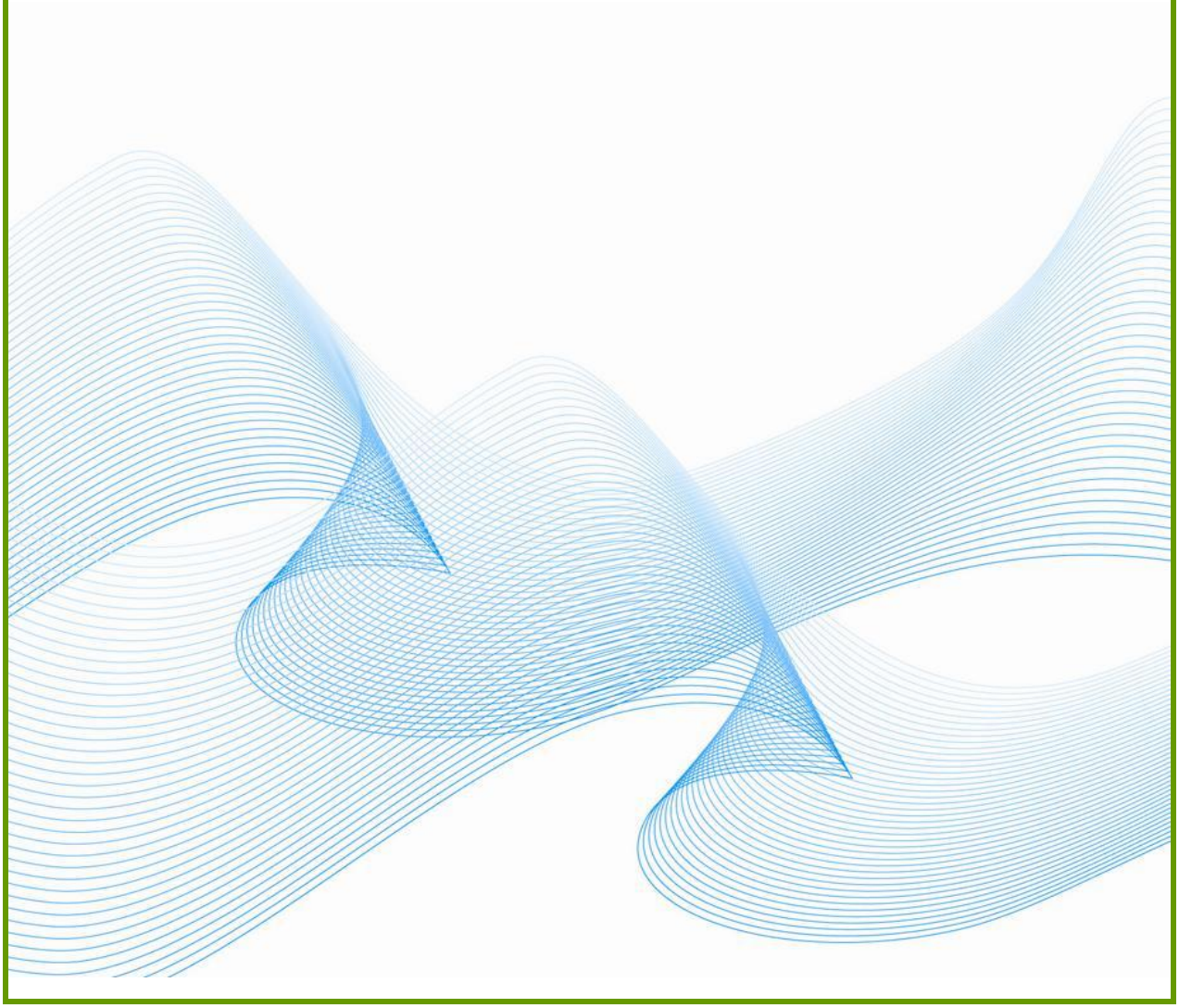
Water and Sewerage Service
Price Control 2010-13

Final Determination Main Report – Annex O
Calculation of Operational Efficiency Gap

February 2010



Water and Sewerage Revenue and Charges Price Control 2010-2013

Final Determination Main Report

Annex O - Calculation of Operational Efficiency Gap

Contents

O1 Introduction

1.1.1 There are different techniques and methodologies available for regulators to assess the economic efficiency of a decision making unit. These range from unit cost comparisons to econometric modelling (OLS and COLS[1]), stochastic frontier analysis (SFA) or data envelopment analysis (DEA). The established methodology within the water industry in the UK involves a top-down comparison of companies based on linear regressions and unit costs.

1.1.2 The purpose of this annex is to give a brief explanation of the models used, the impact on costs and how this translates into an assessment of the relative efficiency of NI Water. More detailed explanations of the regressions can be found on the Ofwat website in their latest Relative Efficiency Assessment for operating expenditure 2008-09.

1. The various sections are ordered as follows:
2. In sub-section O2 we examine the Ofwat models;
3. In sub-section O3 we present the results of our analysis on NI Water;
4. In sub-section O4 we discuss the steps involved in calculating NI Water's efficiency gap;
5. In sub-section O5 we take NI Water's efficiency gap and derive its efficiency targets;
6. In sub-section O6 we discuss the various criticisms which pertain to our adopted approach to setting efficiency targets; and,
7. In sub-section O7 we conclude.

[1] OLS = Ordinary Least Squares
COLS = Corrected Ordinary Least Squares (The method adopted by Ofwat and subsequently the Utility Regulator in Northern Ireland).

O2 Ofwat Models

2.1.1 The Ofwat econometric models were developed in the early 1990's by the regulator in question and Professor Mark Stewart. The analysis was first used in the 1994 price review and has been an integral part of all subsequent determinations in England and Wales, although the models have developed over time as a result of regular academic peer review.

2.1.2 The benefit of the models is that they focus on separate areas of the business and can identify where cost differentials exist between comparable companies. This 'yardstick' approach allows regulators to identify either 'good' and 'bad' performance in relative terms compared to either the average or frontier performance as benchmark.

2.1.3 There are nine service areas where Ofwat look at costs as a function of external variables. These models consist of econometric regressions and simple unit cost comparisons. The models include:

Table 2.1 - Water service models

Functional Area	Model Type	Explanatory Variables
Water Distribution	Log regression	Length of main per connected properties
Water Resource and Treatment	Linear regression	Number of sources per distribution input and the proportion of supplies from boreholes
Water Power	Log regression	Distribution input multiplied by average pumping head
Water Business Activities	Log regression	Number of properties billed

Table 2.2 - Wastewater service models

Functional Area	Model Type	Explanatory Variables
Sewerage Network	Log regression	Sewer length, area of sewer district, resident population and holiday population
Large Sewage Treatment Works	Log regression	Total load, type of treatment used and the effluent consents
Small Sewage Treatment Works	Unit cost	Total load by treatment type
Sludge Treatment and Disposal	Unit cost	Dry solids disposed by route
Sewerage Business Activities	Unit cost	Number of billed properties

2.1.4 In order to assess the relative efficiency of NI Water, the Regulator has applied the asset data of NI Water to the regressions in order to estimate what expenditure would be for the average water utility. This is then compared to the actual expenditure incurred by the company in order to assess the level of efficiency.

2.1.5 For the purpose of establishing an efficiency gap and targets for PC10, the Regulator has used 2007-08 as the base year for modelling. Within 2007-08 the results of the various models are given in the tables below along with an explanation of the reasoning behind the analysis.

2.1.6 ***Water Distribution*** – In the most recent published efficiency assessment, Ofwat changed the format of the water distribution model to take the following functional form:

Table 2.3 - Ofwat 2007-08 water distribution model

Water Service:	**Water Distribution Expenditure**	
Data:	June Returns	
Modelled cost:	ln (distributional functional expenditure less power costs [£m], divided by number of properties connected at year end [000's])	
Explanatory Variables:	Coefficient	Standard Error
Constant	-2.066	0.711
Ln (length of main [km], divided by number of connected properties [000's])	-0.713	0.267
Form of Model:	ln modelled cost = -2.066 - 0.713 * ln { length of main/connected properties}	
Statistical Indicators:	Number of observations = 22	R^2 = 0.263
	Model standard error = 0.268	F test = 0.015

2.1.7 The regression estimates cost per property as a function of the ratio of mains length per connected property. The explanatory variable has a negative coefficient, indicating that higher costs are associated with urban areas where the length of main per property is relatively low. The density variable (length of main [km] / number of connected properties [000's]) is considered an influential factor affecting distribution costs i.e. increased urbanisation will tend to increase costs whilst increasing rurality reduces cost.

2.1.8 ***Water Resource and Treatment*** – The model format is given in Table 2.4 below:

Table 2.4 - Ofwat 2007-08 water resource and treatment model

Water Service:	**Water Resource and Treatment**	
Data:	June Returns	
Modelled cost:	Functional expenditure less power costs [£m], divided by resident winter population [millions]	
Explanatory Variables:	Coefficient	Standard Error
Constant	6.098	1.003
Number of sources divided by distribution input [Ml/day]	25.136	8.115
Proportion of supplies from boreholes	-7.165	2.569
Form of Model:	Modelled cost = 6.098 + 25.136 * {number of sources/DI} – 7.165 * {proportion of supplies from boreholes}	
Statistical Indicators:	Number of observations = 22	R^2 = 0.341
	Model standard error = 2.438	F test = 0.019

2.1.9 The cost per head is dependent upon the number of sources per distribution input (DI) and the proportion of borehole supplies. The explanatory variable rationale is that economies of scale exist at source level i.e. the fewer sources required the lower the cost incurred. The model also takes account of the difficulty of treatment depending on the source since borehole supplies will generally be cheaper to treat. The cost per population is preferred to a volumetric measure as this may be unfairly influenced by leakage.

2.1.10 ***Water Power*** – This regression estimates power costs based on the amount of water pumped (DI) and the vertical lift required (average pumping head) as a result of a company's topography i.e. if more hilly, power consumption and hence power costs would tend to rise. The 2007-08 model is illustrated in Table 2.5 below.

Table 2.5 - Ofwat 2007-08 water power model

Water Service:	**Water Power**	
Data:	June Returns	
Modelled cost:	ln power expenditure [£m]	
Explanatory Variables:	Coefficient	Standard Error
Constant	-8.104	0.253
ln (distribution input [Ml/day] multiplied by average pumping head)	0.907	0.023
Form of Model:	Modelled cost = -8.104 + 0.907 * ln {distribution input * average pumping head}	
Statistical Indicators:	Number of observations = 22	R^2 = 0.987
	Model standard error = 0.144	F test = 0.000

2.1.11 ***Water Business Activities*** – Business activities incorporate various costs such as customer services expenditure, scientific services and the charge associated with doubtful debt arising from non-payment of bills. It is anticipated quite reasonably that these costs will be influenced by the number of billed properties and that economies of scale exist around the billing volumes.

2.1.12 For the purpose of calculating an efficiency gap for NI Water, the Regulator decided that the business activities model would not form part of the analysis. This conclusion was reached due to the fact that domestic charging was not a reality in the base year. As a consequence, NI Water did not have a comparable level of billing costs, metering reading expenditure or any significant level of doubtful debts as most of its revenue was generated from government subsidy. The form of the Ofwat model is however illustrated below.

Table 2.6 - Ofwat 2007-08 water business activity model

Water Service:	**Water Business Activities**	
Data:	June Returns	
Modelled cost:	ln (business activity expenditure [£m] plus doubtful debts [£m])	
Explanatory Variables:	Coefficient	Standard Error
Constant	-3.506	0.251
ln (number of billed properties [000's])	0.918	0.039
Form of Model:	Modelled cost = -3.506 + 0.918 * ln {number of billed properties}	
Statistical Indicators:	Number of observations = 22	R^2 = 0.966
	Model standard error = 0.218	F test = 0.000

2.1.13 ***Sewerage Network*** – Costs associated with the sewerage network are dependent on various factors. In the Relative Efficiency Assessment for 2007-08 Ofwat state,

2.1.14 "In simple terms, the model takes account of the density of the sewerage network and the population it serves, and the higher costs associated with the sewer capacity required to serve additional summer populations."

2.1.15 The form of the model is given below.

Table 2.7 - Ofwat 2007-08 sewerage network model

Sewage Service:	**Sewerage Network**	
Data:	June Returns	
Modelled cost:	ln (network functional expenditure [£m] plus terminal pumping station costs [£m], less service charges [£m], per km of sewer)	
Explanatory Variables:	Coefficient	Standard Error
Constant	-5.146	0.380
ln (area of sewer district per km of sewer)	0.199	0.033
ln (resident population [000's] per km of sewer)	0.961	0.195
Holiday population divided by resident population [000's]	1.253	1.092
Form of Model:	Modelled cost = -5.146 + 0.199 * ln { area of sewer district per km of sewer } + 0.961 * ln {resident population [000's] per km of sewer} + 1.253 * {holiday population / resident population}	
Statistical Indicators:	Number of observations = 63	R^2 = 0.469
	Model standard error = 0.260	F test = 0.000

2.1.16 The model estimates unit costs based on sewer length, area of sewer district, resident population and holiday population. Population is considered important since this will impact on sewage volumes. The size of the area of the sewer district is also a factor given that it will impact on surface water drainage volumes.

2.1.17 ***Large Sewage Treatment Works*** – This model accounts for the costs associated with treatment of sewage at large works (i.e. at least 25,000 population equivalent[2]). Again, costs are shaped by a number of factors, detailed in the model format below.

Table 2.8 - Ofwat 2007-08 large sewage treatment works model

Sewage Service:	**Large Sewage Treatment Works**	
Data:	June Returns	
Modelled cost:	ln (sewage treatment functional expenditure [£000's], less service charges [£000's], less terminal pumping costs [£000's])	
Explanatory Variables:	Coefficient	Standard Error
Constant	-1.165	0.245
ln (total load [kg COD/day])	0.766	0.027
Activated sludge	0.326	0.052
Tight effluent consent	0.110	0.046
Form of Model:	Modelled cost = -1.165 + 0.766 * ln {total load} + 0.326 * {activated sludge} + 0.110 * {tight effluent consent}	
Statistical Indicators:	Number of observations = 382	R^2 = 0.725
	Model standard error = 0.450	F test = 0.000

[2] Population equivalent is defined by Ofwat in their Glossary of Terms as, "The capacity of a sewage treatment works is measured in terms of the amount of organic material that can be treated. It is assumed that one person is equivalent to a load of 60g of biochemical oxygen demand. Effluent may also include industrial wastewater treated at works. Hence, the population equivalent served by a works can greatly exceed the population served in the catchment, especially if a large volume of industrial effluent is also treated."

2.1.18 Expenditure is influenced by the load entering the works, the type of treatment and whether any environmental quality standards have been imposed on the output of the works. Unsurprisingly all of the variables impact costs in a positive fashion. Within the model both activated sludge and effluent consents take the form of a dummy variable. That is, they take a value of zero or one to indicate absence or presence respectively.

2.1.19 *Small Sewage Treatment Works Model* – Predicted costs for small works are calculated on a unit cost basis. Expenditure is dependent on the load treated [kg BOD/day] and the type of treatment applied e.g. primary, secondary activated sludge etc.

2.1.20 *Sludge Treatment and Disposal Model* – Expenditure associated with the treatment and disposal of sludge is also modelled on a unit cost basis. Costs are predicted by Ofwat based on the amount of solids disposed [thousand tonnes of dry solids {ttds}] and the disposal route e.g. farmland, landfill, incineration etc.

2.1.21 *Sewerage Business Activities Model* – Sewerage business activities is similar to its comparator on the water side, only on a unit cost basis. The modelled cost includes customer service expenditure, scientific costs and a doubtful debt charge. It is considered that these costs are influenced by the number of billed properties. For the same reasons as stated earlier in the water function, this model has also been excluded from the final calculation of the efficiency gap.

O3 Results for NI Water

3.1.1 For the purposes of establishing an efficiency gap, the Regulator has used 2007-08 as the base year for comparison. By applying NI Water asset data to the various regressions it is possible to establish what an 'average' company would spend under such circumstances and then make comparisons with what NI Water actual costs were. The results of the models are as follows:

Table 3.1 – NI Water efficiency results 2007-08

Functional Area	NI Water Actual Expenditure (£m)	Predicted Expenditure of an Average Company (£m)
Water Distribution	45.77	8.45
Water Resource and Treatment	22.07	13.46
Water Power	9.18	7.32
Water Business Activities	11.13	12.91
Sewerage Network	30.25	9.47
Large Sewage Treatment Works	10.66	9.46
Small Sewage Treatment Works	14.89	10.89
Sludge Treatment and Disposal	12.42	6.97
Sewerage Business Activities	11.56	9.15
TOTAL	**167.94**	**88.07**

1. *All figures given in 07-08 prices.*
2. *Costs may not sum due to rounding.*

3.1.2 The modelled costs (£167.94m) for the company represent 91% of actual expenditure within the year. Costs excluded from the analysis include rates, third party services and PPP unitary charges.

3.1.3 Analysis of the models would appear to indicate a significant level of inefficiency within the company. Comparison to average English and Welsh performance would suggest a reduction of almost 48% would be required if the company was to be considered an averagely efficient performer. Such a conclusion would however be flawed as other factors need to be considered before an efficiency gap can be established.

3.1.4 At this initial stage it is worth considering some areas of interest in the findings. The most obvious concern is the water distribution model where costs are vastly in excess of what would normally be considered reasonable. The gap in performance is also significantly greater than any other model, prompting some cause for reflection. In reality there are a couple of issues at work which are influencing this regression.

3.1.5 Firstly, the form of the model is disproportionately influenced by the outlier status of NI Water's length of main per connected property[3]. In the second place, the misallocation of costs, in particular general and support functions was a particular issue in the base year. This has been resolved in 2008-09 with distribution costs (excluding power) subsequently falling by almost £10m (07-08 prices) as a consequence of reallocation alone.

3.1.6 Other functions of the business which generate particular interest include the treatment of water, the sewerage network and sludge disposal where costs are significantly in excess of what might be expected from an average performing company.

3.1.7 It is also important to highlight functions of the business which are closer to English and Welsh performance. For instance, when the special factor[4] is taken into consideration, NI Water is close to average performance in terms of water power usage. On the sewerage side the company is ranked 7th of the 11 Water and Sewerage Companies for large treatment works expenditure and performs better than even the frontier company in this area[5].

3.1.8 As table 1.9 illustrates, NI Water is performing at the average in terms of its business activities functions for water and sewerage. This however is an anomalous result given the company does not carry out the same level of activities with regard to domestic customer billing or metered readings. The absence of domestic billing further means that NI Water does not incur the same extent of doubtful debt that is prevalent elsewhere in the industry. Since these costs are not comparable the Regulator has decided to exclude these models from the analysis for this final determination.

[3] Annex D2 sets out this issue and determines the final allowance for this special factor.
[4] See Table 1.10 flowchart for explanation of special factor impacts.
[5] Caution must be exercised when making judgements about economic efficiency as level of service must also be considered.

O4 Establishing the Efficiency Gap

4.1.1 After completion of the initial modelling, the Regulator determines the efficiency gap to the frontier company, as opposed to average performance. In order to do so the Regulator must make certain adjustments to the data. For instance, account must be taken for:

1. Special Factors
2. Atypical expenditure
3. Residual adjustments
4. Frontier adjustments

4.1.2 The various steps in this process are demonstrated by the flow chart below.

Table 4.1 – Flowchart for establishing the efficiency gap

Establishing the Efficiency Gap
NI Water Actual Expenditure

(+/-) Special Factors Special factors relate to ongoing circumstances whereby a company is disadvantaged (or benefits) in comparison to other companies by virtue of uncontrollable exogenous factors e.g. location, topography etc. Such factors will obviously have an impact on costs which are unrelated to efficiency so must be considered in the modelling. For PC10 the Regulator has decided the special factors to apply include length of main, power costs and the beneficial impact on wages resulting from location.

(+/-) Atypical Expenditure Atypical expenditure relates to one-off costs that do not recur and are outside the control of management. This might include the costs of dealing with a flood or some other exogenous factor.

In 2007-08 NI Water did not experience any such material costs. For the purpose of modelling at PC10 using 2007-08 as baseline, the Regulator has treated BIP and VER/VS[6] as atypical. By definition this should not be the case as such costs are within management control. The Regulator has however followed the precedent set by WICS and recognised the fact that NI Water lags behind other companies who have been privatised for almost 20 years. Therefore atypical allowance of transformation costs for one price review is considered reasonable.

Residual Adjustment

The residual adjustment is a recognition that not all of the gap in costs may be due to efficiency. Other factors may be of relevance including errors in the modelling, omitted variables not being considered, sampling errors or measurement errors. Ofwat has designated that 10% of the water residual and 20% of the sewerage residual costs should be ignored as they may not be due to efficiency alone[7].

Frontier Adjustment

After adjustments to NI Water costs, predicted costs must shift to reflect the out-performance of the frontier company against average expenditure. For instance, if the frontier performer is 10% below the average, the predicted costs for NI Water will also fall by 10% to reflect frontier performance.

Final comparison between NI Water adjusted costs and Predicted Costs

[6] BIP is the Business Improvement Programme designed to transform the business.
VER/VS is the Voluntary Early Retirement/Voluntary Severance scheme associated with staff leaving the business.

[7] See paragraph 6.1.2 in this report for further discussion of this topic including Cubbin views.

4.1.3 The calculation of the efficiency gap is demonstrated by analysis of the water resource and treatment model. This is demonstrated in the table below.

Table 4.2 – Calculation of the efficiency gap to frontier

Efficiency Gap Calculation (Water Resource and Treatment Model)	
NI Water actual cost	£22.07m
Predicted average expenditure	£13.46m
Predicted frontier expenditure	£10.62m
Efficiency Gap	**£11.45m**
Efficiency Gap (Reduction Required)	**51.9%**
NI Water score	164.0
Average score	100
Frontier score	78.9
Efficiency Gap	**51.9%**

4.1.4 The analysis highlights that NI Water requires an £8.61m (39.01%) reduction to achieve average performance and a £11.45m (51.88%) fall in operational costs if they were to operate at the frontier of the industry. The results of the model are then converted into relative efficiency scores by dividing each cost by the average.

4.1.5 In reality, the efficiency gap is not as great the table suggests as the allowance for atypical expenditure, special factors (if any) and the residual adjustment is yet to be undertaken. The table simply looks at this model results in isolation and demonstrates the process by which the calculation of the efficiency gap is completed.

4.1.6 After allowance for these other factors the final results of our analysis is demonstrated in Table 4.3:

Table 4.3 – NI Water efficiency gap using different approaches

Methodology	Ofwat all models approach	Ofwat (excluding business activities)	Cubbin all models approach	Cubbin (excluding business activities)
NI Water score	155.6	174.1	123.2	128.6
Average score	100	100	100	100
Frontier score	84.6	89.3	91	93.8
Efficiency gap (reduction required in NI Water costs to achieve benchmark)	45.6%	48.7%	26.1%	27.0%
Percentage above benchmark	84.0%	95.0%	35.3%	37.1%
1 .Numbers may be slightly changed due to rounding				

4.1.7 For the purpose of the final determination the Regulator has chosen to use the Ofwat discounts but exclude the business activities models. The results of this approach indicate that a significant efficiency gap exists. NI Water would have to reduce overall costs by almost 49%, almost a half if it is to deliver performance at the frontier of the industry.

O5 Setting the Efficiency Target

5.1.1 The calculation of the efficiency gap is the fundamental factor in setting efficiency targets for the company. Once established, the Regulator must then decide the rate of catch-up. For the final determination the catch-up has been set in-line with Ofwat assumptions. This represents a 60% catch-up to frontier industry benchmark over five years. Although the price control is only a three year period, the performance of the last two years of the SBP has been fully taken account of, contributing to a five year performance target from 2007-08 onwards.

5.1.2 Although in-line with Ofwat precedent, the Regulator considers the catch-up percentage to be reasonable given that funding for BIP and VER/VS schemes has been supported during the SBP and PC10 periods. Under similar circumstances in Scotland, where considerable Invest to Save was available, the WICS determined upon an 80% catch-up over four years.

5.1.3 Application of 60% catch-up rates to a 48.70% required reduction to operating expenditure results in a five year efficiency target of 29.22%, the equivalent of 6.68% per annum using a geometric mean or average. In addition the Regulator has applied an assumed frontier or continuing efficiency shift of 0.25% per annum in line with Ofwat. Both this catch-up and frontier shift target has been applied to all costs excluding BIP, VER/VS and PPP spends. The catch-up percentage has also been applied, without any upward revision, to any new costs which have been accepted by the Regulator.

5.1.4 The Regulator expects an improvement in relative performance and a convergence towards the frontier. Unfortunately the scale of this convergence is clouded by two factors:

5.1.5 *Impact of additional operating expenditure* – Each of the three water regulators have proposed different levels of increased operating expenditure which they consider reasonable. The consequence of different allowances is that movements in relative efficiency are hard to estimate. The issue is further complicated by the slightly higher efficiency targets Ofwat applies to enhancement or new opex.

5.1.6 *Frontier shift over time* – It is as yet unknown how the industry will perform against the proposed targets. Frontier shifts in England and Wales will undoubtedly have some impact on the measurement of NI Water's relative efficiency.

5.1.7 Given such uncertainties the Regulator has not set any targets for the closure of the relative efficiency gap, although some reduction would certainly be expected by the end of the period. The Regulator does however note the aspiration of NI Water to move from the Lower E banding[8] to be an Upper D band[9] company for both water and sewerage operational efficiency by the end of PC10.

[8] A lower E band company represents required reduction in excess of 35%
[9] An upper D band company represents required reductions of 25% - 30%

O6 Criticisms of the Approach

6.1.1 As with any efficiency modelling, the analysis is by no means foolproof and open to some debate. Over the lifespan of the models there has been certain concerns raised over the application of the data. NI Water has also raised various issues within the draft determination consultation response about certain aspects of the Regulator's analysis.

6.1.2 The main criticisms and our subsequent responses are summarised below:

6.1.3 *Choice of explanatory factor* – Commentators have argued that the explanatory variables may not be the most reflective of what is actually driving costs in certain functions of the business. This is sometimes demonstrated by the relatively low predictive power of the models. This issue was also raised by NI Water for the water distribution model where it considered that the length of main was more influential than the property density or urbanisation proxy that is currently used.

6.1.4 *Regulator Response* – The construction of the models by Ofwat has been done in conjunction and consultation with the water companies. The relationship between dependent and independent variables is therefore soundly based on years of modelling and investigation. Concerning water distribution costs, the Regulator accepts that the length of main will influence costs so has made an explicit adjustment in the allowed special factors. However, the Regulator is not convinced that the length of main is the major determining factor as the size and location of mains will inevitably influence costs significantly.[10]

6.1.5 *Interpretation of residuals* – The basic assumption of the analysis is that cost above the average is considered to be inefficiency while expenditure below average is thought to be associated with good performance. Some commentators, in particular John Cubbin in his Assessing Ofwat's Efficiency Econometrics, A report for Water UK, March, 2004 have queried this assumption. Cubbin's analysis indicates that the residual is likely to be influenced by other factors besides efficiency such as omitted variables, sampling errors, measurement errors etc.

6.1.6 *Regulator Response* – The Regulator accepts the problems raised by Cubbin and recognises that efficiency cannot be the only explanation for residual differences. However, the Regulator believes that it has taken adequate account of these other variables. For instance, within the modelling itself, an assumption has been made that 10% of the water and 20% of the sewerage residuals are removed from the efficiency gap. Second, the Regulator then undertakes further adjustments to account for special factors, atypical expenditure and may make other adjustments where inconsistent cost allocations between companies exist. Thirdly, application of efficiency targets will only apply to a proportion of the gap rather than its entirety. This helps to mitigate against the risk of incorrect conclusions. Finally, the Regulator has not made decisions solely dependent on the conclusions of the COLS analysis. Our expert advisors (NERA) analysed efficiency performance using panel data and Stochastic Frontier Analysis (SFA) and found similar

[10] See Annex D2 for further information

levels of inefficiency.[11] The Regulator therefore has confidence in the robustness of its findings.

6.1.7 *Application of the process to NI Water* – Within some of the consultation responses the point was made that it is not appropriate to benchmark NI Water against the rest of the UK industry as the models are not comparing like-with-like.

6.1.8 *Regulator Response* – It is recognised that NI Water will at the present lag a mature industry in the same way as Scottish Water's experience at SR02. There are also historic reasons for the efficiency gap which should be recognised. However, this does not mean that benchmarking should not take place. Rather the Regulator expects that the efficiency gap is closed as quickly as practicable which makes benchmarking essential. The argument that comparisons are not like-for-like could be made across any company in the industry given the differences between regions. It is the opinion of the Regulator that this issue is adequately provided for in the models and the company has had opportunity to make representation on any special factors it sees fit.

6.1.9 Besides the general concerns, the company has raised certain specific issues with the application of efficiency targets in the draft determination. A summary of these concerns and the Regulators responses is detailed in the subsequent paragraphs.

6.1.10 *Retrospective application of efficiency targets (during SBP period)* – The company have been critical of the Regulator's assumption that efficiency delivery was greater for 2008-09 and 2009-10 than what was included within the company's PC10 Business Plan. NI Water has viewed this as an unfair approach not in line with normal regulatory methodologies.

6.1.11 *Regulator Response* – The Regulator has accepted that the efficiencies prescribed in the draft determination were in excess (£0.9m) of what the company had submitted within the PC10 Business Plan for the years 2008-09 and 2009-10. The Regulator has modified the efficiency profile to account for this and by 2009-10 there is virtually no difference between us in respect of the company's cumulative efficiency position at that year. Despite this adjustment the efficiency target remains the same for the five years so the cumulative percentage does not change from draft to final determination. The only difference is the efficiency profile, with zero additional cumulative efficiency at 2009-10.

6.1.12 *Application of catch-up targets to new opex and opex from capex* – The company has queried the application of the same efficiency targets to new opex as well as baseline expenditure. NI Water notes that this effectively assumes that all new opex is as inefficient as the base year. The company are also concerned that no evidence has been provided to support this assumption.

6.1.13 *Regulator Response* – The Regulator is of the opinion that the current approach is justified. Within their business plan commentary and tables, NI Water was given the opportunity to make representation on this issue. The company made the same assumption as the Regulator and applied identical targets to enhancement opex as to base opex, although it was stated that they did not consider the scope for efficiency to be as significant.

[11] See Annex E – Table 5.2

6.1.14 The precedent set by Ofwat in their latest review would indicate that the Regulator has perhaps been lenient with respect to this issue. On the basis of historical trend information relating to the out-performance of enhancement opex assumptions, Ofwat have applied a factor uplift of 1.5 to both the frontier shift and catch-up efficiency targets. Ofwat have stated that this represents the enhanced scope for efficiency associated with operating new and enhanced assets. Based on this example and the assumptions made by NI Water, the Regulator feels fully justified in stating its approach as reasonable.

6.1.15 *Application of targets to non-modelled costs* – The company does not consider it appropriate to apply efficiencies to non-modelled opex such as property rates or regulatory costs. NI Water is of the opinion that such costs are largely outside the control of the company with little scope to make improvements during PC10.

6.1.16 *Regulator Response* – The full application of the efficiency target is considered justified. This is due to the fact that elements of these costs can be controlled. The target which has been set is a generic one which does not specify from where efficiencies have to be made. The Regulator would not expect a similar proportion of efficiency to be achieved in every area of the business as it will always be tougher or easier to achieve efficiency in different areas depending on circumstances.

6.1.17 The Regulator has also followed the precedent of Ofwat in its application of the efficiency challenge to these costs. Were the approach not to be adopted the likelihood of the risk that the efficiency gap might widen would increase ceteris paribus (all other things being equal).

6.1.18 *Special factors* – The company have raised concerns over the allowance given to the water distribution claim and in particular the negative special factor for regional wages. The company have noted that neither the WICS nor Ofwat have made such an adjustment for wages when setting opex targets.

6.1.19 *Regulator Response* – The Regulator is not minded to make any change to the special factor allowance in the final determination. A full discussion of the issues for water distribution can be found in Annex D2. With regard to the negative allowance, the Regulator believes that cognisance should be taken for all factors, whether beneficial or detrimental. Recognition has been given to some of the legitimate concerns which the company raised. In particular, the impact of having to accept some level of public sector pay and conditions of employment is a well reasoned argument for the reduction of this allowance. This would support a reduction of this negative special factor.

6.1.20 Within the final determination the Regulator has not however made any such adjustment. This is due to the fact that full account for other variables would more than cancel out this impact. For instance, within the modelling no recognition has been given to the lower level of service provided by NI Water. Were this to be considered, as was the case in Scotland, the impact would be significant for the assessment of relative efficiency. By way of example the company have submitted a claim for increased power usage of £5.64m (quantity only effect) in order to improve drinking water quality and effluent at PPP site operations. Given that the levels of service in the base year are below that in England and Wales, a negative special factor for power alone of £5.64m should really be considered in the modelling. This is true of other elements of expenditure which were not part of base opex for NI Water but would represent normal business expenditure elsewhere e.g. abstraction licences.

O7 Conclusions

7.1.1 The Regulator recognises that no one methodology can provide a definitive measure of efficiency. It is further accepted that certain problems will arise in terms of comparability, measurement and interpretation. This does not mean that such an analysis should not be undertaken or that the problems are insurmountable.

7.1.2 The purpose of this Annex is to demonstrate how the relative efficiency gap has been calculated and the subsequent implication this has on efficiency targets. Although there will always be debateable points concerning certain methodologies, the Regulator has tried to illustrate the adopted approach and demonstrate the reasonableness of this in comparison to historical precedent.

7.1.3 It is important for the Regulator to recognise the historical reasons behind NI Water's performance and any subsequent special factors unique to the province. However, the adoption of an approach consistent with Ofwat is essential when measuring relative efficiency. Furthermore, it is important to have a consistent methodology of benchmarking which allows the Regulator to track the improvement in efficiency over time.

7.1.4 The Regulator is of the opinion that the current efficiency targets reflect a significant challenge to the company, but are based on a sound rationale, supported by demonstrable evidence.