertheless it forms an integral part of the cost input base for NIE Networks and so requires appropriate scrutiny.

2.87 As with the other categories NIE Networks proposed price inflation for this input cost group in their business plan submissions. This included an increase in inflation peaking around 2019 with some tail off then to the end of RP6. The proposals averaged 2.5% for capex (with opex not having costs in this category).

2.88 We rely upon data from the Machinery & Equipment component (K389) of the Producer Prices Index (PPI) and the BCIS Plant and Road Vehicles (90/2) index.

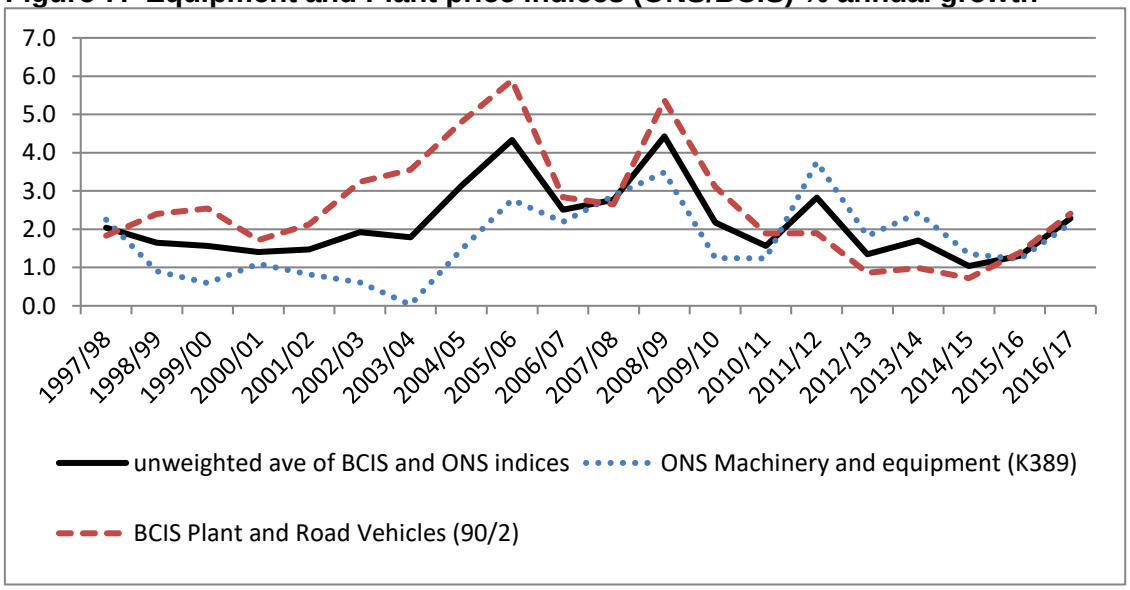
2.89 As we have done for other input cost categories, we took an unweighted average of the ONS and BCIS indices. These indices also provided us with an initial figure from actual data. Using this out turn data, and with no available forecast for the chosen indices, we assume an increase toward the long term average of both indices.

2.90 Figure 7 illustrates the changes in the ONS and BCIS indices from 1997/98 to 2016/17. The indices had shown a convergence to lower growth in 2016. However in keeping with our inflation expectations and the latest actual data we expect the current growth to complete its return to long term average growth rate during RP6.

2.91 As a point of detail, when compared against the materials category it may seem as if equipment and plant assume a faster return to long run average. This is an understandable view given the yearly numbers presented in our calculations. However it is important to note the estimate is driven by our review of the out turn data and not a general assumption on speed of return to trend.

2.92 This can be observed from the indices chosen. Current inflation for the unweighted average of the indices selected stands at 2.3% for the 2016/17 year. The historic average of the data gives a long term average of 2.2%. We determine it is reasonable to then estimate a continuation of long term average for the 2017/18 year given the observed actual data.

Figure 7: Equipment and Plant price indices (ONS/BCIS) % annual growth



Source: ONS Producer Price Indices, Machinery and Equipment (K389) and BCIS Plant and Road Vehicles (90/2)

Input Prices – Other

2.93 Regulatory determinations on price controls often have a category for the "other" costs group. As is normal practice in the absence of a suitable index for this cost category we assume that prices increase at the same nominal rate as the Retail Prices Index (RPI). This in effect leads to a nil RPE applying to "other" costs.

2.94 More detail on the RPI values is provided in the next section.

Table 8: Indices used by cost category

Cost category	Index
Labour	1. ONS Average Weekly Earnings (EARN01) – private sector 2. OBR – Average Hourly Earnings Growth
Materials	1. BIS Resource Cost Index of Building Non-housing materials – NOCOS 2. Resource Cost Index for Infrastructure Materials – FOCOS 3. ONS interim construction Output Price Indices -OPIs.
Equipment/plant	1. ONS Producer Prices Index (PPI) - Machinery & Equipment component (K389) 2. BCIS Plant and Road Vehicles (90/2)
Other	1. OBR estimates of the Retail Prices Index (RPI)

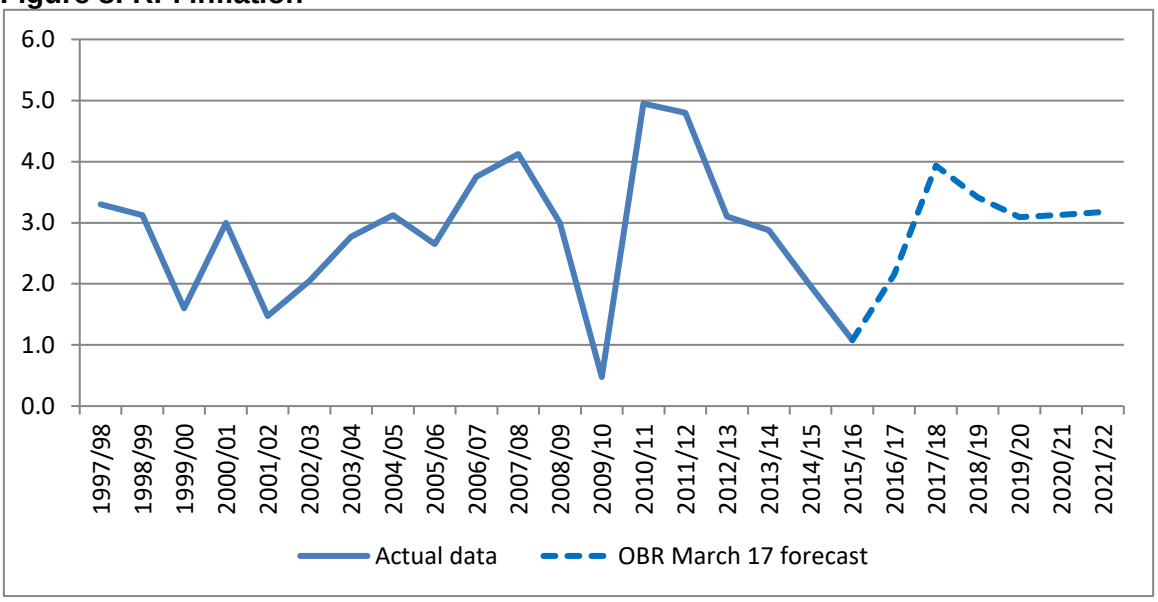
Retail Prices Index Projections

2.95 As the input prices above are in nominal terms, it is necessary to apply an RPI discount in order to transform the calculated price effects into real terms.

2.96 In line with a number of recent price controls we have based our RPI values on forecasts made by the OBR.

2.97 The latest OBR RPI data (March 2017) estimates an increase in expected inflationary pressure to a peak around 2018. Thereafter OBR expect a slight dip before largely flattening out for the remainder of the forecast period at just above 3%. This is illustrated in Figure 8 below.

Figure 8: RPI inflation



Source: OBR, Economic and Fiscal Outlook, Chart 3.16 March 2017.

2.98 We have compared OBR estimates with the latest HM Treasury independent forecasts.[20] There is some slight variation, which is not unreasonable given the estimates are from multiple independent parties in the HM Treasury publication. However they are broadly in keeping with the OBR March 2017 forecasts.

2.99 To maintain consistency we are content to use the OBR RPI forecasts in our calculation of real price effects.

2.100 The detailed annual figures for all input price categories are set out in Table 11: Opex Frontier Shift and Table 12: Capex Frontier Shift.

[20] Forecasts for the UK economy: a comparison of independent forecasts, June 2017 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/620617/Forecasts_for_the_UK_economy_June_2017.pdf

3 Productivity

3.1 A company can become more efficient over time and so close the gap between its efficiency level and that of the economic frontier. Equally, the whole industry's overall efficiency or frontier can change over time. It is possible the most efficient company in an industry can find new or improved ways of using less input volumes to maintain current output levels.

Productivity Growth

3.2 In addition to the real price effects described previously, it is necessary to apply a productivity assumption to opex and capex so as to take account of continuing efficiencies which the industry can achieve over the price control period. This is a base level of efficiency which even frontier companies would be expected to achieve as they continually improve their business over time. For example with the use of new technologies, new working practices or other means to enable their businesses to run more efficiently.

3.3 For this area NIE Networks provided us with analysis carried out by their advisors NERA. This included description of the EU KLEMS data and the various considerations and decisions they faced and made as part of their analysis.

3.4 This work resulted in the company's view of what a range of possible productivity for capex and a range for opex could be. NIE Networks proposed taking a midpoint of both the capex and opex ranges they had calculated giving 0.6% and 0.8% respectively. As a final step the company proposed an average of the midpoint estimates in their business plan. This gave a proposed productivity assumption for RP6 of 0.7% (between 0.8% and 0.6%).

3.5 In coming to our estimation of productivity we considered the following:

a) other recent regulatory decision on productivity

b) NIE Network's business plan submission

c) the database known as 'EU KLEMS'

3.6 The EU KLEMS data relied on for our draft determination analysis period was 1970 – 2007. We are of the view that this data set provides a reasonable balance to the analysis on the data series.

3.7 We considered the option of undertaking an exercise to attempt to map the EU KLEMS data to the NIE Network activities. We are however mindful of the analysis undertaken by Ofgem in their investigation for the various RIIO price controls.

3.8 For instance Ofgem reviewed the industry categories and took account of the productivity improvement that individual companies assumed as part of the RIIO business plans. They then drew productivity assumptions that lay within a reasonable range of possibility for their regulatory decisions.

3.9 The Ofgem analysis and approach was in turn reviewed by and incorporated in to the CC's decision during their RP5 referral decisions.

3.10 With this breadth of analysis and precedent relevant to the current price control under consideration we draw a range from the Ofgem and CC analysis. We are mindful of the scrutiny the calculations and ranges provided have been subjected to. Given our use of the same core Ofgem/CC analysis and dataset it is reasonable that the rationale continues to hold for the EU KLEMS data and analysis.

3.11 We take some time to discuss some highlights of the Ofgem experience with EU KLEMS as the CC incorporated their approach in its own RP5 decision.

3.12 Ofgem explain their analysis and the ranges they calculated from EU KLEMS data in their RIIO T1/GD1 RPEs and ongoing efficiency initial proposals document[21]. The calculations were drawn from both total and partial factor productivity. It is useful to note the ranges calculated suggested higher potential productivity than the 0.5 – 1.5 range they drew from for T1/GD1 (as did we for GD17). That is: 0.5 – 2.8 for opex and 0.5 – 2.3 for capex.

3.13 However on balance of all the relevant circumstances Ofgem decided to use narrower ranges. We would suggest that this and the above background information, along with other checks including against regulatory precedent, provide a suitable counter balance to over estimation concerns for our assumptions at RP6.

3.14 Ofgem for the T1/GD1 periods ultimately set a 1% opex/0.7% capex productivity target based on their chosen derivation method[22]. In particular they gave weight to construction industry productivity in relation to gas networks.

3.15 While Ofgem elected for a different target based on their rationale there remains an element of judgement. Our range of productivity is likewise drawn from the Ofgem analysis of EU KLEMS data (subsequently CC reviewed during RP5). The CC set a 1% productivity improvement target for NIE at RP5 for opex and capex. At GD17 we set a 1% productivity improvement for gas distribution networks. The precedent provides useful background and indicates the plausible range for our RP6 productivity assumption for opex and capex.

3.16 Part of the judgement to be made with EU KLEMS is in that it offers both gross output (GO) and value added (VA) measures of total factor productivity. NERA in their analysis for NIE Networks opted for the GO measure solely, as it was not clear to them that VA was relevant to the RP6 price control framework. NERA also referenced comment by Ofgem and the CMA on the suitability of the VA measure.

3.17 In considering NERA's position on use of GO and/or VA measures the Competition Commission's (CC) recent deliberations and conclusions on the matter in their recent NIE RP5 determination are relevant.

3.18 The CC took a balanced view of both productivity measures. They noted that neither measure perfectly captures the productivity changes that could be expected in a company's cost base. In addition the CC noted changes in GO have been systematically smaller than changes in VA. However they subsequently concluded while there were some disadvantages, that it was their view that both GO and VA measures are useful[23].

3.19 On that basis they produced a range of possible productivity improvement. Table 8 shows the CC's figures for aggregate average annual productivity growth rates (i.e. for the UK economy as a whole) based on the different measures of productivity.

3.20 The CC applied this rationale in their final determination of the NIE Networks price control. The Commission considered that the aggregate EU KLEMS data could support a range of estimates of productivity of between 0.5 and 1.5 per cent. The Ofgem RIIO-GD1 and T1 analysis underpinned the CC's range produced for Table 9.

[21] https://www.ofgem.gov.uk/ofgem-publications/48211/riiot1andgd1initialproposalsrealeffects.pdf#page=21
[22] https://www.ofgem.gov.uk/ofgem-publications/48211/riiot1andgd1initialproposalsrealeffects.pdf
[23] See appendix 11.1 of the CC's NIE RP5 final determination, §§ 3 - 10 https://assets.digital.cabinet-office.gov.uk/media/534cd4b4ed915d630e000041/appendices-glossary.pdf

Table 9: Average annual TFP growth rates for different sectors using EU KLEMS, 1970 to 2007

per cent

Sector/group	*TFP (VA)*	*Labour & intermediate input productivity (VA) at constant capital*	*TFP (GO)*	*Labour & intermediate input productivity (GO) at constant capital*	*Labour & intermediate input productivity (GO)*
Unweighted average all industries	1.3	1.5	0.5	0.5	0.8

Source: EU KLEMS/Ofgem RIIO—T1/GD1: Real Price Effects and ongoing efficiency appendix, p15, 17 December 2012.

Notes:
1. The averages used by Ofgem exclude the following industries: real estate, public administration, education, health and social services.
2. VA = value added measure.
3. GO = gross output measure.

Source: Competition Commission final determination of the NIE RP5 price control, Table 11.2

3.21 As part of the price control package, it is necessary to determine the level of productivity improvement likely to be achievable. We can establish or cross check an improvement amount applicable in different ways. A reasonable gauge of potential productivity improvement calculations is that which has been observed in industries similar to the company and/or has been applied to it or other DNOs previously.

3.22 In terms of available observation data we agree with the CC/CMA and consider the EU KLEMS data provides a useful data source over an acceptable length time series. From the material set out above, and the range summarised in Table 9 we consider it reasonable to conclude that continuing productivity is relatively small. As such the above estimated range provides a suitable choice for productivity improvement.

3.23 While considered relatively moderate productivity increase, over time this is material enough to indicate continued efficiencies are possible due to their cumulative effect. This means we expect that companies shall deliver further efficiencies into the long term, even if residing at the frontier for the industry as the frontier is not static.

3.24 Table 9 has been taken from the CC's determination and updated for more recent price control decisions. It shows a summary of various regulatory assumptions that have been made regarding annual productivity improvement assumptions. In GD17 we applied a 1.0% productivity assumption for both opex and capex. The CC applied the same assumptions to NIE Networks at their last price control. These previous productivity assumptions provide a useful comparison but do not of themselves act as a range estimate for RP6.

3.25 We note these examples of previous productivity assumptions as background and a form of self-critical sense-check of actual improvement decisions, not as a definitive list of scale points for potential improvement.

Table 10: Recent regulatory assumptions on productivity

Opex productivity	
UR—Water and sewerage	0.9
PPP Arbiter—underground infracos, central costs	0.7
PPP Arbiter—underground infracos, opex	0.9
Ofgem—GB DNOs	1.0
Ofgem—Transmission & Gas Distribution	1.0
ORR—Network Rail, opex	0.2
ORR—Network Rail, maint	0.7
CC – NIE RP5 opex	1.0
CMA – Bristol Water PR14[24]	1.0
UR – GD14 opex	1.0
UR – GD14 opex	1.0
UR – GD17 opex	1.0
Capex productivity	
PPP Arbiter—underground infracos	1.2
Ofgem—GB DNOs	1.0
Ofgem—Transmission & Gas Distribution	0.7
ORR—Network Rail	0.7
CC - NIE RP5 capex	1.0
CMA – Bristol Water PR14[25]	1.0
UR – GD14 capex	1.0
UR – GD17 capex	1.0

Source: UR, CC RP5.

3.26 Of particular relevance is the productivity assumption for the current NIE Networks price control, RP5. In their final determination of RP5 for NIE Networks, the Competition Commission, in assessing all the available evidence, considered a productivity assumption of 1% as reasonable in their case:

> *"To reach our decision on productivity, we considered the evidence provided by other regulatory decisions, the EU KLEMS data and the recent business plans of the GB DNOs. We considered that the recent business plans of the GB DNOs and Ofgem's recent decisions in respect of the GB DNOs and Transmission & Gas Distribution were particularly relevant. This was because these businesses overlapped significantly with NIE's business activities.*
>
> *Based on this evidence, we considered that we should expect NIE to make an incremental efficiency improvement of 1 per cent a year for each of opex and capex.*
>
> *We therefore determined that we should apply a productivity assumption of 1 per cent a year to NIE's costs (ie to each of opex and capex)."*

3.27 We also note CMA analysis from the recent Bristol Water regulatory determinations. The CMA in their Bristol Water final determination applied a cost trend adjustment for RPI–1% (efficiency and input price inflation).

3.28 We acknowledge NIE Networks concerns about productivity. NIE Networks are of the opinion that we are not providing specific funding for particular ('efficiency driving') IT projects and for what they consider modelled efficient costs. They opine that by doing this we are effectively increasing the necessary productivity improvement beyond 1%.

[24] Applied to totex
[25] Applied to totex

3.29 We are of the opinion the overall RP6 price control package is appropriate and indeed provides significant headroom for the company. How NIE Networks deliver productivity is a matter for it and we do not see it as the role of the regulator to provide an increase in costs linked to the delivery of productivity measures. The Gemserv report, included as Annex E, sets out the detail of the IT funding decisions contained within it.

3.30 With the data evidence and precedent presented by other regulatory decisions on productivity improvement the CC/CMA range of 0.5% - 1.5% appears to continue providing a reasonable range in the broad circumstances of a regulated monopoly network company. Subsequently we also consider a midpoint productivity assumption of 1.0% per annum continues to be a reasonable assumption for NIE Networks given the relevant precedent available, the current working assumption for RP5 and the company's own business plan submissions. Therefore we apply a 1.0% per annum productivity assumption for the RP6 price control for NIE Networks.

4 Frontier Shift Conclusions

4.1 The 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.[26] The net impact of frontier shift for opex and capex is shown in the tables 11 and 12 below.

4.2 In a simplified calculation however, frontier shift can be determined as follows:

Frontier shift in real terms =	input price increase	minus
	forecast RPI (measured inflation)	minus
	productivity increase	

4.3 Applying each of the assumptions set out above would result in a cumulative frontier shift of 6.3% for opex in total over the RP6 price control. This is calculated from yearly frontier shift assumptions that are relatively higher in the first 2 years but then more moderate, tailing off for the rest of RP6.

4.4 For capex we would estimate a similar profile of frontier shift change, starting relatively higher then tailing off after the first 2 years. This would give a cumulative frontier shift of 6.8% for capex in total for the RP6 price control. The impact of the frontier shift on NIE Network's opex and capex cost base is shown in the last line of each table.

Table 11: Opex Frontier Shift

UR final determination		Opex								
		RP5			RP6					
Opex	Weight	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Labour	77.3%	2.8	2.7	2.7	3.1	3.3	3.7	3.9	3.9	3.9
Materials	7.7%	2.5	2.3	2.5	3.0	3.5	3.9	3.9	3.9	3.9
Equipment/Plant	0.0%	1.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Other	15.0%	1.1	2.2	3.9	3.4	3.1	3.1	3.2	3.2	3.2
Total nominal input price inflation		2.5	2.6	2.8	3.2	3.3	3.7	3.8	3.8	3.8
RPI		1.1	2.2	3.9	3.4	3.1	3.1	3.2	3.2	3.2
Productivity growth		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Frontier shift (forward look)		**0.0**	**-0.6**	**-2.0**	**-1.3**	**-0.8**	**-0.5**	**-0.4**	**-0.4**	**-0.4**
Frontier Shift (%)		0.0%	0.6%	2.0%	1.3%	0.8%	0.5%	0.4%	0.4%	0.4%
Frontier Shift (Cumulative %)		0.0%	0.6%	2.6%	3.8%	4.6%	5.1%	5.5%	5.9%	6.3%
Efficiency effect on cost base - opex		100.0%	99.4%	97.4%	96.2%	95.4%	94.9%	94.5%	94.1%	93.7%

Table 12: Capex Frontier Shift

UR final determination		Capex								
		RP5			RP6					
Capex	Weight	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Labour	52.8%	2.8	2.7	2.7	3.1	3.3	3.7	3.9	3.9	3.9
Materials	30.2%	2.5	2.3	2.5	3.0	3.5	3.9	3.9	3.9	3.9
Equipment/Plant	5.9%	1.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Other	11.1%	1.1	2.2	3.9	3.4	3.1	3.1	3.2	3.2	3.2
Total nominal input price inflation		2.4	2.5	2.7	3.1	3.3	3.6	3.7	3.7	3.7
RPI		1.1	2.2	3.9	3.4	3.1	3.1	3.2	3.2	3.2
Productivity growth		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Frontier shift (forward look)		**0.0**	**-0.7**	**-2.1**	**-1.3**	**-0.8**	**-0.5**	**-0.5**	**-0.5**	**-0.5**
Frontier Shift (%)		0.0%	0.7%	2.1%	1.3%	0.8%	0.5%	0.5%	0.5%	0.5%
Frontier Shift (Cumulative %)		0.0%	0.7%	2.8%	4.1%	4.9%	5.4%	5.8%	6.3%	6.8%
Efficiency effect on cost base - capex		100.0%	99.3%	97.2%	95.9%	95.1%	94.6%	94.2%	93.7%	93.2%

[26] For example for 2016/17 the opex frontier shift is calculated as follows: (1.026/1.022)*(1-0.01)-1=-0.6%. When applied to gross opex and capex these numbers are transformed into a *frontier shift multiplication factor* by subtracting from 100% i.e. the cumulative 6.3% becomes (100% minus 6.3%) = 93.7% or a factor of 0.937.

4.5 The results of the above frontier shift calculations indicate that there should be a frontier shift of around -0.8% on average per annum for both opex and capex, from 2015-16 base year to the end of RP6.

4.6 However, while we are content that the arguments provided in response to the draft determination are not sufficient to overturn the individual assumptions set out above, the final decision needs to take account of a more high level view of ensuring we arrive at a balanced position on the frontier shift, and indeed on the overall price control.

4.7 In considering this, we have determined that for the final determination NIE Networks should be provided with some 'headroom' against the above assumptions for real price effects and productivity in RP6. Firstly this has the effect of both addressing the generality of NIE Networks response, for while we were not convinced to make significant changes to our assumptions, providing headroom in the final frontier shift figure ensures that NIE Networks is afforded some protection in case some of the individual assumptions result in an overly ambitious target.

4.8 Furthermore, we recognise that, in maintaining and operating a distribution network over the next six and a half years there are likely to be a number of uncertainties and events where we would expect an efficient, co-ordinated and economical operator to respond, and absorb within the RP6 period.

4.9 For final determination we therefore consider that the following efficiency effect on cost base should be applied for opex and capex over RP6.

Table 13: Applied Frontier Shift for RP6

	RP6						
	2017/18	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**2022/23**	**2023/24**
Effect on Cost Base - Opex	98.3%	97.5%	96.6%	95.8%	95.0%	94.2%	93.4%
Effect on Cost Base - Capex	98.3%	97.5%	96.6%	95.8%	95.0%	94.2%	93.4%

4.10 In our financial calculations we apply a more moderate frontier shift for both opex and capex, from 2015-16 base year to the end of RP6.

4.11 However we would highlight that we plan to monitor carefully the frontier shift over the course of RP6 against the final determination. We will use this, and other relevant information, to consider the appropriate approach to determining frontier shifts in future price controls.