

Office for Research and Economics - Review of Regional & Special Cost Factors

For discussion

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1. Regional or Special Cost Factors: Systematic Literature Review

The Office of Research and Economics has prepared this analysis because Ofgem will have to evaluate business plans submitted by network companies for RIIO-2. As part of this evaluation, Ofgem is required to assess whether the submitted cost estimates are sensible.

This document presents an overview of how Ofgem and other regulators have accounted for regional cost factors when evaluating network companies' submissions. The conclusion of this analysis does not represent Ofgem final view. We will continue working to further refine our understanding, and welcome comments and observations.

1.1. What are regional or special cost factors? Why do they matter to regulators?

In the context of the design of regulatory price controls, cost assessment is a key component. The regulator's views regarding whether a regulated company is operating efficiently are shaped by its assessment of the company's historical data and/or business plan for the price control period. Based on this assessment, the regulator sets allowances for the company for the subsequent regulatory period.

As a result, the accuracy of the regulator's assessment of whether the reported costs are likely to reflect operating efficiency is crucial in determining the ultimate effectiveness of price controls. In the UK, Ofgem and Ofwat, the energy and water sector regulators, have used benchmarking techniques in previous price controls.¹ The Northern Ireland Utility Regulator (UR) has also adopted benchmarking in previous years² to determine whether companies' stated costs are likely to reflect efficient performance.³ In the context of regulation, benchmarking is an incentive mechanism through which regulators attempt to encourage companies to strive to be more efficient, by assessing a company's

¹ Jamasb and Pollitt (2008): Reference models and incentive regulation of electricity distribution networks: An evaluation of Sweden's Network Performance Assessment Model (NPAM). Energy Policy 36 (2008) 1788–1801. and NERA (2017): Comparative Benchmarking Assessment to Support Preparation of Bristol Water's AMP7 Business Plan: Prepared for Bristol Water

² Utility Regulator (2016): RP6 Business Plan - Benchmarking & Efficiency Data Submission: Guidance Notes.

³ See for instance Ofgem (2012): RIIO-GD1: Initial Proposals – Supporting document – Cost efficiency.

performance using the lens of a comparison either with a yardstick of a very efficient hypothetical firm or with an alternative reference measure.⁴

One issue that often arises with benchmarking distribution network operators in energy as well as water utilities relates to the fact that companies in both areas operate as natural monopolies. In the electricity distribution sector, for instance, the UK has 14 DNOs, each of which covers a different geographical region.⁵ This implies that while benchmarking these companies, the regulator in question has to compare their business plan submissions with those of their counterparts in different regions of the country.

In doing so, the regulator often has to account for potentially significant differences in the cost structures faced by companies operating in different regions owing to unique regional characteristics. For instance, wage pressures might be different in different areas, and some areas might be more sparsely populated than others, resulting in smaller economies of scale for companies which serve those areas (relative to, say, a company which serves a densely populated city). Further, companies may be advantaged or disadvantaged by other company-specific costs (such as transport related costs, reinstatement or excavation costs, and capital costs). This implies that at least in theory, there may be a case for the regulator to consider cost adjustments or allowances proposed by companies, purely on account of regional variations. This leads to the idea of allowing for **regional cost factors**, **special cost factors** or **company specific effects** in order to ensure comparability between companies and thus undertake a sensible benchmarking exercise. Ofgem accounted for such factors in setting RIIO-1⁶, and is currently in the process of re-evaluating these factors for RIIO-2.

1.2. The importance of comparability

Comparability is a key issue in setting regulatory price controls yet there is no definitive approach for how to assess comparative efficiency.⁷ Each regulator has applied a process which takes into account the specific characteristics of their sector. There are however some overlapping methodologies. A primary concern involves the types of company costs which should be compared, especially in terms of whether to use a total expenditure ('totex') measure as opposed to considering operating expenditure ('opex') and/or capital expenditure ('capex') separately.⁸ Within each category, there may be further decisions to be made – for instance, for 'opex' benchmarking, the regulator could

⁴ Jamasb and Pollitt (2008): Reference models and incentive regulation of electricity distribution networks: An evaluation of Sweden's Network Performance Assessment Model (NPAM). Energy Policy 36 (2008) 1788–1801.

⁵ See <https://www.ofgem.gov.uk/electricity/distribution-networks/gb-electricity-distribution-network>

⁶ See for instance Ofgem (2012): RIIO-GD1: Final Proposals – Supporting document – Cost efficiency

⁷ https://www.ofgem.gov.uk/sites/default/files/docs/2014/11/riio-ed1_final_determination_overview_-_updated_front_cover_0.pdf 4.26

⁸ CEPA (2014): Cost Assessment – Advanced Econometric Models

opt for either 'top-down' methods (involving a direct comparison between different firms' operating costs, controlling for cost drivers) and 'bottom-up' methods (based on estimation of efficient allowances for each element of costs).^{9 10}

Effectively, comparability derives from having a good measure of the 'efficient frontier', which is represented by a hypothetical company producing the relevant output (e.g. distributing gas volumes or providing services to customers) at the lowest possible cost or resource levels.¹¹ Through benchmarking, regulators try to establish the 'catch-up efficiency' of each regulated firm, in terms of the level of cost or resource reductions required for each firm to attain the frontier efficiency level.¹¹ To ensure comparability, specific cost types often have to be excluded from the benchmarking process, prior to modelling being undertaken. For instance, in its GD17 price control, the UR excluded training and apprentice costs, streetwork costs, environmental costs and a range of other cost types from its models.¹¹

The benchmarking process entails accounting for a range of considerations which differentiate companies - such as company size. When dealing with small utility firms specifically, a common challenge arises in terms of constructing a counterfactual for their operation where ready comparators do not already exist.¹² Further, comparability of business plan estimates may be rendered more difficult if a double or multiple track submission process is in place. In RIIO-1, for instance, Ofgem offered incentives for 'fast-tracking' business plan submissions, effectively rewarding companies which submitted clearer and more efficiency-driven business plans with a faster approval rate.¹³ Companies which did not meet the fast-tracking threshold were 'slow-tracked', which implied that they had to revise and resubmit their business plans for further consideration. This is likely to have imposed additional costs and administrative burdens on the 'slow-tracked' companies.¹⁴ In turn, slow-tracked companies might argue that they may have been unfairly treated and call for the fast-tracking process to be reconsidered, and for the regulator to level the playing field over the price control period.¹⁵ Such concerns must be set against the potential benefits of fast-tracking, in terms of all companies arguably having less of an incentive to 'game' the system in the

⁹ CMA (2017): *Firmus Energy (Distribution) Ltd v Northern Ireland Authority for Utility Regulation: Final Determination*

¹⁰ Ofgem Default Tariff Cap Policy Consultation: Appendix 4

¹¹ Deloitte (2016): Annex 4 - GD17 Efficiency Advice: Relative Efficiency of Northern Ireland Gas Distribution Networks

¹² Ernst and Young (2018): *The value of small local water only companies – Final Report for Bristol Water, Portsmouth Water and SES Water*

¹³ CEPA (2018): *Review of the RIIO Framework and RIIO-1 Performance – Ofgem*

¹⁴ See for instance Ofgem (2014): *RIIO-ED1: Final determinations for the slow-track electricity distribution companies – Business plan expenditure assessment*

¹⁵ See for instance Northern Powergrid (2014): *RIIO-ED1 Draft Determination for the Slow-Track Electricity Distribution Companies – The Northern Powergrid Response to Ofgem's Consultation Issues on 30 July 2014*

initial pre-review stage, and the slow-tracked companies having an incentive to target the benchmark(s) set by fast-tracked firms.¹⁶

There are trade-offs involved in terms of making adjustments for specific costs prior to and after the main modelling stage of benchmarking.¹⁷ Taking the example of indirect opex costs attributed to connection activities, where the costs are accounted for prior to modelling, then there is more flexibility on allocation rate assumptions in the following stage, but a number of post-modelling adjustments may be required. However, if connection costs are adjusted for after modelling, then the analysis better targets regulated costs, but at the expense of potential distortions introduced by cost allocation between connections and other activities (on the part of the modeller).¹⁷

More broadly, carrying out benchmarking modelling before costs are allocated removes the incentive to overestimate non-regulated costs but does require regulated and unregulated costs to be modelled separately and evaluations made of gross versus net costs. Carrying out modelling post-allocation of non-regulated costs reintroduces the risk of inflated non-regulated costs which can reduce the proportion of indirect costs that are included in the benchmarking thereby improving the efficiency performance of regulated companies. However, the post allocation approach is effective in focusing directly on the regulated costs.

The UR chose an approach of applying a 50% weighting to both the pre-allocation and the post-allocation models with a view to 'managing the trade-off between using both approaches' however this approach and certainly the percentage weighting may not be appropriate in all cases. The UR approach was challenged at draft stage but was taken forward to the final determination.

1.3. Consideration of cost factor assessments

During the process of setting the RIIO-1 price control, submissions were received from the regulated companies in addition to the approach put forward by Ofgem. Whether the submitted factors were accepted and to what extent, was influenced by certain criteria such as: the materiality of the factor, whether the factor is within the control of the company and the overall impact each factor has on the relative balance of other agreed factors. Although the materiality of each was considered, a specific materiality threshold for submissions was not set.

¹⁶ CEPA (2018): Review of the RIIO Framework and RIIO-1 Performance – Ofgem

¹⁷ CEPA (2017): RP6 Efficiency Advice – The Northern Ireland Utility Regulator

In addressing the submissions made for the inclusion of additional regional, special and company-specific cost factors, each was dealt with in a case-by-case basis and considered on its individual merits. A defined framework for considering cost factor submissions from regulated companies was not used. One particular approach which Ofgem undertook to interrogate the strength of the cost factor submissions was to hold company workshops wherein the submitted cost factors were open to discussion and challenge from other companies. The working groups led to significant discussions and reduced the initial long-list of factors through challenges from Ofgem, and from the network companies challenging submissions. The network company challenges are particularly useful as they are built upon the network companies own knowledge of operation. However, there is an incentive for companies to challenge factors which apply to other companies but not to themselves. Each cost factor that is approved and doesn't apply to every company could potentially negatively impact the companies not covered by the factor. An approach to mitigate this, taken by Ofwat, was to apply accepted adjustment claims to all relevant companies regardless of the source of the submission.

1.4. Previous applications of regional, special and company-specific cost factors

1.4.1. Ofgem – RIIO-1

In this section we consider applications of cost factors in earlier regulatory exercises including Ofgem, Ofwat and the NI Utility Regulator. There are examples from water, gas and electricity. These examples are summarised below and concern the treatment of Regional Labour costs in all cases, as well as examples of how non-wage regional factors such as sparsity and urbanity are dealt with as well as company-specific factors such as the cost impacts driven by maintenance of storage facilities and rail electrification projects amongst others.

Ofgem applied a number of regional or special cost factors for RIIO-GD1.¹⁸ These factors may be classified under four headings, as Table 1 outlines.

¹⁸ [Ofgem \(2012\): RIIO-GD1: Final Proposals – Supporting document – Cost efficiency](#)

Table 1 - Ofgem's application of regional or special cost factors during RIIO-GD1

Cost Factor	Ofgem's Application During RIIO-GD1
Regional labour costs	Ofgem accounted for differences in regional labour costs or earnings on the basis of the Annual Survey of Hourly Earnings (ASHE). Focussing specifically on the labour cost differentials between London & the South East of England (which typically has higher labour costs) and the rest of GB.
Sparsity adjustments	Sparsity factors seek to account for cost differentials attributable to areas with low population density, primarily on account of the difficulty in servicing such areas in operational, infrastructural and emergency contexts. Ofgem used district level areas and population estimates to arrive at sparsity adjustments to GDNs' costs.
Urbanity adjustments	The opposite of the sparsity factors; urbanity factors attempt to correct for cost differentials which are driven by lower labour productivity levels registered in particularly densely populated urban centres, on account of greater underground and above-ground congestion. Ofgem applied a 15 per cent labour productivity adjustment to GDN costs arising from work undertaken inside the M25, based on mains reinforcement, connections and reinstatement activity.
Other factors	Ofgem also accepted a request made by Northern Gas Networks (NGN) to exclude newly submitted salt cavity maintenance costs from its benchmarking analysis.

Source: Ofgem (2012): RIIO-GD1: Final Proposals – Supporting document – Cost efficiency

For RIIO-ED1, Ofgem followed a very similar approach to the above, although some of the cost types were distinct on account of sector-specific features:¹⁹

- As with RIIO-GD1, Ofgem accounted for differences in **regional labour costs** on the basis of the Annual Survey of Hourly Earnings (ASHE), using adjustments for the proportion of work undertaken in London & the South East.
- Ofgem accounted for most of the adjustments proposed by SSEPD on the grounds that the company served remote areas in Scotland, and that **sparsity factors** were therefore

¹⁹ [Ofgem \(2013\): RIIO-ED1 business plan expenditure assessment - methodology and results](#)

justified (these were largely driven by transport, communication and depot staffing costs).

- Ofgem also accepted 30 per cent of adjustments proposed by UKPN on the grounds of **urbanity** driven considerations, particularly in terms of transport and travel costs linked to the dense internal London transport network.
- Further, Ofgem excluded certain costs from its benchmarking, either for special reasons or because they were relevant only to some DNOs.¹⁹ These included streetwork costs, business support insurance costs, ETR 132 tree cutting activity and wayleave payments arising from linked indirect activities. Further, WPD forecast some costs to be associated with line diversion due to Network Rail's electrification programme, which Ofgem assessed as being efficient and excluded from its benchmarking.²⁰

1.4.2. Challenges to RIIO-ED1

Following publication of the RIIO-ED1 decision in 2015, Northern Powergrid and British Gas Trading (BGT) both raised challenges which were considered by the Competition and Markets Authority. The BGT position did not challenge the regional or special cost factors of the RIIO methodology and is therefore not covered here.

Northern Powergrid

One of Northern Powergrid's 3 challenges to RIIO-ED1 was based upon a challenge of the methodology used to calculate Regional Labour Cost Adjustments (RLCAs).²¹ In brief, RIIO-ED1 based its RLCAs on difference in wage levels across GB regions. The figures used come from the Annual Survey of Hours and Earnings (ASHE) carried out by the Office for National Statistics. These figures are broken down using Standard Occupational Classification (SOC) codes²² which offer 4 levels of granularity at which to split out occupations. The first level is the lowest level of granularity and the largest sample size and the 4th level the highest granularity and smallest sample size. RIIO-ED1 is based upon the 2nd level of granularity, 2 digit SOC codes. The substantive challenge was that this level of granularity didn't fully reflect the specific labour cost differences between DNOs in different regions and was more prone to compositional bias than more granular data. The CMA considered both the challenge and the GEMA response which stated that the approach taken provided balance between sample size and precision, and found in favour of retaining the existing methodology.²³ The CMA ruled that in order to replace

²⁰ www.gov.uk/cma-cases/energy-price-control-appeal-british-gas-trading#final-determination

²¹ British Gas Trading also challenged GEMA on RIIO-ED1 however none of the 5 grounds related to the scope of this paper.

²² [Office for National Statistics – Standard Occupational Classifications](https://www.ons.gov.uk/peopleinwork/employmentandearnings/methods/surveyofhoursandearnings/soc)

²³ [CMA final determination – Northern Powergrid RIIO-ED1 \(2015\)](https://www.cma.gov.uk/cma-cases/energy-price-control-appeal-northern-powergrid-riio-ed1)

the proposed methodology, it is not sufficient to identify the shortcomings of a particular methodology and evidence should be provided of a superior alternative.

1.4.3. Ofwat – PR14 and PR19

The UK water sector regulator, Ofwat, has also considered regional or special cost factors fairly extensively in its 2014 price review (PR14) and its more recent price review (PR19). For PR19, Ofwat has a 'special cost factor' process in place to gauge companies' efficiency levels with as much precision as possible.²⁴ Ofwat has emphasised applying symmetrical adjustments to companies' cost submissions where appropriate, so as to correct for both underestimation and overestimation. Overestimation of company costs on the basis of business plan submissions is clearly the greater concern, as it is likely to lead to inflated expenditure claims, at the ultimate expense of end consumers having to overpay for an essential product. Underestimation of costs, while less likely, also presents a challenge in that it could deter companies from investing sufficiently in network improvements.

Ofwat's methods also emphasise fairness, in the sense that where claims for adjustment made by one business are accepted, they will be applied to other companies where relevant.

An important element of the Ofwat process is the specification of the categories of evidence required to support cost adjustment submissions. The following are the criteria for evidence assessment of cost claims made under PR19:

- Need for cost adjustment
- Management control (whether the claim is driven by factors beyond management control)
- Need for investment
- Best option for customers
- Robustness and efficiency of costs
- Customer protection
- Affordability
- Board assurance (of investment proposal robustness and feasibility of delivery, and options appraisal)

The definition of this evidential bar provides clarity to regulated companies and reduces the costs of submitting and evaluating cost claims.

²⁴ Ofwat (2017): Delivering Water 2020: Our final methodology for the 2019 price review – Appendix 11: Securing cost efficiency

In the context of PR19, Ofwat published a longer list of cost drivers for a variety of water services, relative to what Ofgem had published as final factors during RIIO-1²⁵. Many of the Ofwat factors are very specific to the water sector and not relevant to Ofgem, yet some may be worth considering in the context of RIIO-2. However, the final cost factors that were settled on by Ofgem for RIIO-1 are broader measures and designed to incorporate a number of more specific factors that could be derived.

As regards regional wage adjustments for the PR14 review, Ofwat used a different technique relative to Ofgem's *ex ante* adjustments in RIIO-1. Rather than make *ex ante* adjustments, Ofwat explicitly included a regional wage control variable in its benchmarking models.²⁶ Prior to the PR19 review, Ofwat commissioned CEPA to undertake an econometric assessment of the relative merits and weaknesses of these alternative approaches. CEPA concluded that adjusting for regional wages did not improve modelling results, and therefore concluded that its baseline models should not incorporate regional wage differentials at all.²⁶ However, CEPA re-ran all of its models with variants of either *ex ante* adjustments or a regional wage variable, to ensure that robustness checks had been undertaken. More specifically:

- To construct a regional wage explanatory variable, CEPA used ASHE data, which were also used by Ofgem in its RIIO-1 reviews. This led to a number of options in terms of a regression control variable. Eventually, CEPA used mean hourly earnings excluding overtime, with a weighting across job categories by region (the weights were based on in-house sector information provided by Ofwat, focused on the variation in job types that might be expected across water or wastewater companies). This yielded a company specific average wage variable, which CEPA used as a control variable (in logarithmic form).²⁶
- Further, CEPA also conducted a robustness check based on *ex ante* regional wage adjustments (along the lines of those carried out by Ofgem during RIIO-1). This entailed constructing a regional wage index reflecting the ratio of each company's wages relative to the UK average (again, this was partly based on in-house mapping data provided by Ofwat). CEPA emphasised that the link between company costs and regional wage differentials would hinge on the degree to which companies had to source labour from within their region of operation, and ran separate models assuming the proportion of labour sourced within the region to be either 100% or 70%.²⁶

²⁵ Ofwat (2018): Cost assessment for PR19: a consultation on econometric cost modelling

²⁶ CEPA (2018): PR19 Econometric Benchmarking Models – Ofwat

As regards sparsity or urbanity/density considerations, the only variable used by Ofwat in its PR14 review was the total number of connections or length of mains. CEPA has emphasised that the impact of density on company costs is unlikely to be easy to predict.²⁶ On the one hand, the increased complexity inherent in working in more densely populated spaces (due to local authority legislation or greater congestion, for instance) could drive up company costs. On the other, serving more remote or sparsely populated areas brings its own challenges in terms of maintaining larger numbers of depots and incurring higher staff travelling costs. To model these effects and test whether either was more dominant, CEPA used a range of alternative measures borrowed from a prior study²⁷:

- Total connections divided by total length of mains
- Total properties divided by total length of sewers
- Ofwat high density explanatory variable
- Ofwat weighted average density explanatory variable
- Annual urban runoff
- Percentage of urban customers
- Percentage of urban assets

1.4.4. The Utility Regulator of Northern Ireland - Gas distribution

In Northern Ireland, the Utility Regulator (UR) has also accounted for regional and special cost factors in setting its price controls for Gas distribution. While useful to consider in our review of these factors, it is important to highlight that there are grounds for caution in any exercise assessing whether Ofgem's RIIO-2 modelling could borrow from the UR's assessments²⁸

- There are only three monopoly GDNs in Northern Ireland, as opposed to eight in Great Britain, on account of which the GDNs in Great Britain tend to be used as benchmarks for the Northern Ireland GDNs.
- There are differences in activity scope and legislation for GDNs in Great Britain and Northern Ireland (GB and NI). This necessitates the exclusion of certain cost categories (e.g. training and apprentice costs, streetwork costs etc) to ensure a like-for-like comparison.
- The GB GDNs are significantly larger in scale relative to their NI counterparts.
- Network utilisation differs across the GB and NI GDNs.

²⁷ Vivid Economics and Arup (2017): Understanding the exogenous drivers of wholesale wastewater costs in England & Wales

²⁸ Deloitte (2016): Annex 4 - GD17 Efficiency Advice: Relative Efficiency of Northern Ireland Gas Distribution Networks

- The GB GDNs are considerably older than their NI counterparts, which has implications for asset maintenance costs (higher in general for older networks).
- The UR has used Ofgem's RIIO-1 regional or special cost factor analyses as benchmarks for its own decisions in the same domain.²⁹

Bearing these points in mind, the regional and special cost factors considered or applied by the UR in recent price controls can be summarised as follows:³⁰

As regards **regional wage adjustments**, the UR uses ASHE data to adjust for earnings differentials across regions prior to undertaking benchmarking. This is in line with Ofgem's RIIO-1 procedure. To arrive at a baseline point estimate of the average wage for each region, the UR makes a series of transparent estimation assumptions, given that the CMA puts the burden of proof on the company to prove that the regulator's assumptions are erroneous.³¹ This may be done on a case-by-case basis. In its recent GD17 review, for instance, the UR rejected a request for regional price adjustments from SGN, a relatively new market entrant in Northern Ireland GD (SGN had asked for an adjustment to account for differences in labour costs between Scotland and Northern Ireland).³² The request was rejected on the basis that the regional wage adjustment is set at a level which founded upon 'local historical costs' and the UR felt there was no need for any additional adjustment relative to GB or within Northern Ireland.

In terms of **sparsity factors**, the UR considers adjustment requests from companies on a case-by-case basis. In GD17, SGN requested a sparsity adjustment to be made, citing Ofgem's RIIO-GD1 adjustments as an example. The UR's analysis, however, suggested that SGN had extra costs amounting to approximately 1% of its construction costs, and the UR decided that that was insufficient to warrant a cost adjustment.³² In the same review (GD17), NIE appealed for a series of sparsity-related special cost factor adjustments to be made by the UR, having commissioned NERA to undertake analysis providing quantitative evidence and justification for these adjustments (for instance, higher costs arising from a high proportion of overhead lines).

Other factors are also considered on a case-by-case basis by the UR. SGN, for example, requested a few additional adjustments during GD17, none of which were granted by the UR after due consideration. For instance, SGN requested adjustments to be made for its relatively late market entry, for lower economies of scale which it

²⁹ See for instance Utility Regulator (2017): Price Control for Northern Ireland's Gas Distribution Networks: GD17 Final determination

³⁰ CEPA (2017): Regional Wage Adjustment: The Northern Ireland Utility Regulator (UR)

³¹ See for instance CMA (2015): Northern Powergrid (Northeast) Limited and Northern Powergrid (Yorkshire) plc v the Gas and Electricity Markets Authority: Final determination

³² Utility Regulator (2017): Price Control for Northern Ireland's Gas Distribution Networks: GD17 Final determination

perceived itself to have relative to its competitors, and for the fact that it was focused on gas distribution and therefore could not benefit from multi-utility construction contracts.³² The UR considered each of these claims and decided against including any of them for the following broad reasons:

- Identified costs were not unique to the appellant
- Identified costs could have been included or accounted for in earlier tender processes.
- Identified costs were considered immaterial

Similarly, the UR decided against applying special factors to NIE's cost estimates during GD17, following claims made by NIE on grounds such as consumer engagement costs and property price differentials.³² A materiality threshold has been set at £100,000 for unforeseen costs incurred related to new outputs, within the normal GDN operations. Additionally costs which were unforeseeable at the time of the price control and out with the control of the GDNs may be considered below the materiality threshold.³²

1.4.5. The Utility Regulator - Electricity distribution and transmission

The approach taken in setting price controls for electricity differs in that there is a single monopoly distribution operator and a single transmission operator. The regional wage adjustment is made using the same methodology as the Gas Distribution price control above, based upon ASHE data. Some special factors were identified however the UR expects the impact of these factors to net to zero and therefore doesn't apply them.³³ Instead, an additional variable is added to the model covering the proportion of overhead lines in an operator's network. This variable is included in the Network Operating Costs (NOCs) and closely associated indirect costs (CAI) models³³

2. A preliminary comparative assessment

In summary, the three UK regulators that we have focused on in our study of regional and special cost factors (Ofgem, Ofwat and the UR) have somewhat similar approaches in this area, although there are a few differences to consider. Our systematic review of the literature has yielded a considerable amount of detail particularly in the case of these regulators' approaches to adjusting for **regional wage differentials**.

2.1.1. Alternative regulatory approaches to regional wage adjustments

³³ Utility Regulator (2017): Transmission & Distribution 6th Price Control (RP6) – Final determination

All three regulators use ASHE data for this purpose, but there are distinctions in their preferred approach to modelling these differentials. At a broad level, Ofgem and the UR have tended to prefer *ex ante* wage adjustments, whereas Ofwat has relied on CEPA econometric analysis to conclude that regional wage differences are unlikely to be a major driver of company cost differentials (irrespective of whether they are modelled *ex ante* or as an explanatory variable).

- One decision regulators need to make is whether to use **mean or median** wage rates in adjusting for regional differences. The mean is more amenable to statistical analysis, whereas the median is less vulnerable to being skewed by outliers in the wage distribution. In most cases, regulators have used the mean for analytical convenience, the key exception being the UR in GD17 (where the median was used). CEPA, however, tested both the mean and the median for the UR and recommended retaining the mean, stating that outliers were not a major issue in this context.³⁴
- To account for **occupational types** being different, Ofgem and the UR have tended to use 2-digit occupational codes (based on the Standard Occupational Classification, SOC), which are not very granular but provide more statistical precision with smaller sample sizes. The UR considered CEPA analysis of whether more granularity would be an advantage, but ultimately decided against using 3- or 4-digit SOC coding.³⁴
- As regards using **weekly or hourly** wage estimates, the UR has proposed to use hourly estimates in future price controls, although it used weekly estimates in GD17. The issue with using weekly estimates is that they are more reliable for **full-time employees**, and make it difficult to compare the earnings of full- and part-time employees. The use of hourly earnings can circumvent this problem. Ofgem also used hourly earnings to estimate regional differentials in RIIO-1.³⁴
- The **number of regions** is also an important factor to consider, in terms of the level of disaggregation of regional wage variations. Ofgem considered only three zones in RIIO-1 (London- South East England, Other GB Regions, and Northern Ireland). CEPA analysis, however, demonstrates that this is likely to be inferior to a more disaggregated analysis using twelve regions as mapped out in the ASHE data (particularly for Scotland, which the data show to have significant wage differentials relative to the rest of the UK). The UR, on this basis, has preferred to use twelve regions in its benchmarking procedure.³⁴
- With **overtime** earnings, Ofgem included these figures in its RIIO-1 models, while the UR and Ofwat have excluded them in their analyses. This remains a matter of debate, as there are arguments to be made both in favour of and against including these estimates. The key justification provided by CEPA for excluding overtime from a regional differentials analysis is that setting overtime rates is a decision made by the

³⁴ CEPA (2017): Regional Wage Adjustment: The Northern Ireland Utility Regulator (UR)

management in each company or DNO, which could lead to endogeneity concerns in modelling.

- There are also **different ways to average** the regional wage estimates and arrive at relevant adjustments. In RIIO-1, Ofgem first took the ratio of regional to UK wages, applied SOC code weighting and then averaged over the time period in question. CEPA, in contrast, recommended in 2017 that the UR should first apply SOC code weighting and then take the regional-to-UK wage ratio for its upcoming RP6 price review, prior to averaging over time, arguing that this would provide more defensible estimates of average company-specific hourly earnings.³⁴
- Ofgem accounted for **locally incurred labour costs** in RIIO-1, having undertaken in-house research and consultations with the GDNs, on the basis of which 40 per cent of work management was assumed to be locally carried out.³⁵ The UR, in the absence of this information, decided not to implement this adjustment in its RP6 review, although it undertook sensitivity checks in this domain.
- Ofgem and the UR both applied **notional rather than actual weights** to determine labour costs for electricity DNOs. The stated advantage of this approach is that notional weighting (based on averaging actual cost estimates, for instance) is more robust to information bias (which may be inherent in company submissions of actual cost information).

Table 2 summarises the approaches adopted by the three regulators which we have focused on, in the context of regional wage adjustments.

Table 2 - Alternative regulatory approaches to regional wage adjustments

Characteristic	Ofgem RIIO- GD1	Ofgem RIIO-ED1	Ofwat PR14	UR GD17	UR RP6*
Mean vs median	Mean	Mean	Mean	Median	Median
SOC code level	2 digit	2 digit	2 digit	2 digit	2 digit
Overtime	Including	Including	Excluding	Excluding	Excluding
All employees or only full-time employees	All employees	All employees	Not reported	Full time	Full time
Hourly / Weekly wages	Hourly	Hourly	Hourly	Weekly	Weekly
Number of regions	3	3	12	12	12

³⁵ Ofgem (2012): RIIO-GD1: Initial Proposals – Step-by-step guide for the cost efficiency assessment methodology

Characteristic	Ofgem RIIO- GD1	Ofgem RIIO-ED1	Ofwat PR14	UR GD17	UR RP6*
Averaging	x/UK; SOC; years	x/UK; SOC; years	n/a	Not discussed	Not discussed
Notional or actual weights	Notional	Notional	n/a	Notional	Notional

*Source: CEPA (2017): Regional Wage Adjustment: The Northern Ireland Utility Regulator (UR) and Ofgem (2012): RIIO-GD1: Initial Proposals – Step-by-step guide for the cost efficiency assessment methodology *To be double-checked*

2.1.2. Alternative regulatory approaches to non-wage regional and special factors

As regards sparsity and urbanity factors and company-specific special factors, it is more difficult to compare the approaches taken by Ofgem, the UR and Ofwat, especially across the energy and water sectors. Table 3 collates some of the information available in the literature as regards such factors.

While there are broad similarities in basic definitions such as population density (the number of people per district or per LSOA, for instance), major differences in asset and infrastructure types across the sectors and major UK regions mean that this is an area in which salient information is more likely to be drawn out in the stakeholder consultation phase. The consultations could focus on drawing out a greater degree of detail on the preliminary comparative assessment outlined above in terms of the non-wage related special factors which regulators have actually considered, and on obtaining more information on other regional or special cost factors that may have been overlooked or have been rejected due to being less relevant at RIIO-1 determination than they have become in the intervening period.

Early and detailed engagement will assist in minimising challenges and will be crucial to understanding changing cost factors due to indirect causes such as legislative or environmental changes. This is particularly true in the case of Ofwat, the UR and other regulators and stakeholders outside of Ofgem.

Table 3 - Alternative regulatory approaches – Non-wage regional and special factors

Characteristic	Ofgem RIIO-GD1	Ofgem RIIO-ED1	Ofgem PR14/ PR19 (The below apply to PR19 unless otherwise specified)	UR GD17/ RP6
Sparsity adjustments	<ul style="list-style-type: none"> - All districts having a population density less than the industry population density defined as sparse - Sparsity effects assumed to have implications only for emergency and repair costs (direct and contract labour) 	92% of adjustments proposed by SSEPD on the basis of remote depot staffing costs in Scotland, as also additional transport and communication costs, incorporated into Ofgem's benchmarking analysis	<ul style="list-style-type: none"> - Weighted average population density (modelled by Ofgem at the Lower Super Output Area (LSOA) level, with higher weights assigned to more densely populated areas) - PR14: (Total connections / Total length of mains) used by CEPA; alternative – (Total properties / Total length of sewers) - Ofgem density index (variable capturing proportion of population living in densely populated areas) - Ofgem weighted density measure (density measure weighted by the population served by each company) 	<ul style="list-style-type: none"> - GD17: Deloitte LLP's efficiency advice document used the variables (Network length / Customer numbers) and (Volume / Customer numbers) used in log form - GD17: The UR also considered volumes of gas per km of main and energy density (average volumes per customer served)

Characteristic	Ofgem RIIO-GD1	Ofgem RIIO-ED1	Ofwat PR14/ PR19 (The below apply to PR19 unless otherwise specified)	UR GD17/ RP6
Urbanity adjustments	<ul style="list-style-type: none"> - Adjustments made to reflect additional costs of working in denser urban areas (e.g. reduction in reinstatement costs for London and the South of England) - 15 per cent productivity adjustment applied to London for SGN, based on SGN evidence (for work undertaken within the M25) 	<ul style="list-style-type: none"> - Consideration of additional labour costs associated with work undertaken in London and the South East, and the proportion of work undertaken by DNOs in these regions - Adjustments proposed by UKPN for the London area, of which 30 per cent were accepted (especially for transport and travel costs) 	<ul style="list-style-type: none"> - Urban runoff - Proportion of urban customers - Proportion of urban (sparse) assets 	<ul style="list-style-type: none"> - RP6: Distinction drawn between urban and rural network types (e.g. by considering the number of customers per km of network)
Company specific factors	<ul style="list-style-type: none"> - Salt cavity adjustment for North West (the only GDN to have this kind of storage) 	<ul style="list-style-type: none"> - Some adjustments were proposed by three DNOs, the adjustments granted for which are summarised above (sparsity and urbanity related) 	<ul style="list-style-type: none"> - Adjustment made in terms of capital cost upliftment for Portsmouth Water (which provided convincing evidence of significant customer benefit and support levels) 	<ul style="list-style-type: none"> - RP6: Quality of service measures were considered: number of customer interruptions per 100 customers (CI), customer minutes lost (CML), average restoration time per customer interruption (CML/CI)

Characteristic	Ofgem RII0-GD1	Ofgem RII0-ED1	Ofwat PR14/ PR19 (The below apply to PR19 unless otherwise specified)	UR GD17/ RP6
Indirect cost allocations	Adjustments for business support costs, other normalised cost adjustments (e.g. for workload and uncertainty considerations)	- DNO cost calculations applied (for activities undertaken at a wider group level, e.g. business support, with sensitivity checks	Unclear	Some (e.g. business support costs) for both GD17 and RP6
Excluded costs	- Certain costs excluded for consistency (e.g. street work costs, smart metering and meterwork loss costs etc)	- Costs incurred only by a few DNOs excluded (e.g. ETR 132 tree cutting costs, wayleave adjustments etc) - Exclusion of costs subject to pass-through mechanisms	- Business rates - Pension deficit costs - Third party services - Other cash items - Total atypical expenditure - Cost associated with the Traffic Management Act (TMA) - Abstraction charges / Discharge consents allocated to water resources - Statutory water softening costs	- GD17: Excluded certain costs such as metering costs, Independent Networks costs, training and apprenticeship costs and advertising costs - RP6: Certain costs excluded for consistency (e.g. street work costs, ETR 132 tree cutting costs etc)

Characteristic	Ofgem RIIO-GD1	Ofgem RIIO-ED1	Ofwat PR14/ PR19 (The below apply to PR19 unless otherwise specified)	UR GD17/ RP6
			- Costs associated with the Industrial Emissions Directive	
Other adjustments	N/A	- Adjustments to Low Carbon Technology related secondary reinforcement expenditure	N/A	Unclear

Sources: Ofgem (2012): RIIO-GD1: Initial Proposals – Step-by-step guide for the cost efficiency assessment methodology; Ofgem (2013): RIIO-ED1 business plan expenditure assessment - methodology and results; CEPA (2018): PR19 Econometric Benchmarking Models – Ofwat; Vivid Economics and Arup (2017): Understanding the exogenous drivers of wholesale wastewater costs in England & Wales; Deloitte (2016): Annex 4 - GD17 Efficiency Advice: Relative Efficiency of Northern Ireland Gas Distribution Networks; Utility Regulator (2016): Annex 5 – Indicative Findings from Top-Down Benchmarking – GD17; Utility Regulator (2017): Transmission & Distribution 6th Price Control (RP6) – Final determination

3. Key points

In summary, the literature and practise from other regulatory examples raises several key points. Some which support the RIIO-1 process as best practice and others which identify additional or alternative processes that could be followed in the future.

- The lack of ready comparators from which to construct a counterfactual can hinder the comparison of the relative efficiency of regulated companies.
- Multi-track processes can increase the complexity of the comparison process.
- A defined framework for considering cost factor submissions could lead to a simpler process and reduce costs for regulated companies.
- The definition of an evidential bar for cost factor submissions and clear materiality thresholds could be expected to improve the quality and reduce the number of submissions.
- A balance between pre-allocation and post-allocation modelling should be sought taking into account the extent to which non-regulated costs contribute to overall costs.
- Regulated companies have an incentive to challenge the exclusion of the submissions of other regulated companies on the grounds the it would impact their relative efficiency.
- The approach taken by Ofwat to apply adjustments to all impacted companies regardless of the source of the submission could contribute to fairer outcomes and fewer challenges.

Consistent across the literature is the value of early engagement with the regulated companies. The opportunity for preliminary engagement covering the existing applied cost factors, discovery of new proposals for additional or amended cost factors and discussion around submission frameworks and an evidential bar, whether explicit or not, could deliver long term benefit.