International comparison of water and sewerage service

2001-02 report

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OFWAT

Contents

Foreword

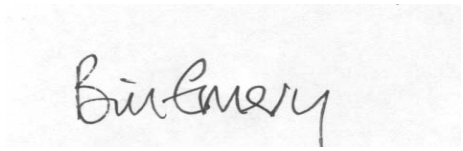
This is our sixth report comparing the relative performance of the regulated water and sewerage companies in England and Wales with water enterprises in four different countries: Australia, Scotland, the Netherlands and the United States of America.

The service performance and the efficiency of a water enterprise within any country will depend to a certain extent on a wide range of local factors. While the relative priority of these factors may vary between countries there is no doubt that there is considerable scope for the exchange of ideas and best practice. We think it is important to identify and investigate the performance of water industries around the world, to put the performance of our industry into an appropriate international context.

Sydney Water once again volunteered comprehensive data for more in depth analysis. I would like to thank Sydney Water for its continued commitment to this initiative. The other comparative data used in this report comes from published documents.

We recognise the importance of placing the performance of England and Wales companies in a UK, as well as a wider context. The Water Industry Commissioner for Scotland (WICS), Alan Sutherland, has now published information on the performance of the Scottish water industry, covering customer service, costs and efficiency, and investment and asset management. The data, in the WICS reports is comparable with England and Wales data. As the three separate Scottish water authorities merged into Scottish Water in 2003, 2001-02 represents the final year of data for these authorities. Alan Sutherland has highlighted the importance of comparing Scottish Water with other water companies.

Our comparisons show that in most areas, companies in England and Wales perform as well or better than their international counterparts. England and Wales companies provide water and sewerage services at similar units cost to companies in other countries, despite high levels of investment and customer service. They also appear to be considerably more cost efficient than Sydney Water and the Scottish authorities.



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1 Summary

In this report we compare data from a range of overseas water enterprises for 2001-02 with the regulated companies in England and Wales.

We concentrate on enterprises from Australia (urban territories), Scotland, the Netherlands and the US but include information from other countries where available. We include enterprises that have, to some extent, a distinct corporate identity, rather than being a consolidated function of local government.

Data comparability
Benchmarking is a key business technique to assess relative performance in price, customer service, quality, unit costs, processes, procedures and efficiency. There will always be limitations in data but nevertheless the findings from benchmarking can, and should act, as a spur to management in the continual search for improved performance and efficiency.

Sydney Water employs a reporter to audit and challenge the data in its submission to us, giving additional comfort that the data can be used to make meaningful comparisons with companies in England and Wales. The data used in this report for the other non-UK water enterprises comes from a variety of sources – mainly trade association publications and annual reports and accounts. Different definitions and assumptions in these sources will mean that information is not completely comparable to that defined in the June return that the companies in England and Wales submit to Ofwat.

However, we consider the data used in this report is sufficiently comparable to allow us to draw generalised conclusions. But we recommend that the reader should be cautious about basing specific regulatory or business decisions on the comparisons in this report (see appendix 1).

Exchange rates and purchasing power parity
The effect of fluctuations in exchange rates can significantly impact on unit costs and perceived efficiency, masking changes in costs. Even the use here of average exchange rates may not provide a true reflection of costs. Fluctuations will affect per property unit costs more than water delivered unit costs because of the (relatively) smaller denominator. Similarly, the impact of currency movement will be greater for smaller (in terms of lower number of properties/amount of water delivered) companies.

Purchasing power parity theory (PPP) is one method of correcting for this. This theory states that exchange rates between currencies are in equilibrium when the purchasing power is the same in each of the two countries. This means that the

exchange rate between two countries should equal the ratio of the countries' price levels of a fixed basket of goods and services. When a country's domestic price level is increasing through inflation, we must apply a depreciating factor to that country's exchange rate in order to return to PPP.

The Organisation for Economic Co-operation and Development (OECD) publishes annual and monthly PPP figures for all OECD countries. PPPs are based on a sample basket of goods and services selected to be representative of the Gross Domestic Product (GDP) for each country. If PPPs specific to water industry expenditure were available they might differ from these, although probably not substantially. Other caveats include:

- for the theory to hold, there should be competitive markets for goods and services in each of the countries;
- people in different countries consume different sets of goods and services, so the comparison is not strictly like-for-like; and
- non-traded goods are not subject to PPP.

For the four countries we are considering, the first two points are unlikely to lead to large discrepancies, since all operate in competitive market environments and consumption patterns in these developed countries are probably sufficiently similar. The third point could lead to errors. Trade between countries in construction and maintenance projects tends to be low. For example, energy and labour costs may need specific corrections. On the other hand, trading in mechanical and electrical equipment and components is likely to occur.

Bearing these limitations in mind, the PPP US$ exchange rates can be converted to base in sterling (table 1) and applied to the relevant expenditure figures.

Table 1 PPP exchange rates against sterling

Country	Period	Currency	PPP exchange rate (currency/£)
Netherlands	Calendar year 2002:	€	1.40
United States	Calendar year 2001:	US$	1.56
Australia	July 2001– June 2002:	A$	2.08

Bills

Comparisons of average household bills between countries suggests that domestic customers in England and Wales face bills that are in line with those in other countries.

Prices to business customers in England and Wales, according to a survey by NUS Consulting[1], are towards the upper end of the range in Europe and increasing. However, such comparisons do not take into account differences in levels of service to customers, compliance with water quality and environmental standards, investment to maintain and enhance assets, or the presence of subsidies.

Sydney Water has less of a problem with bad debt than companies in England and Wales, with a lower proportion of indebted customers and a lower age of debt. Possible reasons for this include Sydney Water's option to restrict or disconnect domestic customers for non-payment of bills, a sanction prohibited in England and Wales, and different procedures for debt collection.

Customer service

Information on the levels of service that companies provide to their customers is rarely available, at least publicly, to the extent found in England and Wales. Scotland's Water Industry Commissioner published its first report on customer service in 2003 for the period 2001-02, but customers in Northern Ireland remain less well informed than their counterparts elsewhere in the UK. Measures of customer satisfaction are more common.

Assessments of overall service performance in Sydney and Scotland suggest that these companies perform less well than the majority of companies in England and Wales. Encouragingly, Sydney Water has improved some aspects of its customer service since 1999-2000.

Against some individual measures of customer service, Sydney Water and the Scottish water authorities' performance is similar or better than companies in England and Wales, for example, Sydney Water's performance on sewer flooding. In other measures, the England and Wales companies perform significantly better.

Water quality and environmental performance

Comparing water quality in both drinking and environmental performance terms between countries is difficult, as standards and levels of monitoring vary widely. Sydney Water reports compliance with UK water quality standards in its June return submission, though its own standards in some cases differ considerably from these. On some standards such as iron and pesticides, its performance was much better than companies in England and Wales in 2001-02; on others, such as coliforms, it performed worse. Within the UK all countries have seen an improvement since 1995, though England and Wales companies generally performed better than their counterparts in Scotland and Northern Ireland.

[1] '2002-2003 International Water Report & Cost Survey' (2003).

Australian companies treat their sewage to similar standards as companies in England and Wales. Due to the geographic constraints of building coastal tertiary treatment plants a large proportion of Sydney Water's sewage receives only primary treatment, further treatment at coastal plants is applied through the use of deep ocean outfalls. Sydney Water achieves a very high level of compliance with its own bathing water standards compared to companies in England and Wales, where standards are more rigorous. Despite the improvement shown by Scotland, companies in England and Wales still performed slightly better on compliance with the EU Bathing Water Directive in 2001 than the rest of the UK.

Water delivered and leakage

Because the volume of water delivered influences costs, it is important for us to have an accurate understanding of the components of the water balance. This also provides useful benchmarks for performance on leakage. The water balance is complicated to assess – different data assumptions and inconsistencies can influence the final figures. Comparison of elements of the water balance (table 2) uncovers some striking differences. Per capita consumption (pcc) in Australia is almost double the level in England and Wales and other European countries. In the US it is approximately three times higher.

This is in line with the findings of the OECD[2]. Greater garden use and use of water intensive equipment (such as swimming pools) in a hotter, drier climate may help explain some of this difference. Customers in Australia and the US use a great deal more water than their European counterparts. Evidence for Sydney Water though shows a trend of decreased consumption by its customers since 1998-1999.

The countries included in this report have high meter penetration and should provide more reliable estimates of the water balance than is currently possible in England and Wales. A number of factors can influence system losses; for example, reducing pressure can lead to lower leakage. US leakage appears high compared to the other countries in the report. This might result from the need for higher operating pressure to meet higher average demand. Similarly, low levels of leakage in the Netherlands may relate to operating conditions and other assumptions. We look forward to the results of the UK Water Industry Research Limited study[3] into the differences in leakage between England and Wales and the Netherlands.

[2] 'The price of water – Trends in OECD countries'.

[3] 'A Comparison of Leakage Practice and Leakage Levels in UK and the Netherlands'-due to commence in April 2004.

Table 2 Water delivered, leakage and water use

	England and Wales	Australia	Netherlands	US
Distribution input (l/prop/d)	650	1100	440	2000
Distribution losses (l/prop/d)	110	100	-	310
Measured household water use (l/head/d)	140	270	-	440
Unmeasured households water use (l/head/d)	150	-	-	-
Household meter penetration (%)	21	100	96	100

Data rounded to two significant figures.

Water service unit costs

Comparisons of unit costs help set the performance of companies in context in areas such as customer service, leakage control and environmental performance. They provide a general indication of the relative efficiency of companies in delivering the required service to customers. Tables 3 and 4 summarise the unit costs of the water service, setting out costs of operations, capital maintenance charges and an implied return on capital (turnover for the service less costs of operations and capital maintenance charges). The return on capital includes England and Wales companies' out-performance of efficiency assumptions.

On a per property basis, companies in Australia and the Netherlands exhibit total unit costs in line with the England and Wales average. Sydney Water's costs, also in line with the England and Wales average, have been relatively stable since 1998-99 despite a downward trend in the cost of operations. Costs in the US are significantly higher, reflecting higher demand per household. On a water delivered basis, high per capita use by customers in Australia and the US means that companies in these countries deliver water at a lower cost than their counterparts in Europe. Costs in the Netherlands are considerably higher on a water delivered basis than England and Wales, reflecting lower per capita water use.

The return on capital element of many companies in the Netherlands is significantly lower than their counterparts in England and Wales. This might reflect the ability of the public sector to borrow at lower interest rates than private enterprises and pay either lower dividends or none at all. Equally it might reflect an element of subsidy in that the providers of capital (i.e. the government) are prepared to accept a rate of return below that which the market would determine.

The tables below include the Purchasing Power Parity theory (PPP) adjusted unit costs. PPP removes the impact of fluctuations in exchange rates, allowing us to

compare costs with greater confidence. PPP adjusted per property costs are similar in England and Wales and the Netherlands, slightly higher in Australia and considerably higher in the US. PPP adjusted water delivered costs suggest that Australian and US costs are lower than England and Wales, while costs in the Netherlands are higher.

Table 3 Costs per property of water delivered (£/property)

	England and Wales	Australia	Netherlands	US
Cost of operations[1]	63	69 (92)	83 (94)	186 (171)
Cost of capital maintenance	41	28 (37)	26 (30)	45 (41)
Return on capital	37	38 (50)	16 (18)	159 (133)
Total cost	**141**	**135 (178)**	**125 (142)**	**390 (346)**

[1] Figures for the Netherlands include abstraction tax.

Figures in brackets represent costs adjusted for purchasing power parity theory.

Table 4 Cost per unit of water delivered (pence/m^3)

	England and Wales	Australia*	Netherlands*	US*
Cost of operations[1]	31	20 (27)	54 (61)	31 (28)
Cost of capital maintenance	20	8 (11)	17 (19)	7 (7)
Return on capital	18	11 (14)	10 (12)	26 (22)
Total cost	**68**	**39 (52)**	**81 (92)**	**65 (57)**

[1] Figures for the Netherlands include abstraction tax.

* Weighted average of those companies included in this report (Australian average includes data that Sydney Water submitted to us rather than data in WSAAfacts). Figures in brackets represent costs adjusted for purchasing power parity theory.

We have compared Sydney Water with companies in England and Wales using statistical models that take account of differences in operating environment that affect unit costs. Scotland's Water Industry Commissioner has performed a similar analysis for the Scottish authorities. These analyses suggest that overall, Sydney Water and the Scottish industry are considerably less efficient than companies in England and Wales.

However, it is important to remember that we developed these models with the England and Wales operating environment in mind. The cost drivers that we use in the models may not be as important in other countries, particularly in Australia where companies face very different conditions. In addition, we did not make any adjustments for company-specific factors (see appendix 3) when comparing Sydney Water with England and Wales. It may be that certain special factor adjustments would be appropriate and help to explain the overall result.

Sewerage service unit costs

For sewerage, per property comparisons are likely to be more meaningful than volumetric comparisons. Costs for the removal, treatment and disposal of sewage (including surface water in combined sewer systems) depend more on the size of the population and differences in treatment standards than on the volume of waste collected. Sewerage service per property unit costs (table 5) are broadly similar in England and Wales and Australia. Applying PPP to sewerage costs suggests Australian costs per property are higher.

Table 5 Costs per property for sewage collected (£/property)

	England and Wales	Australia	Netherlands*	US*
Cost of operations	52	56 (75)		
Cost of capital Maintenance	47	36 (47)		
Return on capital	55	52 (67)		
Total cost	**154**	**144 (190)**		

*Only data for the water service is available for the Netherlands and US.
Figures in brackets represent costs adjusted for PPP theory.

Because of the higher volume collected per head, Australian companies have lower volumetric unit costs (table 6). This difference is less marked when costs are adjusted for PPP.

Table 6 Costs per unit of sewage collected (p/m^3)

	England and Wales	Australia	Netherlands*	US*
Cost of operations	30	21 (27)		
Cost of capital maintenance	27	13 (17)		
Return on capital	32	19 (25)		
Total cost	**88**	**53 (70)**		

*Only data for the water service is available for the Netherlands and US. Figures in brackets represent costs adjusted for PPP theory.

One of the striking aspects of the unit cost analysis is the apparently higher level of capital maintenance expenditure that companies in England and Wales report compared to companies in other countries. Sydney Water data though does show an increase in the level of capital maintenance for water delivery in 2000-01. A study for Ofwat by WS Atkins suggested that differences in capital maintenance expenditure could be related to differing asset valuations, accounting methods and assumptions and the allocation of infrastructure renewal accounts. The study did not

uncover evidence to suggest that these lower levels of expenditure reflected lower levels of capital maintenance activity or lower levels of service.

Capital expenditure and network activity

Average capital expenditure on the water service was considerably higher in England and Wales than in Sydney over a five-year period. Investment in the sewerage service was more evenly matched as Sydney Water has increased spending in this area every year from 1999-2000 to 2001-02. To a large extent any differences are likely to reflect legislative differences and other pressures on service providers to improve rather than efficiency.

Table 7 shows burst rates for water mains in England and Wales and Australia. The higher number of burst rates in Australia may reflect generally lower levels of mains replacement, or may be affected by different soil types.

Table 7 Water main burst rates

	England and Wales[1]		Sydney Water	Other Australian companies[2]
	average	range		
Water mains bursts per 1000 km	218	109-280	375	331

[1] England and Wales is a ten-year average 1992-2002.

[2] 2000-01 data.

The number of sewer collapses per 1000 km was considerably higher in Sydney Water's area than in England and Wales over the same period, despite an overall rate of critical sewer work similar to the England and Wales average.

Financial performance

Companies in England and Wales are privately owned (as are the US companies sampled) and most pay dividends to shareholders. In most other countries, the enterprises are state owned and rely largely on debt finance. Table 8 sets out certain key financial ratios.

Accounting approaches vary between countries. For example, England and Wales and Australia tend to use current cost accounting so depreciation relates to the current replacement cost of assets. The Netherlands and the US use an historic cost approach.

Estimates of the capital base vary markedly. US companies quote a value per property for the water service that is higher than the value for the combined water and sewerage service in England and Wales. Estimates of current replacement costs also vary; companies in England and Wales present a very high figure compared to

Australia. In the Netherlands and Australia a number of businesses do not pay dividends. Those in the US and Australia that do, pay broadly similar dividends and interest payments, relative to their profits, as companies in England and Wales.

The reported returns on capital and operating margins of companies in England and Wales are slightly lower than the private sector companies in the US. State owned enterprises appear to earn a lower profit margin. Generally public sector companies can support much lower levels of interest cover than private sector lenders would tolerate. Evidence from the public owned companies in the Netherlands appears to confirm this, although Australian companies have higher levels of interest cover than might be expected.

Table 8 Financial Indicators

	England and Wales	Australia	Netherlands	US
Estimated capital employed Water service (£/prop)	-	-	463 (526)	1,503 (1,388)
Estimated capital employed Water and sewerage (£/prop)	1,360*	-	-	-
Net replacement cost (MEA) Water and sewerage (£/prop)	8,860*	2,779 (3,676)	-	-
Historic cost dividend cover	1.6	-	No dividends	1.4
Current cost dividend cover	1.2	0.5	-	-
Dividend + interest / capital employed (%)	5.9	3.0	3.6	5.3
Historic cost interest cover	2.7	-	1.4	3.7
Current cost interest cover	2.2	2.9	-	
Return on capital (estimated capital employed) (%)	6.6	-	5.1	10.0
Return on capital (MEA) (%)	1.0	3.2	-	-
Operating margin (%)	30	32	19	39

*Water and sewerage companies only.

Figures in brackets reflect adjustments for purchasing power parity.

Conclusions

- Water and sewerage customers in England and Wales appear to receive levels of service at least equal to customers in other countries. On some measures the England and Wales companies perform significantly better.
- Water use in England and Wales is broadly similar to that found within Europe. Water use in the US and Australia is higher than in Europe, but high outdoor use may be a major influence.

- Reported leakage levels in the Netherlands are extremely low compared to England and Wales, while US leakage is significantly higher. There is evidence to suggest that differences in both the operating environment and methodology employed can explain some of these disparities.
- Per property unit costs are similar in England and Wales, Australia and the Netherlands, and significantly higher in the US. Costs per unit of water delivered are lower than England and Wales in Australia and the US but higher in the Netherlands, probably due to differences in demand. When costs are adjusted for purchasing power parity (PPP), England and Wales unit costs compare more favourably with companies in Australia and the Netherlands.
- Using statistical models to estimate companies' relative efficiency suggests that companies in England and Wales are considerably more cost-efficient than their counterparts in Scotland and Sydney.
- Mains renewal rates across the countries are broadly similar. Water main burst rates appear higher in Australia than England and Wales.
- Financial ratios of England and Wales companies are broadly similar to private companies in the US.

2 Introduction

2.1 Purpose of this report

Comparative competition has served customers in England and Wales by delivering improved services at lower costs and enabling us to identify poorly performing companies. We use comparative information to compare and contrast prices, bills and tariffs, service levels and quality compliance, operational costs and performance (including leakage) and relative efficiency.

We see our international report as an extension of comparative competition. We develop this work both by taking advantage of opportunities to make comparisons with other water enterprises as they arise and by actively promoting further water enterprise comparisons. The extent to which we can use this work varies with the quality of the comparative data that we obtain. We believe the results can, potentially, be used in four ways.

- **Context setting**. The data is not very robust and can only be used to put the regulated companies' performance into an appropriate wider context.
- **Challenging.** Data is not fully comparable but exposes differences that challenge the current performance levels of the regulated companies.
- **Reinforcing.** Data is robust enough to be used as additional support to regulatory decisions.
- **Benchmarking.** Data is robust, identifying a new benchmark to be used in regulatory decisions.

2.2 About this report

Wherever possible we compare data for companies across seven areas that form the basis of our comparative work in England and Wales.

- **Customer service levels and bills.** In England and Wales we assess levels of customer service against indicators that cover a range of customer related aspects of service performance. We publish the results each year so that customers can see how well their company is performing (see appendix 2 for details of criteria).
- **Water quality and environmental performance.** We do not monitor these areas directly, but we publish figures from the Drinking Water Inspectorate and Environment Agency in our annual customer service report.
- **Water delivered, leakage and water efficiency.** This helps us to assess whether or not a company is using its water resources effectively and contributes to our understanding of companies' relative efficiency. Each year, we publish details of England and Wales companies' water balance, levels of leakage and

the measures they are taking to encourage customers to use water efficiently. The assumptions we make when estimating components of the water balance can significantly influence outputs such as unit costs.

- **Unit cost comparisons.** Unit cost comparisons provide a simple indicator of relative cost performance. We express costs on the basis of cost per property billed and cost per cubic metre of water delivered/sewage collected. Overall unit costs are divided into three areas: costs of operations, maintenance and servicing capital. Where possible, we separate the cost of operations into functional areas of expenditure. Unit costs are not in themselves measures of efficiency, as costs may vary due to conditions outside a company's control.
- **Relative efficiency.** High and low costs do not always directly reflect relative efficiency because factors relating to the operating environment may increase or reduce unit costs relative to other businesses. To take account of this we use statistical techniques, combined with assessments of company-specific factors, to identify the relative efficiencies of companies in England and Wales. We publish the overall efficiency of companies against these models each year alongside the unit costs. See appendix three for details of our models.
- **Capital expenditure and network performance.** This provides an indication of the expenditure on maintaining and enhancing service delivery, and the effect this is having on service to customers.
- **Financial performance.** Comparison of companies' financial position and performance is an important component of regulation in England and Wales. It opens company policies to public scrutiny and allows us to ensure that companies are able to fund necessary investment.

2.3 Countries compared and sources of data

The data in this report is based on a number of sources. Table 9 summarises these. Where possible we also include data from other countries.

For England and Wales, Scotland and Australia, this report uses data for the financial year 2001-02. This runs from April to March in England and Wales and Scotland, and from July to June in Australia. The US and the Netherlands report against calendar year. We have used data for the 2001 and 2002 calendar years respectively.

Unless otherwise stated all data in tables is in 2001-02 prices. We use exchange rates from the Bank of England for the appropriate year.

Table 9 Summary of information sources and other assumptions

Country	Companies	Source of data	Financial year	Exchange rate per £
England and Wales		June return 2002	4/01 – 3/02	-
Scotland	East of Scotland Water Authority North of Scotland Water Authority West of Scotland Water Authority	WICS Annual Reports and Strategic Review of Charges 2002-06	4/01 – 3/02	-
Australia	Sydney Water Corporation	Submission to Ofwat	7/01 – 6/02	AU$2.76
Australia	Brisbane Water CityWest Water Gold Coast Water South Australia Water Corporation South East Water Limited Water Corporation Western Australia Yarra Valley Water	WSAA*facts* 2001 (not published in 2002)	7/00 – 6/01	AU$2.76
Netherlands	Duinwaterbedrijf Zuid-Holland Gemeentewaterleidingen Amsterdam PWN Waterleidingbedrijf Vitens Waterleiding Maatschappij Limburg Hydron Midden-Nederland Brabant Water	VEWIN bench-marking study and annual reports	2002 (calendar year)	€1.59
US	California Water Service Company Indiana American Water Company Missouri American Water Company New Jersey-American Water Company Penn American Water Philadelphia Suburban Water Company San Jose Water Company Southern California Water Company Elizabethtown Water Company	NAWC Financial and Operating Data	2001 (calendar year)	US$1.44

Companies in England and Wales submit annual 'June returns', giving details of all their activities. Data is collected according to certain reporting requirements, leading to a high level of data comparability. Sydney Water submits a reduced version of the June return that is audited by an independent reporter (WS Atkins). This allows us to compare it with companies in England and Wales across the seven areas in more depth. Where appropriate we can reflect its ongoing involvement through the inclusion of performance across years. However, trends must be viewed cautiously

because it can be difficult to separate real changes in performance from improvements in data accuracy and data compatibility. This is partly because Sydney Water did not develop its accounting system with our reporting requirements in mind. Its submission may therefore include a greater degree of apportionment than England and Wales companies.

2.4 Ofwat international activity

During 2003 we gave presentations at a number of international conferences in countries such as Brazil, US, Canada, Australia, Denmark and Spain. We also held a series of meetings with companies, regulators and government departments across Australia and New Zealand. We discussed our international comparative work as well as specific issues such as leakage control and measuring efficiency.

We have also hosted several visiting groups from Australian water companies and regulators, who are keen to compare their practices with others around the world during a period of considerable change in the Australian industry.

Such forums have allowed us to exchange ideas and best practice with colleagues working within different regulatory environments.

- Our findings on issues such as the economics of water conservation and reuse, abstraction licence trading, customer service standards and industry structure ensure that we have a wide range of experiences to draw on when making decisions that affect the industry in England and Wales.

- We have a greater understanding of the policies and factors that are driving the performance, and costs, of the companies included in the international report. This has allowed us to be more confident of the implications of any variance in performance between companies in England and Wales and companies in other countries.

We look forward to continuing and deepening our involvement with established partners in the United States and Australia so that more accurate and valuable comparisons can be made. In addition, we will endeavour to forge new opportunities to compare water companies from around the world with those in England and Wales.

3 Sydney Water

3.1 Regulatory structures, data sources and company characteristics

Sydney Water Corporation is an unlisted public company serving around four million customers in south western Australia, formed in 1995 from the previous public water board. The New South Wales government retains ownership.

The Department of Land and Water Conservation considers water resources while the Health Department considers water quality. The Environment Protection Authority considers environmental concerns while, at the time of submission, the Independent Pricing and Regulatory Tribunal (IPART) considers economic, operational and customer service regulation.

Sydney Water submits independently audited data directly to us in the form of a reduced version June return. The June return contains additional data to that available for the other Australian organisations in this report.

Tables 10 and 11 compare Sydney Water with England and Wales on a range of indicators. Sydney Water is around the same size, in terms of properties connected and turnover, as a medium sized water and sewerage company in England and Wales.

Table 10 Comparison of base data

	Properties connected (000s)		Population served (000s)		Volume (Mld)		Network length (000 km)		Turn-over £m
	Water	Sewerage	Water	Sewerage	Water delivered	Sewage collected	Water	Sewerage	Total
E&W average[1]	1944	2269	4351	5413	1030	1037	27.7	30.5	598
E&W range[1]	535-3616	644-5465	1196-8144	1542-13111	308-2107	263-2903	11.2-45.7	8.7-67.0	253-1055
Sydney Water	1508	1461	4153	4058	1521	998	20.6	22.6	451

[1] Water and sewerage companies only

Table 11 Comparison of operating environment

	Population per connection		H/H meter penetration (%)	Length of main per property (m)	
	Water	Sewerage		Water	Sewerage
E&W average	2.3	2.4	21	14.1	13.5
E&W range	2.1-2.5	2.3-2.5	2-50	8.7-21.0	11.7-15.2
Sydney Water	2.8	2.8	99	13.6	15.5

3.2 Customer service levels

Table 12 compares the performance of Sydney Water to companies in England and Wales against Ofwat's 'DG indicators' of customer service levels for 1999-2000, 2000-01 and 2001-02.

Table 12 Performance against DG levels of service indicators

		England and Wales						Sydney Water		
		Average			range					
		1999-00	2000-01	2001-02	1999-00	2000-01	2001-02	1999-00	2000-01	2001-02
DG2 Properties at risk of low pressure (%)		0.13	0.11	0.10	0-1.5	0-1.3	0-1.0	0.41	0.22	0.17
DG3 Properties subject to unplanned supply interruptions (%)	>12 hours	0.06	0.11	0.12	0-1.5	0-0.7	0.0-0.4	0.03	0.05	0.07
	>6 hours	0.36	0.41	0.44	0.1-1.8	0.1-1.6	0.1-1.4	0.64	0.38	0.64
DG5 Properties subject to internal flooding incidents (per 100,000 properties)	overloaded sewers	16.9	14.3	9.3	7.7-33.5	4.7-33.8	2.4-60.7	0.5	1.6	1.6
	'other causes'	14.9	17.2	12.6	5.1-20.5	4.6-25.2	3.6-18.9	7.6	4.6	6.2
DG6 Billing contacts not responded to within five working days (%)		1.5	0.9	1.23	0-4.1	0-3.0	0-4.7	-	-	0.3
DG7 Written complaints not responded to within 10 working days		0.6	0.4	0.7	0-6.6	0-1.2	0-1.7	-	-	-
DG8 Bills not based on meter readings (metered properties) (%)		0.3	0.7	0.45	0-0.5	0-3.3	0-1.7	0.0	0.0	0.1
DG9 Received telephone calls not answered within 30 seconds (%)		9	8	6.4	2-31	1-49	3.4-13.7	29.5	39	10

DG2 Inadequate water pressure

Sydney Water must provide 15 metres head of pressure in the water main adjacent to the property, roughly equivalent to the standard for England and Wales. Sydney Water's operating conditions allow for a relatively stable pressure within the system and the company continues to easily meet the standard in its operating licence (an absolute standard of less than 15,000 properties affected, or just under 1%).

The performance of England and Wales against this measure continues to improve with just 0.1% of properties affected by low pressure in 2001-02. Sydney Water's performance improved again on 2000-01 (which was the best to date) with only 0.17% of Sydney Water's properties below the reference level.

DG3 Supply interruptions

Companies in England and Wales must report unplanned water supply interruptions of 3, 6, 12 and 24 hours. Sydney Water's performance against the 6 hour standard dropped back to 0.64 in 2001-02, above the England and Wales average and in line with its 1999-2000 performance (when four specific incidents located at critical locations on the network affected the results). Sydney Water's performance against the 12 hour standard has also fallen slightly, although it continues to perform better than the England and Wales average. The same is true of interruptions lasting more than 24 hours.

Sydney Water's overall performance score (calculated as >6hrs x1 + >12hrs x1 + >24hrs x2) was 0.73 – equivalent to an 'acceptable' rating and slightly higher than the England and Wales average (0.67). The company's Continuity and Redress Policy is significantly better than those in place in England and Wales.

DG5 Flooding from sewers

The issue of sewer flooding is under close scrutiny in England and Wales at present. Flooding from sewers is one of the worst service failures that customers can face. Ofwat, WaterVoice and companies are all keen to reduce further the number of properties suffering flooding. We consulted on this issue in 2002 and will ensure that sewer flooding receives its proper priority in the forthcoming price review. This year the total number of properties flooded internally in England and Wales fell by 30% to just under 5,000, reflecting a drier winter.

For its part, Sydney Water has a particular problem with tree root intrusion, perhaps stemming from the location of sewers at the rear of houses, usually in gardens. Despite this, the data suggests that Sydney Water's sewerage network continues to be more reliable (in terms of preventing internal flooding) than the network in England and Wales. Sydney Water achieves an 'above average' rating for flooding due to overloaded sewers, despite an increase in 2001-02, and 'other causes'. Sydney Water's performance for 'overloaded sewers' was better than all the England and Wales companies and for 'other causes' outperformed all but two companies.

These figures reflect Sydney's separate sewerage systems for wastewater and stormwater and the presence of external gullies on private sewers to provide protection against internal overflow. This may, however, lead to a problem of external surcharges. Sydney Water's operating licence includes a target that 96% of properties connected to its sewers should not experience a sewage surcharge on their land from these sewers.

DG6 Response to billing queries
This year's submission from Sydney Water included data on the response to billing contacts. A billing contact refers to any written, telephone or direct contact with customers concerning billing issues.

Despite this being Sydney Water's first submission, under this standard its performance of 99.7% of contacts responded to within five working days rates as 'good' on our criteria (above 95% in five working days and 98.5% in ten working days).

DG7 Response to written complaints
DG7 assesses companies against two sets of criteria: responses within ten days and responses that take longer than 20 days. The England and Wales industry averages for this measure were 99.3% and 0.15% in 2001-02.

Sydney Water encourages its customers to make contact by telephone (resolving most complaints within two days) and so receives a very low number of written complaints compared to companies in England and Wales. Consequently they have not reported against this standard but provided a commentary for comparison.

Sydney Water does not compare favourably with the England and Wales companies against DG7, only 33% of written correspondence is responded to within 10 days while 54% have to wait over 20 days. The emphasis Sydney Water place on telephone contact may mean that only the most serious and complex complaints are in written form. This would obviously impact upon the speed of response.

In England and Wales, companies receive approximately eight times more telephone complaints than written complaints. Data for telephone complaints is more difficult to measure however, as judging what constitutes a 'complaint' is quite subjective.

DG8 Meter reading
Universal metering has been in place for a number of years across Australia. Over 98% of the properties that Sydney Water serves have meters installed, many more than in England and Wales. The company reads meters quarterly with 99.9% of meters read in 2001-02, equivalent to a 'good' rating under our assessment, compared to 99.5% in England and Wales.

Performance in meter reading in England and Wales has improved year on year, in spite of the continued increase in the number of metered accounts. An alteration to methodology means Sydney Water's performance is not directly comparable with previous years.

DG9 Telephone contact
Sydney Water's performance against this measure shows a large improvement from last year, thanks to increases in call centre capacity. Just under 90% of calls were answered within 30 seconds, compared with the England and Wales average of 94%. To achieve an 'acceptable' rating, a company must answer 86% of calls within 30 seconds.

A recent survey of England and Wales customers' views, carried out jointly with WaterVoice, has provided a helpful insight into customer attitudes to contacting companies. Over half of customers surveyed preferred to have a person answering the telephone, but seven out of ten customers were prepared to wait for up to 60 seconds for their call to be answered provided that this helped to pinpoint the person most able to help them.

While customers clearly prefer human interaction, well-designed automatic systems may help direct customers to those best placed to deal with their enquiry and improve the overall time taken. In its current form, the 30-second DG9 standard includes any time that a customer might spend negotiating an automatic system. We are concerned that this measure should not deter water companies from introducing new technologies that could improve customer service.

As telephony systems become more varied and sophisticated it is increasingly difficult to assess what constitutes good service and what time period should be measured. With this in mind, we are working with Water UK and WaterVoice to develop a new telephone contact indicator. This might combine a measure of satisfaction based on customer feedback together with some quantitative data such as abandoned calls.

Bad debt
The level of bills in Sydney is generally similar to the England and Wales average.

Sydney Water clearly has less of a problem with bad debt than companies in England and Wales. Across all measures, Sydney Water's levels of debt are significantly lower than the average for England and Wales. The proportion of revenue outstanding in older age bands is lower for Sydney Water (1% between 24 and 48 months old) than for England and Wales (28%).

Table 13 sets out the average positions on household debt for Sydney Water and water companies in England and Wales.

Table 13 Comparison of household bad debt

	England and Wales average	Sydney Water
Average debt across the industry (£ per indebted household customer)	£156	£52
Number of households with outstanding revenue	209,622	138,835
% of households served with revenue outstanding	19%	10%
% of Total household revenue outstanding*	16%	2%
% of total household revenue outstanding less than 12 months	47%	97%
% of total household revenue outstanding 12-24 months	25%	2%
% of total household revenue outstanding 24-48 months	28%	1%
Household revenue outstanding for up to 48 months	£33m	£7m
annual cost of collecting outstanding household revenue (£ per household billed)	£1-3	£1
Cost of collecting outstanding revenue per indebted customer	£10-20	£10
Revenue written off as a proportion of household revenue	2%	Negligible

* Total amount of revenue outstanding (<48 months) as a percentage of total household revenue billed in 2001-02.

There are a number of possible reasons for the differences, in particular the ban on domestic disconnection for non-payment of water bills in England and Wales. Sydney Water has the sanction of restricting or disconnecting the water supply of non-paying customers. Other reasons may include different debt collection procedures, policies on revenue write off and a New South Wales law under which all outstanding debts to Sydney Water become the responsibility of the purchaser of a property when a house is sold.

Sydney Water's outstanding revenue collection operating expenditure is towards the lower end of that found in England and Wales. While this might simply be related to the smaller amount of revenue that each customer owes and the lower number of customers in debt, there may be other reasons. For example, companies in England and Wales often use more expensive 'direct' methods to recover outstanding revenue, such as home visits and court action, due to their inability to disconnect or threaten to disconnect domestic customers for non-payment of bills.

3.3 Water quality and environmental performance

Water Quality

Sydney Water reports to New South Wales' Department of Health against the Australian Drinking Water Quality guidelines 1996 (NHMRC). On a number of indicators these differ from UK standards. For this exercise, Sydney Water's performance was compared against the UK regulations. Table 14 outlines the results.

Table 14 Water quality – company performance in 2001

		Sydney Water (2001-02)	England and Wales	
			average	range
Water supply zones in company supply area	-	169	2,303	-
	Prescribed concentration	**% zones not complying with regulatory requirements**		
Faecal coliforms	0cfu/100ml	4.1	2.6	0-6.7
Nitrate	50mg/l	0	1.1	0-21.4
Aluminium	200ug/l	0	1.2	0-3.9
Iron	200ug/l	3.6	15	0-44
Pesticides	Standards for individual pesticides	0	2.8	0-13.6

Mg/l=milligrams per litre of water tested; ug/l=micrograms per litre.

While Sydney Water exhibited a greater proportion of failures for faecal coliforms, it performed significantly better against the nitrate, aluminium, iron and pesticides standards.

In addition to water supply zones, Sydney Water submitted data for the presence of coliforms at water treatment works and service reservoirs (table 15).

Table 15 Presence of coliforms at treatment works and service reservoirs

	England and Wales 2001	Sydney Water 2001-02
% tests of water leaving treatment works containing coliforms	0.1	0.4
% Treatment works with coliforms detected	9.6	20
% service reservoirs with coliforms detected in more than 5% of samples	0.13	12

The data suggests that, on average, companies in England and Wales have performed better than Sydney Water. Coliforms are used as an indicator organism,

giving a warning that more dangerous organisms may be present. They are easy to detect and their presence in water leaving a treatment works can indicate that the effectiveness of the treatment or disinfection has been reduced.

Environmental performance

Table 16 compares Sydney Water's performance against a number of indicators of environmental performance with companies in England and Wales.

Table 16 Environmental impact - company performance 2001-02

	Equivalent population served by STWs[1]		Non-compliant bathing waters		Category 1 and 2 pollution incidents	
	millions of residents	% served by works in breach of consent	%	Successful prosecutions	Water	Sewerage
Sydney Water	5.004	1.96	0	0	0	0
England and Wales	63.5 (1.5-13.9)	1.2 (0-11.8)	3 (0-12)	54 (1-15)	5 (0-1)	146 (4-29)

[1] Only includes those works with numerical (rather than descriptive) consents

Range in brackets

Although the data is comparable at a broad level, caution needs to be applied when drawing detailed conclusions, particularly due to the different standards in the two countries. For example, Sydney Water's inland STW consents are generally tighter than those of England and Wales, while the limits for disposal to marine waters are much less rigorous.

Sydney Water's population equivalent served by sewage treatment works is lower than the England and Wales industry average. In 2001-02, around 98% of Sydney's customers were served by works complying with their treatment consents. Companies in England and Wales maintained a high level of compliance with an equivalent figure of around 99%. Both Sydney Water and the England and Wales industry suffered a slight fall in performance this year.

Compliance with bathing water standards in England and Wales has improved significantly over the years, and now stands at 97%. Much of this improvement is a consequence of investment by the water industry in improving or removing point sources of pollution such as storm overflows or sewage treatment works. The Environment Agency's analysis shows that intermittent and diffuse sources of pollution are increasingly becoming the cause of microbial non-compliance of bathing waters.

Sydney Water does not report any bathing water non-compliance, though the standards to which this performance relates differ considerably from EU standards.

One relevant factor might be that Sydney receives more natural UV than England and Wales, which might facilitate natural degradation of seaborne micro-organisms.

There were no successful prosecutions against Sydney Water in 2001-02, compared to an average of five in England and Wales. It is difficult to quantify how strict the Australian Agency might be with prosecutions. The Environment Agency (EA) is apparently becoming increasingly tougher on prosecuting in England and Wales.

Sydney Water does not report any category 1 and 2 pollution incidents which suggests either a very good performance or some differences in reporting categories between the two regimes. Sydney Water runs few, large sewage works compared with England and Wales; it may be easier to manage these works and thus to meet consents and avoid pollution incidents. Table 17 sets out sewage treatment figures for the two industries.

Table 17 Sewage treatment - company performance 2001-02

	% population equivalent served by works with:		% sewage treated to			% sludge disposal to		
	Nutrient removal	UV disinfection	Primary or untreated	Secondary	Tertiary	Incineration	Agricultural land	Compost
Sydney Water	12	9	74	4	21	0	84	14
England and Wales	11	4	2	66	32	16	58	6

Percentages may not add due to rounding.

Fourteen of Sydney Water's works (almost 50%) have nutrient removal capacity, though these serve just 12% of the population equivalent. This seems low considering the small number of works that Sydney Water utilises. In England and Wales just 2% of works have nutrient removal capacity, serving 11% of the population equivalent. Ten of Sydney Water's works have UV disinfection capacity serving 9% of the population equivalent. This compares with just 1% of works in England and Wales serving 4% of the population equivalent.

While companies in England and Wales treat almost all their sewage to secondary or tertiary standards, a large proportion of Sydney Water's sewage receives only primary treatment. Since 1989 Sydney Water has not been permitted to discharge sludge to the ocean. In Europe a similar ban was instigated on 31 December 1998.

Overall, Sydney Water recycles to land over 98% of its sewage sludge i.e. it uses almost its entire waste sewage treatment product for beneficial use. In England and Wales, Welsh Water (89%), Northumbrian Water (79%) and Southern Water (94%) dispose of similar proportions to agricultural land. The disposal route of sludge to agricultural land in England and Wales is coming under increasing pressure from big

food retailers. It is not known whether similar pressures apply in Australia, or indeed if the availability of suitable land is as restricted as it is in England and Wales. We will look into this for the 2002-03 report.

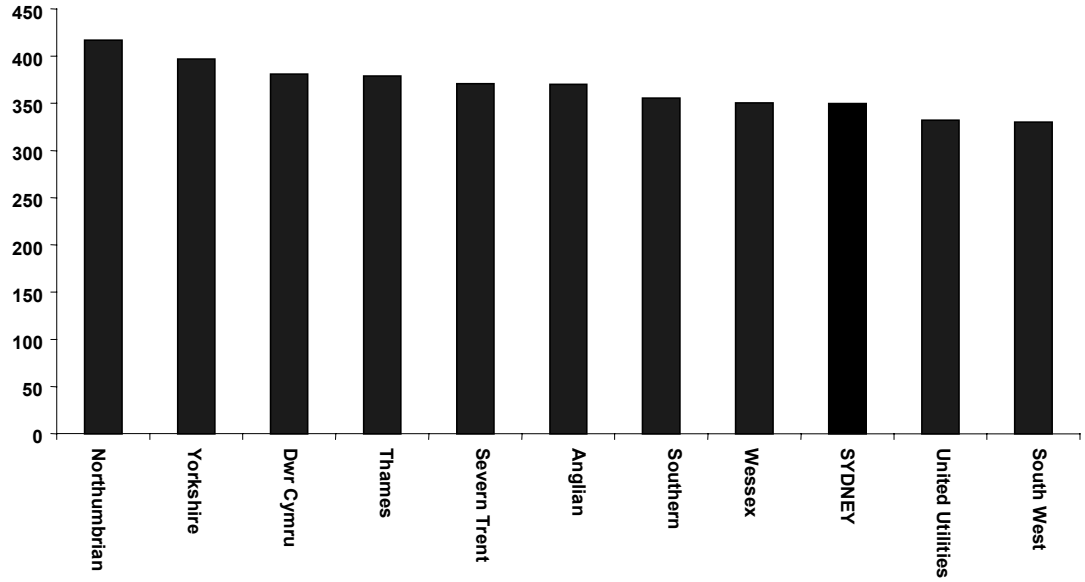
Overall Performance Assessment (OPA)

As part of this year's submission, Sydney Water agreed to participate in the overall performance assessment that we produce as part of the comparison of levels of service to customers. The assessment is a weighted average of 16 performance indicators for the water and sewerage companies and 9 for the water companies. It takes account of such factors as performance against DG indicators, debt and revenue policies, and environmental impact, including leakage.

Against water and sewerage companies only, Sydney Water achieves a score of 350 points, ranking it 9th out of the 11 companies (figure 1 on page 28). The England and Wales range is 330-417. Overall Sydney Water is ranked 24th out of 24 in the all company assessment, with a score 10 below the next company. Sydney Water performs well on the majority of measures. Measures on which it appears to perform less well include water pressure, waste water treatment works in breach of consent and telephone contact. Improving only two of these could place them well in the mid to upper ranges of company performance.

The design of the OPA takes account of the UK operating environment and may not be entirely appropriate to the Australian operating environment. We have also had to make judgements on some of the more qualitative aspects of customer service, which may not truly reflect Sydney Water's performance.

Figure 1 Comparison of 2001-02 OPA score for Sydney Water and water and sewerage companies in England and Wales



3.4 Water delivered, leakage and water efficiency

Table 18 sets out the key parameters for water use.

Table 18 Water delivered, leakage and water use

	England and Wales average				Sydney Water			
	1998-99	1999-00	2000-01	2001-02	1998-99	1999-00	2000-01	2001-02
Distribution input (l/prop/day)	650	650	640	650	1100	1100	1200	1100
Distribution losses (l/prop/day)	110	110	100	110	140	122	124	124
Supply pipe leakage (l/prop/day)	41	38	38	38	-	-	-	4
Total leakage (l/prop/day)	150	140	140	150	140	120	120	130
Proportion of water delivered to non-households (%)	32	32	31	31	36	36	35	35
Measured household water use (l/head/day)	140	140	130	140	250	250	260	240
Unmeasured household water use (l/head /day)	150	150	150	150	-	250	240	220
Average household water use (l/head/day)	150	150	150	150	250	250	260	240

Data rounded to two significant figures.

Leakage

The large proportion of metered properties, both household and non-household, in Sydney Water's area, means the water balance calculation is easier than in England and Wales because more components can be directly measured. Companies in England and Wales rely on pcc (per capita consumption) monitors to estimate unmeasured household demand and use continual night flow monitoring as a tool to estimate leakage. In Sydney Water's area, unmeasured demand may be ignored and water delivered directly measured. Leakage can therefore be calculated as a residual of measured distribution input minus measured water delivered. Of course some smaller components, such as operational use and water taken unbilled, still have to be estimated. Improved estimation of these components would increase confidence in the leakage figures.

Sydney Water has provided an estimate of supply pipe leakage (leakage from customers' underground supply pipes within the boundary of their property) for the first time this year, based on rebates made to customers who reported leaks on their

properties. This figure does not include an allowance for undiscovered leaks and is probably therefore an underestimate, but this is likely to be insignificant.

Sydney Water's level of supply pipe leakage is much lower than the England and Wales average. This may be explained by the older pipes and the impact of the more acute temperature fluctuations in England and Wales, as well as the widespread use of copper service pipes in Sydney Water's area. Comparatively low levels of supply pipe leakage mean that although Sydney Water compares well to England and Wales for total leakage it compares relatively poorly for distribution losses.

Total leakage at Sydney Water has remained fairly stable over the past few years; some of the slight rise this year relates to the inclusion of supply pipe leakage for the first time. Sydney Water's total leakage of 128 l/p/d and 9.4 m^3/km/d places it within the pack of England and Wales, but slightly below the average of 139 l/p/d and 9.83 m^3/km/d.

Sydney Water's distribution losses are 125.5 l/p/d and 9.1m^3/km/d compared to the England and Wales averages of 107.7 l/p/d and 7.6 m^3/km/d. There has been a downward trend in distribution losses for both Sydney Water and companies in England and Wales (figure 3). However, both comparators have shown slight increases in the last two years.

Figure 2 places Sydney Water's 2001-02 distribution losses in an England and Wales context, while figure 3 shows historic trends in distribution losses from 1997-8 to 2001-02.

Figure 2 Distribution losses of Sydney Water versus England and Wales

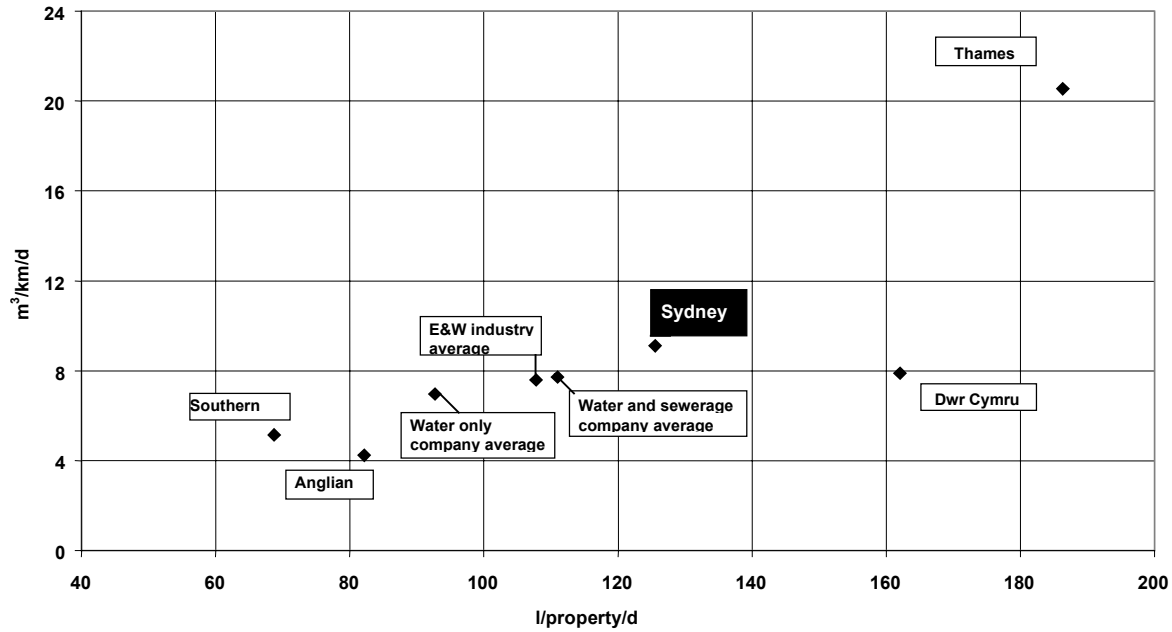
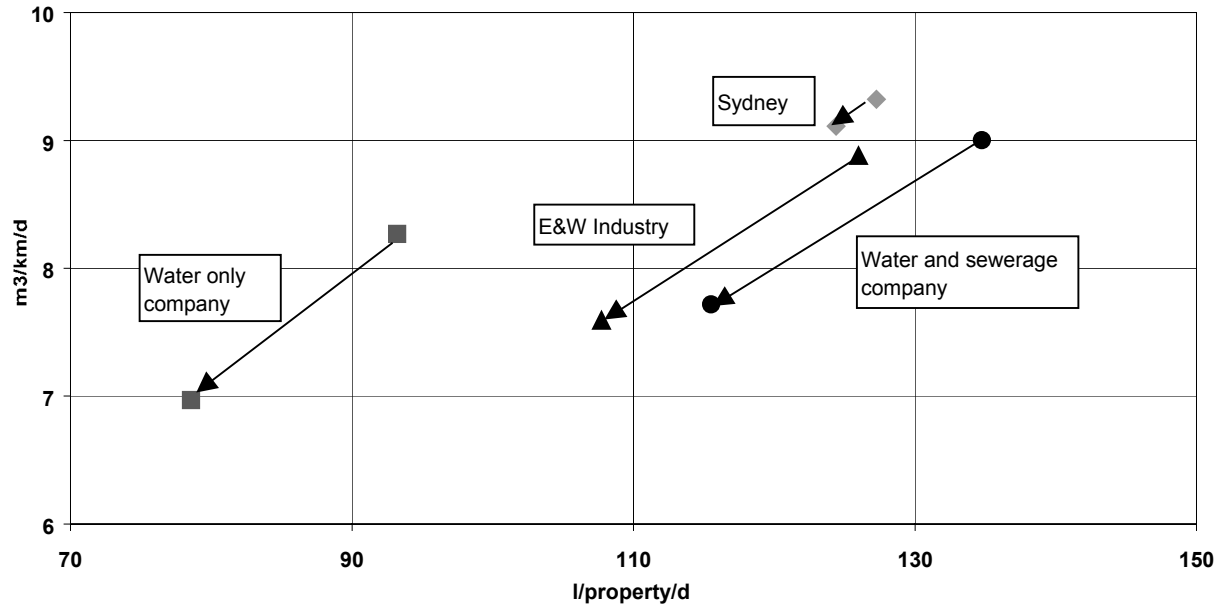


Figure 3: Historic trends in distribution losses



Sydney Water is now 30 months into its five-year leakage reduction program that aims to reduce water loss by 29 Ml/day. It is making steady progress towards this target; savings at the end of 2001-02 were estimated at 22 Ml/day. When set alongside its licence obligation to reduce distribution input, this should encourage further reductions in leakage in the next few years.

Companies in England and Wales companies appear to have achieved a larger reduction in leakage than Sydney Water. This might result from greater external pressure on the companies, from the government and Ofwat. Similarly, companies in

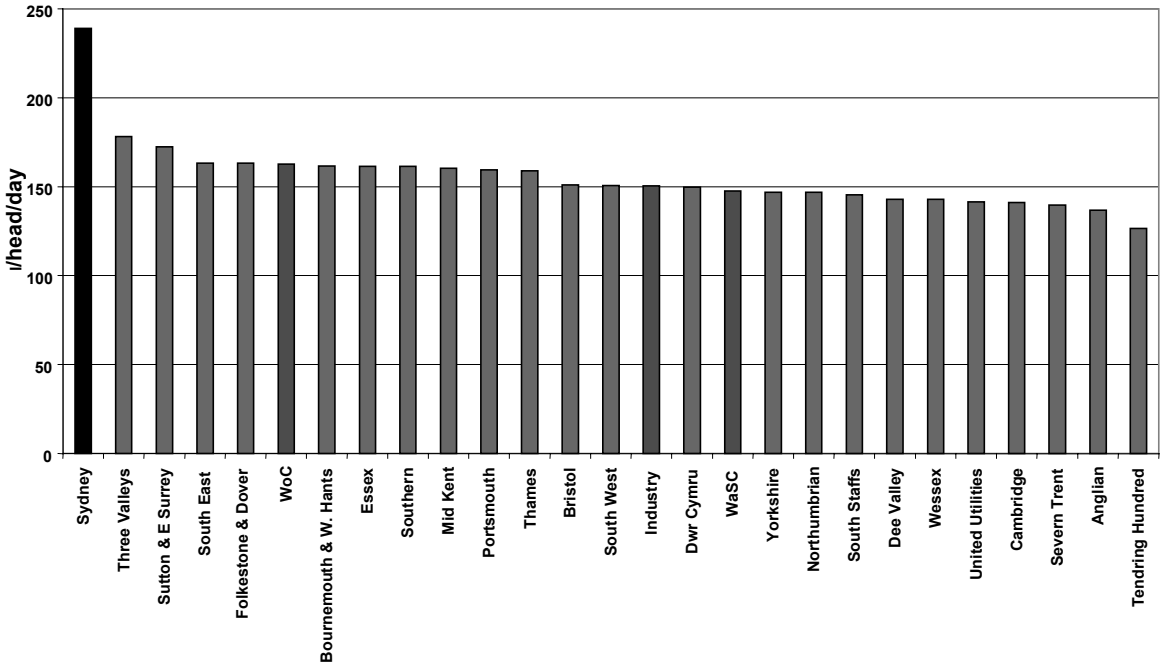
England and Wales report shorter leakage detection and repair times than Sydney Water.

Demand and water efficiency

Sydney Water's unmeasured and measured pcc continue to be much higher than England and Wales. Its level of demand is in fact closer to the US (see chapter 4). There is no discernible long-term trend in pcc for either Sydney Water or England and Wales, though climatic variations influence demand patterns from year to year.

Figure 4 shows the range of pcc's for all the England and Wales companies and Sydney Water.

Figure 4 Per capita consumption 2001-02



It would seem rational to expect the warmer climate in Sydney Water to be a major influence on the higher pcc. Other factors may also be partly responsible. Top loading washing machines, which use significantly more water than the front loading machines found in the UK, are very common in Australia. In addition to this the toilet cistern design common in Australia is thought to be more prone to leaks than the syphonic designs in the UK.

Sydney Water has significant licence obligations relating to demand management, and has been required to reduce the per capita quantity of water drawn from all storage by a quarter in the last decade. Measures taken by the company include a retrofit programme to fit low flow showers, flow regulators and fixing any leaks on the properties using retained, contracted, plumbers. The cost is close to £48 per visit, with an £8 charge to the customer, and has realised average savings of 50 litres per

day per property. This approach has been piloted in England and Wales, but not adopted due to the cost.

Sydney Water operates a similar business premises audit programme to those of companies in England and Wales, which appears to have yielded similar savings. The Sydney Water National Water Conservation and Labelling Scheme is mirrored here with the Market Transformation Scheme which aims to establish a water efficiency rating in the same way as energy efficiency ratings.

Successful demand management also relies on knowledge of water use. It is clear that Australian consumers use greater volumes outside the house, for example in the garden. Sydney Water intends to target this area for future water saving initiatives.

Sydney Water estimates three-year savings from water efficiency measures at 35Ml/day at a cost of around £11million, a unit cost of savings of 86p/m^3. This compares to an England and Wales estimate of around 72p/m^3. Although this must be treated with caution it does suggest that the initiatives achieve a broadly similar cost effectiveness.

Meter under registration averages for Sydney Water are 2.1% household and 4.9% non-household, while for England and Wales they are 3.2% and 4.9%. It is expected that Sydney Water's figures will fall further as a significant meter replacement programme is put in place.

3.5 Unit costs and relative efficiency

Unit cost comparisons provide a simple indicator of relative cost performance. Tables 19 to 23 set out an analysis of unit operating, capital maintenance and return on capital costs against England and Wales averages. To take account of currency movements we have calculated unit costs using both exchange and purchasing power parity (PPP) rates.

Water unit cost comparisons

Tables 19 and 20 set out the costs per property and per cubic metre of water delivered.

Table 19 Costs per property of water delivered (£/ property)

	England and Wales 2001-02		Sydney Water			
	Average	Range	1998-99	1999-00	2000-01	2001-02
Cost of operations	**63**	**47-87**	**130 (112)**	**129 (111)**	**107 (92)**	**95 (81)**
Resources and treatment	19	13-40	42 (24)	68 (50)	57 (42)	58 (42)
Distribution	21	17-32	42 (42)	42 (42)	35 (35)	32 (32)
Business activity	23	16-32	46 (46)	18 (18)	15 (15)	6 (6)
Cost of capital maintenance	**41**	**18-52**	**21 (28)**	**18 (25)**	**18 (24)**	**27 (33)**
Return on capital	**37**	**18-69**	**N/a (8)**	**20 (31)**	**15 (24)**	**25 (35)**
Total cost	**140**	**100-182**	**148 (148)**	**166 (166)**	**141 (141)**	**148 (148)**

Figures in brackets reflect adjustments for Build Own Operate contracts.

Data for the England and Wales range column may not add up due to rounding.

Table 20 Costs per unit of water delivered (p/m^3)

	England and Wales 2001-02		Sydney Water			
	Average	Range	1998-99	1999-00	2000-01	2001-02
Cost of operations	**31**	**24-50**	**35 (30)**	**35 (30)**	**28 (25)**	**26 (22)**
Resources and treatment	9	7-17	11 (6)	19 (14)	15 (12)	15 (11)
Distribution	10	8-17	11 (11)	11 (11)	9 (9)	9 (9)
Business activity	11	8-17	13 (12)	5 (5)	4 (4)	2 (2)
Cost of capital maintenance	**20**	**9-27**	**6 (7)**	**5 (7)**	**5 (6)**	**7 (9)**
Return on capital	**18**	**9-51**	**n/a (2)**	**5 (8)**	**4 (6)**	**7 (9)**
Total cost	**68**	**49-127**	**40 (40)**	**45 (45)**	**37 (37)**	**40 (40)**

Figures in brackets reflect adjustments for Build Own Operate contracts.

Data for the England and Wales range column may not add up due to rounding. Data in 2001-02 prices.

Sydney Water's unit costs of operations, in per property and water delivered terms, continue to show a downward trend. The relatively stable level of total costs could suggest that it has taken Sydney Water time to fully understand the reporting requirements for allocation of costs. The presence and absence of exceptional items can also swamp real trends. Nevertheless it seems likely that the trend does reflect a degree of genuine cost reduction. Capital maintenance costs remain below the England and Wales average but rose in 2001-02.

As in previous analysis, Sydney Water's costs per property are similar to the England and Wales average. Sydney Water's relatively high per capita consumption pushes its costs per unit of water delivered well below those in England and Wales.

Comparisons of unit costs using PPP adjusted figures suggest that the exchange rate continues to under-represent the Sydney Water's true costs by about 20%. Table 21 illustrates this.

Table 21 Water unit costs adjusted for PPP 2001-02

	Costs per property of water delivered (£/property)			Costs per unit of water delivered (p/m^3)		
	England and Wales		Sydney	England and Wales		Sydney
	Average	Range	2001-02	Average	Range	2001-02
Cost of operations	**63**	**47-87**	**126 (107)**	**31**	**24-50**	**34 (29)**
Resources and treatment	19	13-40	76 (57)	9	7-17	20 (15)
Distribution	21	17-32	42 (42)	10	8-17	11 (11)
Business activity	23	16-32	8 (8)	11	8-17	2 (2)
Cost of capital maintenance	**41**	**18-52**	**36 (43)**	**20**	**9-27**	**10 (12)**
Return on capital	**37**	**18-69**	**34 (46)**	**18**	**9-51**	**9 (12)**
Total cost	**140**	**100-182**	**196 (196)**	**68**	**49-127**	**53 (53)**

Figures in brackets reflect adjustments for Build Own Operate contracts.

Data for the England and Wales range column may not add up due to rounding.

Sydney Water's PPP adjusted unit costs are significantly higher than the England and Wales average on a per property basis. Adjusting unit costs for PPP reduces the gap between Sydney and England and Wales on a water delivered basis.

Sewerage unit costs comparisons

Tables 22 and 23 set out Sydney Water's sewerage unit costs.

Table 22 Costs per property for sewage collected (£/ prop)

	England and Wales 2001-02		Sydney Water			
	Average	Range	1998-99	1999-00	2000-01	2001-02
Cost of operations	**52**	**40-71**	**107**	**105**	**83**	**87 (115)**
Sewerage	8	5-13	37	37	28	33 (44)
Sewage treatment	17	12-34	40	43	33	41 (54)
Sludge disposal	11	9-21	13	14	11	7 (9)
Business activity	16	12-22	17	12	10	6 (8)
Cost of capital maintenance	**47**	**37-64**	**43**	**43**	**36**	**27 (36)**
Return on capital	**55**	**40-119**	**16**	**22**	**39**	**46 (62)**
Total cost	**154**	**119-240**	**166**	**171**	**158**	**161 (213)**

Figures in brackets reflect adjustments for PPP.

Data for the England and Wales range column may not add up due to rounding. Data in 2001-02 prices.

Table 23 Costs per unit of sewage collected (p/m^3)

	England and Wales 2001-02		Sydney Water			
	Average	Range	1998-99	1999-00	2000-01	2001-02
Cost of operations	**30**	**19-46**	**40**	**41**	**27**	**35 (46)**
Sewerage	5	3-8	15	15	9	13 (18)
Sewage treatment	10	6-22	15	17	11	16 (21)
Sludge disposal	6	4-12	5	5	4	3 (4)
Business activity	9	6-14	7	5	3	2 (3)
Cost of capital maintenance	**27**	**18-38**	**17**	**17**	**12**	**11 (14)**
Return on capital	**32**	**20-77**	**6**	**9**	**13**	**18 (24)**
Total cost	**88**	**58-156**	**64**	**68**	**51**	**64 (85)**

Figures in brackets reflect adjustments for PPP.

Data for the England and Wales range column may not add up due to rounding.

For sewerage, unit costs are likely to be more dependent on the size of the population and differences in treatment standards than on the volume of water collected. On a per property basis, the most meaningful measure, Sydney Water's total costs are higher than the England and Wales average. Adjusted for PPP this difference is more marked. As for water, total costs have been relatively stable. Changes in individual elements, including a reduction in costs of operations, may be due to genuine trends or to different methods of cost allocation.

Sydney Water's figure for wastewater collected was around 20% lower in 2001-02 than in 2000-01 due to a correction in its methodology. On a wastewater collected basis Sydney Water's unit costs therefore appear higher than last year. The figure is below the England and Wales average, while the PPP adjusted cost is similar to England and Wales. The adjustment does not impact on per property costs.

Sydney Water's sewerage and sewage treatment unit costs seem particularly high given the significant proportion of sewage that receives only primary treatment. The lower sludge costs might relate to the greater proportion of sludge disposed to agriculture. Its sludge generally only receives 'conventional' treatment, rather than the more costly 'advanced' treatment prior to disposal. However the greater distances (and therefore greater cost) that sludge is transported for disposal is likely to counterbalance this cost advantage.

Relative efficiency

High and low costs cannot be relied upon to reflect relative efficiency because unit cost comparisons do not take into account factors relating to the operating environment, which might increase or reduce costs relative to other businesses. To take account of this we use statistical modelling techniques combined with assessments of company specific factors to identify the relative efficiencies of companies in England and Wales. Appendix 3 details the cost drivers for each model and explains our system of special factors.

Work in the electricity industry suggests that the use of PPP has a limited impact on econometric modelling. Our work last year appeared to confirm this.

Water operating efficiency

Table 24 illustrates the performance of Sydney Water against our operating expenditure models and outlines the explanatory factors.

Table 24 2001-2002 Operating expenditure econometric modelling results - water

Model	Band	Rank[1]	Explanatory variables
Resources and Treatment	E	23	Population, no. of sources, distribution input, proportion of supplies from rivers
Distribution	E	18	Population, proportion of total mains length with diameter >300mm
Business Activities	A	1	Number of billed properties
Power	A	1	Distribution input, average pumping head

[1] Ranking is based on 1 to 23.

Sydney Water has a low number of sources, and only one river source, so continues to appear much less efficient than companies in England and Wales under the resources and treatment model. The reasons for this are complex. Sydney Build

Own Operate contracts distort resources and treatment costs of operations, though when we make adjustments for this the resulting figure is lower but still well short of the required reduction. It might also be more reasonable to exclude from modelled costs of operations the costs associated with the purchase of water from the Sydney Catchment Authority (SCA).

While Sydney Water's banding for water distribution remains an E, its ranking has improved from 2000-01 due to a significant reduction in modelled costs of operations. The low banding relates to Sydney's low winter population in relation to modelled costs compared with other companies.

Sydney Water is ranked band A for business activities this year, representing an improvement on 2000-01 when it was ranked band D. This improvement is due to a significant reduction in costs of operations.

Sydney Water performs very well on the power model, showing particularly low average pumping head (aph) for the level of distribution input pumped. The reported cost of operations is low compared to companies in England and Wales with a similar modelled 'unit' to Sydney, suggesting perhaps that Sydney Water has access to generally lower cost electricity.

When we aggregate the individual models, Sydney Water is placed in band E, largely due to the impact of its poor performance on resources and treatment. The model suggests that Sydney Water is spending double the amount it needs to. This is a marked improvement on its 2000-01 result.

However it is important to realise that the results of the combined econometric modelling for companies in England and Wales are adjusted for certain atypical costs, special factors and non-econometric adjustments (see Appendix 3). In this analysis, neither the Sydney Water nor England and Wales results have been adjusted for such factors. It may be that certain special factor adjustments to the Sydney Water result would be appropriate and explain the banding for the overall model.

Sewerage operating efficiency

We have less scope for developing econometric models for sewerage service than for water because there are only ten regulated sewerage businesses in England and Wales; robust models require more than ten data sets. By collecting data at sub company level we can overcome this problem to an extent. We have assessed Sydney Water's performance against our models for the first time in 2001-02. Table 25 shows the results.

Table 25 2001-2002 Operating expenditure econometric modelling results - sewerage

Model	Band	Rank[1]	Explanatory variables
Large works model	E	11	Total load, use of activated sludge, tight effluent consent for suspended solids and BOD[2]
Small works model	E	11	Works size, works type, load
Network model	E	11	Sewer length, sewer district areas, resident population, holiday population
Sludge	C	6	Weights of dry solids, disposal route
Business activities	A	1	Billed properties

[1] Ranking is based on 1 to 11.

[2] Biochemical Oxygen Demand.

In the large works model Sydney Water's costs appear very high relative to the amount of load treated. All of the large treatment works perform poorly compared with those of other companies. Similarly, Sydney Water's costs are very high relative to the amount of load that is treated at small works.

The company has a low winter population compared with its counterparts in England and Wales and has a large, though not unusually large, ratio of sewer length to sewage district area. These factors are not, however, enough to account for Sydney Water's extremely high functional expenditure in the network model.

Sydney Water's sludge disposal costs are close to those that the model predicts.

Sydney Water does perform particularly well under the business activities model, exhibiting low costs relative to the total of households and non-households billed sewage.

Because of Sydney Water's poor performance on three of the models its combined ranking is 11th. The models estimate that Sydney Water is spending just over double the amount the models predict it needs to. However, as for water it should be remembered that no adjustments for atypicals, special factors and non-econometrics have been made.

Water capital maintenance efficiency

Table 26 illustrates the performance of Sydney Water against the capital maintenance models and outlines the explanatory factors. Results of the capital maintenance models tend to suggest that there may be inconsistencies between Sydney Water's allocation policies and those used in England and Wales.

Table 26 Capital maintenance econometric modelling results - water

Model	Output	Explanatory variables
Distribution infrastructure	expenditure reasonable fit	Length of main, burst rate, proportion of communication pipes that are lead
Distribution non-infrastructure	expenditure well above predicted	Pumping station capacity, service reservoir and water tower capacity
Resource and Treatment	expenditure well below predicted	Billed properties, proportion of billed properties that are non-household
Management and general	expenditure well above predicted	Billed properties, proportion of billed properties that are non-household

Distribution infrastructure expenditure is a reasonable fit to the expenditure predicted by the model. In Sydney Water's case, we have assumed that no lead communication pipes exist.

Distribution non-infrastructure expenditure is well above the level that the model predicts. The same is true of management and general expenditure.

The water resources and treatment expenditure is only compared through a unit cost model (properties connected). However against this model Sydney Water's expenditure continues to be well below the level that the model predicts.

Sewerage capital maintenance efficiency
Not all data was available to run the sewerage capital maintenance models. The exception is sewerage management and general. This model rates Sydney Water's costs as 'well above' predicted.

3.6 Capital expenditure and network activity

Wastewater drove Sydney Water's capital expenditure in 2001-02, with around 40% of wastewater expenditure going towards increased environmental standards. Sewerage non-infrastructure and quality enhancements were particularly strong drivers of capital investment for both England and Wales and Sydney Water. On the water side, Sydney Water's expenditure on quality enhancement and supply demand balance was significantly below England and Wales. However, there are some areas in which expenditure may be apportioned differently in the two industries so these conclusions should be treated with caution. In addition, any differences are likely to reflect legislative differences and other pressures on service providers than efficiency.

Table 27 sets out the level of capital expenditure per property by purpose, giving an indication of the broad drivers of expenditure.

Table 27 Capital expenditure by purpose 2001-02 (£/property)

	England and Wales average		Sydney Water
	Average	Range	
Water			
Infrastructure maintenance	15	11-21	12 (16)
Non-infrastructure maintenance	19	13-28	15 (20)
Quality enhancement	21	10-42	1 (1)
Enhance service level	1	0-5	0 (0)
Improving supply demand balance	11	3-23	3 (4)
Sewerage			
Infrastructure maintenance	7	3-13	10 (13)
Non-infrastructure maintenance	23	19-35	31 (41)
Quality enhancement	32	10-100	42 (55)
Enhance service level	2	0-5	0 (0)
Improving supply demand balance	3	0-13	26 (34)

PPP adjustments in brackets.

Tables 28 and 29 set out the level of capital expenditure by sub service area, separated between ongoing capital maintenance and expenditure directed towards improving standards of service (including those that quality regulators impose). We compare individual and average Sydney Water data for 1997-2002 to the England and Wales single year average and for 1997-2002. The five-year average removes the effect of fluctuations in activity between years.

Water service

Table 28 Annual water capital expenditure per property by sub service area

	England and Wales 1997-02		Sydney Water			
	Average	Range	1999-00	2000-01	2001-02	1997-02
Water resources and treatment	**15.2**	**3.6-31.9**	**0.4**	**0.1**	**1.3 (1.7)**	**2.0**
Maintenance	8.8	1.8-22.7	0.0	0.1	1.3 (1.7)	0.6
Enhancement	6.4	0.4-21.6	0.4	0.0	0.0 (0.0)	1.4
Water distribution	**46.2**	**16.7-61.4**	**26.0**	**16.6**	**16.9 (22.3)**	**16.3**
Maintenance	17.6	8.0-24.7	10.3	13.4	14.4 (19.0)	11.2
Enhancement	28.6	4.0-44.2	15.7	3.2	2.5 (3.3)	5.2
Management and general	**9.5**	**2.8-16.0**	**8.5**	**2.3**	**12.5 (16.5)**	**6.8**
Water total	**70.9**	**28.7-95.1**	**34.9**	**18.9**	**30.6 (40.4)**	**25.1**

Figures in brackets reflect adjustments for PPP. Data in 2001-02 prices.

Data for the England and Wales range column may not add up due to rounding.

Water service asset maintenance expenditure is higher for companies in England and Wales than for Sydney Water. This is partly due to the latter's externalisation of operation and maintenance of treatment works for water resources and treatment (meaning that capital maintenance is not required on these assets). In addition, Sydney Water's rehabilitation programme in the 1960s left it with very few remaining unlined iron mains and resulted in lower annual expenditure on its distribution system and on water resources and treatment.

Sydney Water's expenditure in 2001-02 broadly matched the previous year, with the exception of Management and General expenditure which showed significant increases for both water and sewerage.

Sewerage service

Table 29 Annual capital expenditure per property by sub-service area

	England and Wales 1997-02		Sydney Water			
	Average	**Range**	**1999-00**	**2000-01**	**2001-02**	**1997-02**
Sewerage network	**29.4**	**11.8-64.6**	**44.7**	**60.3**	**40.2 (53.2)**	**42.3**
Maintenance	10.6	6.2-16.5	21.3	16.06	11.2 (14.8)	18.1
Enhancement	18.8	5.6-51.7	23.4	44.2	29.0 (38.4)	24.3
Sewage treatment and sludge treatment and disposal	**52.0**	**23.9-102.3**	**21.4**	**27.6**	**34.0 (44.9)**	**20.1**
Maintenance	15.1	8.9-31.0	20.7	21.6	11.7 (15.5)	12.4
Enhancement	36.8	11.7-90.9	0.7	6.0	22.3 (29.4)	7.7
Management and general	**8.5**	**3.8-11.5**	**10.8**	**3.9**	**33.6 (44.5)**	**10.6**
Sewerage total	**89.9**	**41.0-152.0**	**76.9**	**91.8**	**107.8 (142.5)**	**73.1**

Figures in brackets reflect adjustments for PPP. Data in 2001-02 prices.
Data for the England and Wales range column may not add up due to rounding.

Sydney Water's sewerage expenditure continues to see year-on-year increases to meet anticipated environmental standards. Its 2001-02 expenditure was significantly higher than the five-year average, and slightly above the England and Wales average. This difference is more marked if expenditure is compared using PPP rates. Despite this Sydney Water's longer-term average is below that of companies in England and Wales for total sewerage capex.

Expenditure on sewage treatment and sludge treatment and disposal maintenance remains significantly below the England and Wales average, despite continued high spending on maintenance. The likely cause of this disparity is the high level of expenditure required in England and Wales to meet new quality obligations.

Enhancement expenditure on the sewerage network is broadly equivalent but Sydney Water spends significantly more on maintenance.

Network activity and performance

Network activity measures provide a snapshot view of the performance of assets to be viewed against longer-term trends. The trends help us to make judgements as to whether the capital maintenance activity carried out by the companies over the period resulted in stable, improving, uncertain or deteriorating serviceability to customers. Such trends need to be considered across a long historical period, using sound data.

Table 30 compares network activity rates, alongside burst and collapse rates for water mains and sewers for Sydney Water since 1998 against the long term (1992-2002) average for England and Wales.

Table 30 Network activity

	England and Wales 1992-02		Sydney Water				
	Average	Range	1998-99	1999-00	2000-01	2001-02	Average 1997-02
% of total mains length							
Renewed	0.92	0.2-1.7	0.16	0.06	0.16	0.2	0.15
Relined	0.61	<0.1-1.7	0.0	0.0	0.01	0.0	0.0
Mains bursts per 1000 km	218	109-280	435	423	377	375	419
% of total critical sewer length							
Renovated	0.12	0.02-0.36	0.48	0.22	0.16	0.22	0.26
Replaced	0.16	0.04-0.49	0	0	0	0	0
Sewer collapses per 1000 km	15	7-35	49	47	42	43	49

Sydney Water's network does not contain significant lengths of unlined mains. Infrastructure activity levels are higher in England and Wales, where a comprehensive mains rehabilitation programme continues.

The lower activity levels might partly explain Sydney Water's higher burst rates compared with England and Wales. However, Sydney suffers around three times as many collapses per 1000 km as in England and Wales, despite an overall rate of critical sewer work that is similar to the England and Wales average. The Reporters note that Sydney Water suffers from expansive clay and that tree root intrusion is a significant problem, which contribute to the collapse and burst rates.

When we compare the 2001-02 burst and collapse rates to the long-term average (since 1997) we can see a steady improvement in performance. While this improvement might reflect an improvement in data quality it may also reflect genuine improvements in performance. While the timescale is too short to allow anything

other than tentative conclusions, Sydney Water's mains bursts and sewer collapse rates might be said to be 'improving' under our system, albeit from a poor level.

3.7 Financial performance

We have a duty to ensure that companies can finance their functions. Because of the large levels of investment that companies require it is important that they retain a strong enough financial position to allow them to raise the money they need, either through debt or equity. When we set price limits we take into account the levels of financial indicators that will allow companies to do this.

Table 31 summarises some key financial indicators. These provide a snapshot of the financial health of the companies and are therefore used by credit agencies and lenders to assess a company's credit worthiness.

Table 31 Financial indicators

	England and Wales		Sydney Water
	Average	Range	
Water and sewerage net replacement cost (MEA) (£/prop)*	8860	6886-11507	5,965
Current cost dividend cover	1.2	0.3-1.6	0.7
Current cost interest cover	2.2	1.1-9.7	1.4
Return on capital (MEA) (%)	1.0	0.8-2.5	0.8
Operating margin (%)	30	18-41	15
Cash interest cover (EBIDA)	4.8	3.7-6.4	3.2
Gearing (%)	55.6	40-75	27
Debt payback period	4.2	3-7.5	4.2
Net cashflow to capital expenditure (%)	68.6	26-128	73

*Water and sewerage companies only.
Data in 2001-02 prices.

The last few years have seen a reduction in interest cover and dividend and an associated increase in gearing and debt payback as companies have borrowed more to finance investment within the price limits.

Sydney Water's dividend cover and interest cover are lower than England and Wales due to its relatively low operating margin. This low margin could be influencing its ability to raise debt, hence the much lower level of gearing. Equally, Sydney Water's historically lower capital expenditure reduces its borrowing requirement relative to

England and Wales. We might expect the nature of ownership to allow the tolerance of lower indicators than for the privatised entities in England and Wales.

Sydney Water's Modern Equivalent Asset (MEA) per property is low compared to companies in England and Wales, given the length of mains and sewers. One explanation is the longer asset lives that Sydney Water assigns, which will in turn impact on levels of capital maintenance. Different assumptions on the unit cost of replacement may also be a factor. The Reporters also note that the exclusion of impounding reservoirs (owned by the catchment authority) and Build Own Operate treatment plants contributes to the low assessment.

4 Further companies

4.1 Regulatory structures, data sources and company characteristics

Approaches to water service provision and regulation differ across the world. Customers demand an efficiently run company that seeks to minimise price increases and provide good levels of customer service.

The regulatory framework in Scotland is now very similar to that in England and Wales. The Water Industry Commissioner for Scotland (WICS), created in 1999, oversees economic and customer service regulation, while separate public bodies regulate drinking water standards and environmental performance. Water and sewerage services are provided by Scottish Water, a publicly owned company formed in April 2002 from the three vertically integrated water authorities. WICS completed a strategic review of charges in 2001, marking the beginning of a substantial investment programme.

Australia also adopts a generally similar regulatory framework to England and Wales. Public bodies exist to regulate drinking water standards and environmental concerns. Each state is responsible for regulating its water sector. The exact nature of the sector varies from vertically integrated organisations to separate entities undertaking the wholesale and the distribution/retail functions.

Water resources management in the Netherlands involves national, provincial and local government. Local and regional government bodies own the 18 companies that represent the majority of water service providers. The trade association the Netherlands Waterworks Association (VEWIN) represents their interests. The regional governments agree prices with the water providers on a regular basis although there does not appear to be a formal framework for price setting. The government introduced a compulsory benchmarking system recently to encourage comparisons.

The number of water systems in the US is large, varying widely in size and form of ownership, while the form of regulation varies with the ownership and location of the system. Federal policy drives drinking water quality. The privately owned concerns are members of a trade association, the National Association of Water Companies (NAWC). Many serve cities or suburban areas. Each of these companies is relatively small in terms of properties connected, none being larger than a large water only company or small water and sewerage company in England and Wales.

Tribunals generally regulate prices in the US by fixing the rate of return that a company can earn on its assets. There is less emphasis on medium term incentive-based regulation as used in England and Wales.

Table 32 sets out the abbreviations used for companies in this section.

Table 32 Company abbreviations

Abbreviations used in tables in this report	Company name	Area served
SCO	Combined figure for Scottish water authorities[1]	
ESW	East of Scotland Water	
NSW	North of Scotland Water	
WSW	West of Scotland Water	
DZH	Duinwaterbedrijf Zuid-Holland	South Holland
AMS	Gemeentewaterleidingen Amsterdam	Amsterdam
NHO	PWN Waterleidingbedrijf	North Holland
VIT	Vitens[2]	Gelderland, Overijssel, Friesland
WML	Waterleiding Maatschappij Limburg	Limburg (Maastricht)
WMN	Hydron Midden-Nederland	Mid Netherlands (Utrecht)
BRA	Brabant Water[3]	North Brabant
CAL	California Water Service Company	Various communities including East LA and South San Francisco
IND	Indiana American Water Company	Indiana
MA	Missouri American Water Company	Missouri
NJ	New Jersey-American Water Company	Monmouth / Camden / Cape May / Hunterdon
PEN	Penn American Water	Various communities including Pittsburgh and Hershey
PH	Philadelphia Suburban Water Company	Philadelphia
SJ	San Jose Water Company	San Jose Metropolitan Area
SC	Southern California Water Company	Sacramento / Santa Barbara / LA
ET	Elizabethtown Water Company	Parts of Northern New Jersey
BRB	Brisbane Water	Brisbane, Queensland
CW	CityWest Water	Melbourne, Victoria
GC	Gold Coast Water	Gold Coast, Queensland
SAW	South Australia Water Corporation	Adelaide, South Australia
SEW	South East Water Limited	Melbourne, Victoria
WC	Water Corporation Western Australia	Perth
YVW	Yarra Valley Water	Melbourne, Victoria

[1] The three water authorities listed above merged in April 2002 to form Scottish Water. For ease of future comparison, this report shows each authority's published figure for 2001-02 and the combined figure for the whole of Scotland.

[2] Formed in May 2002 from merger of three companies including Waterbedrijf Gelderland and Waterleiding Maatschappij Overijssel.

[3] Formed from the merger of Waterleidingmaatschappij Oost-Brabant and Waterleiding Maatschappij Noord-West-Brabant.

Data sources

The WICS recently published his first annual customer service, investment and asset management and costs and performance reports on the Scottish Water industry, covering 2000-02 and 2001-02. Where possible, WICS has followed our methodology. Data from these publications is used in this report. Where indicated, we have also used information from WICS' 'Strategic Review of Charges 2002-06' document, published in 2001. The data is of varying quality though, 2000-01 is particular poor.

Other than on Sydney Water, limited information is available on Australian companies in 2001-02. In previous years, we have used information from the Water Services Association of Australia's annual overview of company performance, WSAA*facts*. This was not published in 2002. We have included the 2000-01 data in this report for ease of comparison with other countries. WSAA*facts* was published in 2003 and this information will be included in next year's report.

Data for the Netherlands is drawn from 2002 company annual reports and a 2001 Accenture consultancy benchmarking exercise for VEWIN. In the US, NAWC publishes a set of annual operating and financial data of its members. Information is based on the published information for 2001.

Tables 33 and 34 (on pages 47 and 48) compare a range of indicators between each country and a range of companies in England and Wales. Australian and Scottish data is for 2000-01.

The most obvious difference between countries in the United Kingdom (England, Wales and Scotland) and other countries studied, is the near universality of metering outside the UK. The exception to this is Amsterdam (AMS), which has low levels of metering, but despite this the overall level of metering in the Netherlands is very high. High meter coverage influences the approach that companies may take to certain activities. For example, it may allow more accurate measurement of leakage and the water balance as well as allowing greater application of demand management through tariff structure. Equally, higher meter penetration will incur associated operating costs.

The water industry in Scotland operates in similar conditions to the more sparsely populated companies in England and Wales; climate, for example, is similar to Wales and the north of England. Population served and lengths of main and sewer per connection are within the range for companies in England and Wales. In terms of properties connected, the individual water authorities are similar in size to a small water and sewerage company in England and Wales, while Scotland as a whole is similar to that of a large water and sewerage company.

Table 33 Comparison of base data with a range of England and Wales companies

	Properties connected (000s)		Population served (000s)		Volume (Mld)		Network length (000 km)		Turn-over[2] £m
	Water	Sewerage	Water	Sewerage	Water delivered	Sewage Collected	Water	Sewerage	Total
Southern	1001	1780	2227	4451	528	800	13.4	20.9	424
South West	723	644	1559	1542	372	263	15.0	8.7	253
Thames	3616	5465	8144	13111	2107	2903	31.4	67.0	1055
Wessex	535	1080	1196	2,536	308	492	11.2	15.8	259
ESW	715[1]		1690[1]		493	-	12.2	9.5	-
NSW	560[1]		1204[1]		269	-	18.1	7.4	-
WSW	1110[1]		2320[1]		559	-	16.7	12.1	-
SCO	2385[1]		5215[1]		1322	-	46.9	29.1	765
BRB	376	368	879	8 58	391	288	5.8	6.5	134
CW	265	261	605	605	303	295	3.6	3.1	67
GC	190	177	419	388	161	133	2.7	2.7	55
SAW	470	442	1053	1032	384	256	8.6	6.8	134
SEW	545	508	1302	1302	439	321	7.9	7.1	101
WC	566	489	1376	1178	567	273	11.5	9.1	183
YVW	593	539	1576	1461	474	372	8.5	8.0	111
DZH	568	-	1158	-	189	-	4.0	-	75
AMS	420	-	792	-	197	-	2.3	-	52
NHO	700	-	-	-	284	-	9.5	-	105
VIT	1598	-	-	-	672	-	-	-	190
WML	511	-	-	-	203	-	8.4	-	68
WMN	536	-	-	-	217	-	6.2	-	55
BRA	917	-	2165	-	467	-	16.5	-	112
CAL	443	-	1,709	-	1001	-	8.4	-	169
IND	263	-	710	-	389	-	6.3	-	81
MA	418	-	2347	-	680	-	14.0	-	107
NJ	374	-	901	-	502	-	7.6	-	176
PEN	563	-	2,000	-	526	-	12.9	-	220
PH	375	-	1,300	-	408	-	6.8	-	145
SJ	219	-	988	-	509	-	3.9	-	93
SC	247	-	1,119	-	639	-	4.7	-	122
ET	202	-	606	-	472	-	4.6	-	97

[1] Figure for Scottish authorities is the greater of the two values of the number of billed properties for water or for sewerage. Data from Strategic Review of Charges.

[2] Australian 2000-01 turnover figure is inflated using Australian 2002 rate and converted into sterling using 2002 exchange rate. Scottish 2000-01 turnover figure is inflated using UK 2001-02 rate.

Table 34 Comparison of operating environment with England and Wales

	Population per connection	H/H meter penetration (%)	Ground or surface water	Length of main per property (m)	
				Water	Sewerage
E&W average	2.3	21	Mixed	14.1	13.5
E&W range	2.1-2.5	2-50	-	8.7-21.0	11.7-15.2
ESW	2.4	-	-	17.1	13.3
NSW	2.2	-	-	32.2	13.3
WSW	2.1	-	-	15.0	11.0
SCO	2.2	-	-	19.7	12.2
DZH	2.0	100	Surface	7.1	-
AMS	1.9	9	Surface	5.4	-
NHO	-	100	Surface	13.6	-
VIT	-	100	Ground	-	-
WML	-	100	Ground	16.4	-
WMN	-	99	Ground	11.6	-
BRA	2.4	100	Ground	18.0	-
BRB	2.3	100	Surface	15.4	17.6
CW	2.3	100	Surface	13.6	12.0
GC	2.2	100	Surface	14.4	15.1
SAW	2.2	100	Surface	18.3	15.3
SEW	2.4	100	Surface	14.5	14.0
WC	2.4	100	Mixed	20.3	18.6
YVW	2.7	100	Surface	14.4	14.9
CAL	3.9	100	-	19.0	-
IND	2.7	100	-	23.9	-
MA	5.6	100	-	33.6	-
NJ	2.4	100	-	20.3	-
PEN	3.6	100	-	23.0	-
PH	3.5	100	-	18.0	-
SJ	4.5	100	-	17.8	-
SC	4.5	100	-	18.9	-
ET	3.0	100	-	22.9	-

The Australian companies reviewed here range in size from 190,000, similar to a medium-sized water only company in England and Wales, to close to 600,000 properties, similar to a small water and sewerage company. The two countries share a number of characteristics including similar mains lengths per property and population per connection, perhaps because WSAA*facts* covers only urban areas. Other aspects are strikingly different, particularly those affected by climate.

Companies in the Netherlands are generally comparable in size to the larger water only companies in England and Wales. Operating conditions, for example climate, are broadly similar in the Netherlands and England and Wales, but we might expect the flatter nature of the Netherlands to have some cost implications. Population per connection is also similar, as is the range of values for network length per connection. Urban areas such as Amsterdam (AMS) and South Holland (DZH) have a very low connection to network length ratio. Others, such as North Brabant (BRA) are more sparsely populated. Overall, a larger proportion of the public water supply in the Netherlands is drawn from groundwater than in England and Wales.

The US companies reviewed are the largest of the private water companies in the US and are comparable to medium to large water only companies or small water and sewerage companies in England and Wales. The US companies differ from the other countries studied in their higher occupation rates and sparser population distribution. The higher occupation rate per property suggests that each connection serves a number of dwellings.

4.2 Bills

Table 35 (page 50) sets out a selection of average household bills, based on the average household water use in England and Wales, which a domestic customer in a selection of countries pays.

It is difficult to draw detailed conclusions from such a comparison. Simple, average household figures do not provide an indication of the level of service to customers, investment to maintain and enhance assets, or the presence of subsidies. However the figures do suggest bills that customers in England and Wales face following large levels of investment are not out of step with those that customers in other countries face. Those in Europe are perhaps most pertinent because of the need to comply with EU legislation.

Table 35 Water and sewerage household bills (£)

	2000-01	2001-02	2002-03	2003-04
	Water only	Water and sewerage	Water and sewerage	Water and sewerage
England and Wales	**103**	**224**	**228**	**236**
SCO		231	241	
Australia				
BRB				266
CW				220
GC				321
SAW				216
SEW			206	213
Sydney			326	336
YVW				222
Finland				
Helsinki			225	
France				
General				
Paris		221		
Marseilles		250		
Germany				
General		369		
Berlin			356	
Netherlands				
General	129			
Amsterdam	122			
Maastricht	97			
Eindhoven	114			
Rotterdam	140			

Where bills depend on consumption, figures are based on average household water use of 136m^3.

Other currencies are converted into sterling using PPP rates for the relevant year. For 2003-04 the most recently available PPP rates (2002) are used.

All data in outturn prices.

Data comes from both national association publications and company websites.

Table 36 (page 51) shows estimates of charges to business customers in a range of European countries, taken from a 2001 NUS consulting survey. Figures are calculated on the basis of a model supply for a business occupying 45,000 sq ft of city centre office space and consuming 10,000 cubic metres p.a.

It appears that the UK (including Scotland) was the third most expensive country in 2001 and the only country apart from Spain that saw prices increase over the period. This though may reflect varying levels of subsidy, service and investment to maintain and enhance assets. Some countries, such as Italy, appear to be holding tariffs below the levels required to fund necessary improvements in infrastructure. Prices are generally expected to increase as companies move to ensure security of supply and improve water quality in order to meet the incoming EU Water Framework Directive.

Table 36 Charges to business customers in a range of European countries (p/m^3)

	1998 (p/m^3)	1999 (p/m^3)	2001 (p/m^3)
UK (including Scotland)	74	75	78
Germany	119	118	107
Denmark	103	106	103
Belgium	80	79	53
Netherlands	79	77	69
France	77	77	66
Italy	47	48	43
Finland	43	41	37
Ireland	39	40	-
Sweden	36	36	36
Spain	36	35	41

Data rounded to two significant figures.

Currency conversions use the daily exchange rate at a given point during the year.

Key Conclusions

- Bills for domestic customers in England and Wales are in line with those that customers in other countries face.
- UK businesses face high and increased charges compared to their European counterparts.

4.3 Customer service levels

Information comparing levels of customer service is generally difficult to find. Comparing levels of service gives comfort to both the regulator and the customer that companies, in the absence of full competition, provide an appropriate service. It allows us to ensure that drives for efficiency are not made at the expense of the service customers receive.

The UK generally stands out for the quality and range of information provided to customers. In Scotland, WICS collects data on the industry's performance against Our customer service indicators, as well as a number of its own standards. Its first annual customer service report, covering 2001-02, compares the performance of the three Scottish water authorities, and of Scotland as a whole, with the companies in England and Wales. Australian regulators require companies in the major cities such as Melbourne, Perth and Sydney to provide details of customer service.

Table 37 compares service performance against some of Ofwat's 'DG indicators' for companies in England and Wales, Scotland and Australia. Australian data covers 2000-01.

Table 37 Customer service indicators

	DG2: Properties at risk of low pressure[1] (%)	DG3: Properties subject to unplanned interruptions >six hrs (%)[2]	DG5: Properties subject to internal sewer flooding incidents (per 100,000 properties)		DG6: Billing contacts not responded to in 10 working days (%)[3]	DG7: Written complaints not responded to within 10 working days (%)	DG9: Received telephone calls not answered within 30 seconds (%)
			Overloaded sewers	Other causes			
E&W average	0.10	0.44	9.3	12.6	0.2	0.7	6.4
E&W range	0.00-0.98	0.06-1.35	2.2-60.7	3.6-18.9	0-0.8	0-1.7	3.4-13.7
ESW	0.21	0.06	6.57	0.84	-	0.1	-
NSW	0.90	0.64	-	-	-	1.0	-
WSW	0.09	0.00	13.96	24.14	-	1.1	-
SCO	0.32	0.17	-	-	-	0.8	-
BRB	-	0.71	-	-	21.8	31	-
CW	-	0.46	-	-	0	0	-
SAW	-	-	-	-	0	5	-
SEW	-	0.19	-	-	0	0	-
WC	-	1.40	-	-	1	29	-
YVW	-	0.05	-	-	0	14	-

[1] Companies in all three countries report against a standard of 15 metres head in the adjacent water main serving the property.

[2] Australian companies report against a five-hour standard, Scottish authorities against a twelve-hour standard.

[3] Note difference from five-day standard in table 13.

The Scottish Water authorities' performance against the above indicators was broadly similar to companies in England and Wales.

The Scottish water authorities average figure for properties at risk of low pressure was above the England and Wales average, though all three authorities were within the England and Wales range. West of Scotland Water performed better than the England and Wales average. On unplanned interruptions, Scotland as a whole appears from table 36 to have performed better than the England and Wales average. It should be noted, though, that the Scottish authorities report against a longer time period for restoring supply. The figure for interruptions lasting for more than 12 hours in England and Wales was 0.12 in 2001-02, below the Scottish figure.

East of Scotland Water performed very well on sewer flooding incidents per 100,000 properties. Its performance would have achieved an 'above average' rating in our assessment of this measure, and on 'other causes' it outperformed all of the England and Wales companies. The low absolute number of incidents, however, means that this figure could vary considerably from year to year. West of Scotland Water performed worse than the England and Wales average, partly due to poor weather. North of Scotland Water did not report numbers of incidents.

On speed of response to written complaints, the Scottish authorities achieved a similar performance to England and Wales, with East of Scotland Water doing particularly well. All authorities showed a significant improvement in performance from 2000-01, when 13.8% of complaints were not answered within ten days. As well as this indicator, WICS assesses the quality of responses through audits. All three authorities improved against this measure in 2001-02.

WICS has not provided figures for the other customer service indicators. The Customer Service Report indicates that the authorities performed significantly worse than England and Wales on speed of response to billing enquiries, and slightly worse on speed of call answering. This latter result, however, was due to a poor performance by West of Scotland Water. The other two authorities' performance was close to the England and Wales average.

WICS also compared the overall service performance of the Scottish authorities against their England and Wales counterparts using an overall performance assessment based on our indicator. The assessment took account of such factors as performance against DG indicators, water quality and environmental impact.

Overall, Scotland as a whole performed significantly worse than all the water and sewerage companies in England and Wales, with North of Scotland Water performing particularly poorly. East of Scotland Water performed slightly better than the worst-performing company south of the border. WICS split the overall assessment down into measures of asset performance and customer service. On both of these the overall performance of the Scottish industry was again below all the England and Wales companies.

In addition to the DG indicators that we use to monitor company performance, customers are entitled to guaranteed standards of service, as laid down by the Government. These set out both the standards that companies must adhere to and the conditions under which customers are entitled to compensation. Guaranteed minimum standards were introduced in Scotland in 2000.

Australian companies' performance generally appears broadly similar to England and Wales, though there is considerable variation between companies.

There is no data on the levels of customer service for the US. Some standards of service, for example on pressure, are set out in 'general orders'.

Little information is available on the level of customer service Dutch companies provide, although VEWIN found in 2001 that around 90% of customers were satisfied, or very satisfied, with service levels. Translation of customer standards into service guarantees has increased significantly since 1997. Dutch law defines certain

standards, for example the quality and pressure of water that the water companies must supply.

Key conclusions

- Water and sewerage customers in England and Wales appear to receive levels of service at least equal to customers in other countries for which data is available.
- The first assessment of overall service performance in Scotland suggests that most England and Wales companies performed significantly better than their Scottish counterparts.

4.4 Water quality and environmental performance

Comparing water quality in both drinking and environmental performance terms between countries is difficult. The EU acknowledges that implementation of Directives and reporting procedures varies between countries. An Australian Productivity Commission (2000) report[4] noted that while it was possible to observe regulatory processes, data for identifying gaps between standard requirements and actual water quality or public health outcomes was generally not obtainable. WSAA*facts* notes that, like England and Wales, companies within Australia exhibit high levels of compliance with state and national standards.

Water quality

Water quality information is difficult to find for many countries. Consequently, variations in water quality are only considered for the water industries in England and Wales, Scotland and Northern Ireland.

Tables 38 and 39 show how water quality varies between the water industries in the United Kingdom. The prescribed concentration value (PCV) defines the minimum or maximum legal concentration levels needed to meet water quality standards. The PCV can be relaxed in some circumstances, in emergencies or because of extreme meteorological conditions for example.

[4] 'Arrangements for setting drinking water standards – International benchmarking'.

Table 38 Overall water quality in the United Kingdom

	Percentage of determinations exceeding PCV or relaxed PCV	
	1995	**2001**
England and Wales		
Water treatment works	0.1	0.01
Service reservoirs	0.21	0.10
Supply zones	0.71	0.17
Total	**0.55**	**0.14**
Scotland		
Water treatment works	1.43	0.40
Service reservoirs	1.99	0.50
Supply zones	1.26	0.80
Total	**1.51**	**0.60**
Northern Ireland		
Water treatment works	0.50	0.13
Service reservoirs	0.70	0.34
Supply zones	1.60	1.62
Total	**1.10**	**0.94**

Source publication: Digest of Environmental Statistics, published September 2003.

Table 39 Results for a variety of water quality measures in the United Kingdom

	Percentage of determinations exceeding PCV or relaxed PCV					
	England and Wales		**Scotland**		**Northern Ireland**	
	1995	2001	1995	2001	1995	2001
Coliforms	0.7	0.51	2.6	0.8	1.4	0.6
Faecal coliforms	0.1	<0.1	1.0	0.2	0.3	0.1
Colour	<0.1	<0.1	2.2	0.6	0.4	0.0
Turbidity	0.2	0.07	0.5	0.2	0.7	0.3
Hydrogen ion	0.1	<0.1	0.3	0.1	2.1	0.6
Aluminium	0.4	0.1	1.8	0.7	3.9	1.9
Iron	2.2	0.99	3.6	2.2	6.6	2.9
Manganese	0.7	0.28	1.1	0.1	0.2	0.2
Lead	3.4	0.63	1.1	0.5	3.1	2.7
Trihalomethanes	1.3	0.74	18.1	14.0	38.2	53.6
Other parameters	<0.1	<0.1	0.4	0.2	0.1	0.2

Source publication: Digest of Environmental Statistics, published September 2003.

Companies in England and Wales have achieved a very high level of overall compliance with water quality regulations. Levels in Scotland have also improved considerably in recent years, though the proportion of failures remains higher than in

England and Wales. Performance in Northern Ireland has improved by a lesser extent and now lags behind the other countries on many standards.

The three industries reach similar standards on a number of individual pollutants such as coliforms, which are used as an indicator for more harmful organisms. For others, levels of failure in Scotland and Northern Ireland remain relatively high compared to England and Wales.

Environment

Table 40 compares Australia against England and Wales on levels of sewage treatment and sewage volumes. As in England and Wales, most Australian companies treat the majority of their sewage to secondary level. The volume of wastewater returned, per property, to the network is significantly higher than even the highest figure in England and Wales. This reflects higher demand per property, though WSAA*facts* estimates that the 2001 wastewater returned data includes 92l/prop/d of infiltration, approximately 11% of the volume returned. Australian data is for 2000-01.

Table 40 Environmental performance and sewage volumes

Proportion of treatment	England and Wales		Australia						
	Average	Range	BRB	CW	GC	SAW	SEW	WC	YVW
Primary only (%)	2	0-16	0	0	0	0	0	45	0
Secondary (%)	66	27-92	47	100	81	100	87	55	0
Tertiary (%)	32	8-64	53	0	19	0	13	0	100
Volume of waste water returned (l/prop/d)	461	402-548	782	1131	753	579	632	558	691

Table 41 shows percentage compliance with the EU Bathing Water Directive for the four countries in the United Kingdom. England and Wales performed best on this measure in 2002, though the small number of bathing waters in Northern Ireland means that its results can vary considerably each year. England, Wales and Scotland have all improved since 1998.

Table 41 Compliance with EU Bathing Water Directive

	Percentage compliance with EU Bathing Water Directive coliform standards during the bathing season	
	1998	**2002**
England	90	99
Wales	94	100
Scotland	52	91
Northern Ireland	94	94

Source publication: Digest of Environmental Statistics, published September 2003.

Key conclusions

- In 2001, England and Wales companies generally achieved better water quality compliance than their counterparts in Scotland and Northern Ireland, though all companies and authorities have seen some improvement
- Australian companies treated their sewage to similar standards as companies in England and Wales.
- Within the UK, England and Wales companies performed slightly better on compliance with the EU Bathing Water directive.

4.5 Water delivered, leakage and water efficiency

Comparison of volumetric data that accounts for all types of water use should always be treated with some caution. Although the measurement of the volume of water put into distribution systems is relatively straightforward, different definitions for water balance components such as distribution losses, supply pipe leakage and customer use can make direct comparison difficult. Large proportions of unmeasured customers can also cause problems.

The International Water Association (IWA) has for a number of years sought to overcome this problem through the development and promotion of a standard water balance similar to that used in England and Wales. Further to this, the IWA has worked on standard performance indicators for water losses with the most detailed being the infrastructure leakage index (ILI). This ILI is the ratio of current annual real losses to the calculated unavoidable annual real losses based on a number of factors such as the number of connections, average pressure and length of mains. Companies in England and Wales have previously been shown to perform well on the ILI. This work continues to be adopted by a number of countries and their regulators and companies. More recently, the IWA has been working to develop the ILI for setting more economically based leakage targets.

With the difficulties of water balance comparisons as a caveat, table 42 sets out the key parameters for water use and includes some data for Malta, Japan and Sweden.

Table 42 Water delivered, leakage and water use 2001-02

	Distribution input (l/prop/day)	Distribution losses (l/prop/day)	Distribution losses (m^3/km/day)	Total leakage (l/prop/d)	Total leakage (m^3/km/day)	Proportion of water delivered to non H/H (%)	Measured H/H water use (l/head/d)	H/H water delivered/ population (l/head/d)
E&W average	650	110	7.6	140	10	31	140	170
E&W range	430-820	60-180	3.6-21	74-240	6-28	19-47	110-180	130-200
ESW	1080			390	23			
NSW	780			300	9			
WSW	1070			570	38			
SCO	1000			450	23			
BRB	1200	120	7.9			32	300	300
CW	1300	150	11			50	250	250
GC	1000	110	7.7			30	270	270
SAW	1100	150	7.9			14	310	310
SEW	890	51	3.5			27	250	250
WC	1300	42	2.1			15	350	350
YVW	920	76	5.3			23	230	230
DZH	350							
AMS	470							
NHO	410							
WML	450							
WMN	400							
VIT	440							
BRA	520							
CAL	2900			680	36	40		350
IND	1700			210	9	60		220
MA	1900			270	8	41		170
NJ	1500			190	9	42		320
PEN	1200			280	12	44		150
PH	1400			290	16	42		180
SJ	2500			130	7	41		300
SC	2700			150	8	11		510
ET	2800			450	20	44		430
Malta				140	14			150
Japan[1]					8.5			
Finland[2]							150	
Sweden					7.6	39		200

Data rounded to two significant figures.

Australian data covers 2000-01.

[1] Data from 1997-98.

[2] Data from 1996.

Water delivered

Water demand in Australia and the US is around double the England and Wales average although there is a marked variation among the US companies. This might be the result of inconsistency in data collection standards, for example, how a company treats internal and external water use. Although slightly lower, perhaps as

a result of near universal metering, distribution input in the Netherlands is broadly comparable to England and Wales.

Climatic, social and economic trends are clearly important determinants of higher water use. In the US, hotter and drier climates in some areas, combined with higher living standards, appear to lead to higher levels of water use. Swimming pools and air conditioning, for example, are likely to be much more widespread. Garden watering will contribute to high water use in arid areas such as California, particularly if, in the face of low rainfall, inhabitants wish to maintain 'temperate zone' gardens with lawns. This is supported by recent work carried out on behalf of the American Water Works Association (AWWA), which linked water use in the US to both climate and garden size. The AWWA's work also suggested that outdoor use in the US accounted for 58% of household use. This is much higher than European countries, including England and Wales but similar to the pattern that Australia exhibits. It is likely that this will at least partly explain the higher distribution input and water use in Australia. Table 43 sets out estimates of elements of household water use.

Table 43 Estimates of elements of household water use (%)

	England and Wales	Scotland	Finland	Switzerland	US	Australia
Toilet flushing	33	31	14	33	11	20
Bathroom (bathing and showering)	20	32	29	32	8	26
Kitchen (washing, dishwashing, drinking and cooking)	17	35	34	19	16	20
Miscellaneous	27	<1	21	14	7	-
External use	3	1	2	2	58	34

Knowledge of water use is an important tool in encouraging the efficient use of water. For example taking a shower instead of a bath reduces water use. The large proportion of water used for toilet flushing shows the importance of encouraging the use of water saving cistern devices and the installation of low flush toilets.

There is anecdotal evidence that water use education and the use of water saving devices can be effective. Water use in Finland has fallen from a high of 160 l/head/day in the 1980s. It is suggested that this was due to increased awareness and efficiency of use, together with a relatively large increase in price. In Japan, the city of Fukuoka reports the lowest water use in the country with pcc 20% lower than the national average. Following severe droughts in the early nineties the city mounted a concerted water saving campaign. According to reports, 94% of households in the city of 1.3 million people have water flow reducing devices installed. Of the population, 97% are said to be conscious of the need to save water, while 72% claim that they try to save water.

The OECD publication 'The price of water – Trends in OECD countries' places both Australia and the US (along with Canada and Japan) within a high use (>250 l/head/d) category. The UK as a whole, on the other hand, is alongside Finland and Switzerland in the middle range (130-190 l/head/d) category. Water use in the Netherlands is thought to be slightly lower than England and Wales.

Leakage

Robust information on leakage is difficult to find outside England and Wales. Leakage is often measured as a percentage of distribution input. The European Environment Agency report 'Sustainable Water use in Europe' sets out, as a percentage, levels of leakage for Europe spanning a number of years. We show figures in terms of megalitres per day (Ml/d), litres per property per day (l/prop/day) and cubic metres per kilometre of main per day (m^3/km/d).

We do not express leakage figures in terms of a percentage of distribution input, as this can mislead. An increase in water use, for example because of a sustained hot, dry period, will appear to lead to an improvement in leakage levels when, in reality, the volume of water lost has not reduced. Likewise, a successful efficient use of water campaign will reduce the amount of water put into supply and leakage will appear to increase. The recently developed IWA performance indicators also support the view that leakage should not be presented in percentage form.

While Australian distribution inputs are higher, distribution losses are more in line with the levels experienced in England and Wales. WSAA*facts* notes that system losses were 38% lower in 2001 than five years previously. This mirrors similar reductions in England and Wales, where reductions in distribution losses of around 30% were achieved over a similar period. The US companies still appear to have higher leakage levels per property than England and Wales although the figures are lower than in the 2000-01 report. Data from the 2000 Water and Wastewater survey suggests that leakage in large systems is apparently higher than in smaller systems. The American Water Works Association Research Foundation (AwwaRF) has recently commissioned a study into whether the pro-active leakage management techniques used in England and Wales can be usefully applied by the US water companies.

Compared to England and Wales Dutch companies tend to report very low levels of leakage (in some cases zero). DZH, for example, reports leakage of 2.16 m^3/km/day. The England and Wales average is 10.08 m^3/km/day. VEWIN puts water not charged (which is likely to contain elements other than leakage) at 1.37 m^3/km/day at the national level.

Recent collaborative work suggests that while no active leakage reduction work in the Netherlands takes place, a number of factors might contribute to the low level of leakage:

- low operating pressures;
- a newer system relative to England and Wales;
- low burst rates;
- mains tend to be located in footpaths under paving blocks. Sandy soils and a high water table means that virtually all leaks are visible;
- water quality controlled to minimise corrosion; and
- rapid response to reported leaks.

UK Water Industry Research Limited (UKWIR) is working on research to better understand the differences in leakage between England and Wales and the Netherlands. UKWIR will also consider the effect of applying Dutch leakage techniques to England and Wales and vice-versa.

Key conclusions

- England and Wales water use is broadly similar to that found within Europe.
- Water use in the US and Australia is higher than Europe, making cost comparisons more difficult. High outdoor use seems of particular significance.
- Reported leakage levels in the Netherlands are extremely low. There is evidence to suggest that differences in both the operating environment and methodology employed can explain some of the disparity between the Netherlands, England and Wales and Australia.
- US leakage is higher than the other countries in this report.

4.6 Unit costs and relative efficiency

Water service unit costs

Tables 44 and 45 set out the main components of water service unit costs per property and per unit of water delivered. The former may be the more useful measure, as levels of water use vary widely between countries and volume may be a poor determinant of costs for some areas of operations.

The comparisons do not take account of the operating environment, level of treatment required, or scale economies. For Sydney Water, we have overcome these problems using econometric modelling, but this requires a large amount of robust data that is not available for other companies.

WICS has not published the relevant costs for the Scottish water authorities, but its report on costs and performance assesses their relative efficiency against the industry in England and Wales.

Table 44 Water delivered unit costs (£/property)

	Cost of operations[1]	Resources and treatment	Distribution	Business activity	Cost of capital maintenance	Return on capital	Total cost
E&W average	**63**	19	21	23	**41**	**37**	**140**
E&W range	**49-89**	13-40	17-32	16-32	**18-52**	**18-69**	**100-182**
BRB	**63**	-	-	-	**40**	**83**	**187**
CW	**41**	-	-	-	**36**	**60**	**137**
GC	**39**	-	-	-	**26**	**68**	**134**
SAW	**60**	-	-	-	**26**	**58**	**144**
SEW	**34**	-	-	-	**26**	**30**	**90**
WC	**59**	-	-	-	**42**	**49**	**150**
YVW	**32**	-	-	-	**28**	**33**	**93**
DZH	**71**	-	-	-	**29**	**31**	**131**
AMS	**90**	-	-	-	**32**	**2**	**124**
NHO	**91**	-	-	-	**41**	**19**	**150**
VIT	**84**	-	-	-	**24**	**10**	**119**
WML	**87**	-	-	-	**27**	**18**	**132**
WMN	**77**	-	-	-	**17**	**8**	**102**
BRA	**81**	-	-	-	**18**	**23**	**122**
CAL	**281**	178	27	76	**30**	**70**	**381**
IND	**114**	36	19	59	**51**	**145**	**309**
MA	**115**	40	26	49	**37**	**103**	**255**
NJ	**193**	99	27	67	**49**	**229**	**472**
PEN	**150**	44	25	82	**55**	**186**	**391**
PH	**133**	55	18	61	**48**	**204**	**385**
SJ	**281**	206	28	47	**41**	**103**	**425**
SC	**263**	149	22	92	**41**	**189**	**492**
ET	**198**	93	30	76	**50**	**230**	**479**

[1] Figures for the Dutch companies include abstraction tax.

Australian data is for 2000-01. Data is inflated using Australian 2002 rate and converted into sterling using 2002 exchange rate.

These results demonstrate the influence that high levels of water use can have on unit costs. On a per property basis the performance of US companies is relatively poor while companies in Australia and the Netherlands generally have similar costs to companies in England and Wales. But the performance of both the US and Australian companies is better than England and Wales using a water delivered unit cost.

The return on capital in England and Wales is now below levels in the US and Australia on a per property basis. Dutch companies report low returns on capital employed compared to England and Wales, suggesting that there may be some form of subsidy involved. The figure for England and Wales has decreased in recent years, reflecting the impact of the new lower price limits that we set in 1999.

Unit operating and capital maintenance costs based on both water delivered and properties served are generally lower in Australia than in England and Wales. The three water retail companies in Melbourne (City West Water, South East Water and Yarra Valley Water) have particularly low costs. Very low capital maintenance costs for some companies may be due to the greater use of outsourcing to supplier companies, which reduces capital maintenance expenditure and inflates costs of operations.

Generally, the costs of operations component of bills in the Netherlands is higher than in England and Wales on both a water delivered and per property basis, while capital maintenance is lower. Consequently total costs are broadly in line with the England and Wales average. Per property unit cost comparison (table 44) suggests that overall the Dutch companies are slightly better performers, though all are within the England and Wales range. This is partly due to the lower water use levels compared with England and Wales.

The companies in the Netherlands with the lowest operating and capital expenditure tend to be those that rely almost exclusively on groundwater. This reflects the higher quality of untreated groundwater compared to untreated surface water and consequently lower treatment costs. The Dutch water industry is moving towards replacing chlorine disinfection of water with UV treatment, which may increase operating and capital maintenance costs.

High per capita water use in the US pushes per property costs up to very high levels compared with all the other countries surveyed. Other factors such as the relatively sparse population distribution may also have an impact. Distribution and capital maintenance costs per property are in line with those in England and Wales, however, suggesting that the total cost of these activities is not substantially affected by the volume of water delivered. Total costs per unit of water delivered vary but in general are below those in England and Wales. The return on capital component varies substantially among the companies reviewed.

Table 45 Water delivered unit costs (p/m^3)

	Cost of operations[1]	Resources and treatment	Distribution	Business activity	Cost of capital maintenance	Return on capital	Total cost
E&W average	**31**	9	10	11	**20**	**18**	**68**
E&W range	**24-50**	7-17	8-17	8-17	**9-27**	**9-51**	**49-127**
BRB	**17**	-	-	-	**11**	**22**	**49**
CW	**10**	-	-	-	**9**	**14**	**33**
GC	**13**	-	-	-	**9**	**22**	**43**
SAW	**20**	-	-	-	**9**	**20**	**48**
SEW	**12**	-	-	-	**9**	**10**	**31**
WC	**16**	-	-	-	**12**	**13**	**41**
YVW	**11**	-	-	-	**10**	**11**	**32**
DZH	**59**	-	-	-	**24**	**26**	**108**
AMS	**53**	-	-	-	**18**	**1**	**72**
NHO	**61**	-	-	-	**28**	**13**	**101**
VIT	**52**	-	-	-	**16**	**7**	**78**
WML	**60**	-	-	-	**19**	**13**	**91**
WMN	**52**	-	-	-	**12**	**6**	**69**
BRA	**44**	-	-	-	**10**	**13**	**66**
CAL	**34**	22	3	9	**4**	**9**	**46**
IND	**21**	7	4	11	**9**	**27**	**57**
MA	**19**	7	4	8	**6**	**17**	**43**
NJ	**39**	20	6	14	**10**	**47**	**96**
PEN	**44**	13	7	24	**16**	**55**	**115**
PH	**34**	14	5	15	**12**	**51**	**97**
SJ	**33**	24	3	6	**5**	**12**	**50**
SC	**28**	16	2	10	**4**	**20**	**52**
ET	**23**	11	4	9	**6**	**27**	**56**

[1] Figures for the Dutch companies include abstraction tax.

Australian data is inflated using Australian 2002 rate and converted into sterling using 2002 exchange rate.

When we analyse costs using the purchasing power parity exchange rates, the general conclusions above are still valid but companies in England and Wales perform better relative to Australia and the Netherlands on both a water delivered and per property basis. Overall costs per property of water delivered, as shown in table 46, are similar for England and Wales and the Netherlands. Costs are somewhat higher in Australia and significantly higher in the US.

Table 46 Costs per property of water delivered based on purchasing power parity (£/property)

	England and Wales	Australia	Netherlands	US
Cost of operations[1]	63	92	94	171
Cost of capital maintenance	41	37	30	41
Return on capital	37	50	18	133
Total cost	**140**	**178**	**142**	**346**

[1] Figure for the Netherlands includes abstraction tax.

Australian data is for 2000-01. Data is inflated using Australian 2002 rate and converted into sterling using 2002 exchange rate.

When based on purchasing power parity, Table 47 shows that the American and Australian water delivered unit costs remain lower than those for England and Wales, while costs in the Netherlands are considerably higher.

Table 47 Costs per unit of water delivered based on purchasing power parity (p/m^3)

	England and Wales	Australia	Netherlands	US
Cost of operations[1]	31	27	61	28
Cost of capital maintenance	20	11	19	7
Return on capital	18	14	12	22
Total cost	**68**	**52**	**92**	**57**

[1] Figure for Netherlands includes abstraction tax.

Australian data is for 2000-01. Data is inflated using Australian 2002 rate and converted into sterling using 2002 exchange rate.

Sewerage service unit costs

Tables 48 and 49 show the unit costs of the sewerage service in Australia and England and Wales.

Table 48 Sewage collected unit costs (£/property)

	England and Wales		Australia						
	Average	Range	BRB	CW	GC	SAW	SEW	WC	YVW
Cost of operations	52	40-71	47 (62)	46 (61)	58 (77)	39 (52)	33 (44)	52 (69)	35(47)
Cost of capital maintenance	47	37-64	37 (49)	31 (40)	32 (43)	27 (36)	30 (40)	56 (74)	32 (42)
Return on capital	55	40-119	89 (118)	39 (52)	74 (97)	84 (110)	39 (52)	92 (122)	37 (49)
Total cost	**154**	**119-240**	**173 (229)**	**116 (153)**	**164 (218)**	**150 (198)**	**102 (135)**	**201 (266)**	**104 (137)**

Figures in brackets are based on purchasing power parity.

Australian data is for 2000-01. Data is inflated using Australian 2002 rate and converted into sterling using 2002 exchange rate.

Table 49 Sewage collected unit costs (p/m3)

	England and Wales		Australia						
	Average	Range	BRB	CW	GC	SAW	SEW	WC	YVW
Cost of operations	30	19-46	16 (22)	11 (15)	21 (28)	19 (25)	14 (19)	26 (34)	14 (19)
Cost of capital maintenance	27	18-38	13 (17)	7 (10)	12 (16)	13 (17)	13 (17)	28 (37)	13 (17)
Return on capital	32	20-77	31 (41)	9 (13)	27 (35)	40 (52)	17 (23)	45 (60)	15 (19)
Total cost	**88**	**58-156**	**60 (80)**	**28 (37)**	**60 (79)**	**71 (94)**	**44 (59)**	**99 (130)**	**41 (54)**

Figures in brackets are based on purchasing power parity.

Australian data is for 2000-01. Data is inflated using Australian 2002 rate and converted into sterling using 2002 exchange rate.

On a per property basis, the England and Wales average is within the range of the Australian companies, though costs of operations and capital maintenance are generally lower in Australia. When adjusted for PPP, costs for most Australian companies are above those in England and Wales. Again however, City West Water, South East Water and Yarra Valley Water have particularly low costs.

As for water, the higher volumes passing through the network in Australia lead to lower estimates of the cost of the service in volumetric terms, though using purchasing power parity exchange rates brings most of the Australian companies' total costs within the England and Wales range.

A 2002 study for Ofwat by WS Atkins found broadly similar levels of capital maintenance across countries. The disparity in levels of capital maintenance expenditure between England and Wales and many of the other companies in this report, particularly evident in volumetric unit cost comparisons, appears to be due to a number of differences in the way in which costs are allocated. As the concept of capital maintenance as applied in England and Wales is not widely applied across the world, our international work uses depreciation as a proxy. This may not fully reflect the actual levels of capital maintenance. In Australia, WS Atkins found clear differences in asset valuations, asset lives and accountancy rules, all of which had significant effects on the non-infrastructure charges.

Relative efficiency

In its 2001-02 report on costs and performance, WICS uses our econometric models to compare the Scottish water industry with the water and sewerage companies in England and Wales. Table 50 summarises the results. A score of 166 indicates that the company would incur £1.66 of expenditure to deliver the service that an efficient company could deliver for £1 in the same operating environment.

Table 50 Relative Efficiency scores

	England and Wales	Scotland			
		ESW	NSW	WSW	SCO
Relative operating efficiency	100[1]	166	168	158	163
Relative capital maintenance efficiency[2]	100[3]	134	138	138	137

[1] Average score for England and Wales companies

[2] WICS uses procurement efficiency as a proxy for capital maintenance efficiency.

[3] Benchmark company in England and Wales.

These results suggest that companies in England and Wales are significantly more cost-efficient than their Scottish counterparts. The difference is even more pronounced when the results are adjusted for expenditure leading to higher levels of service in England and Wales. These results support the conclusions in WICS'

strategic review of charges for 2002-2006. The merger of the three authorities appears to have yielded efficiency savings, and the newly formed Scottish Water has started to make progress towards its challenging efficiency targets.

WICS also used its own models to compare the operating efficiency of the two industries. These produced similar results.

Key conclusions

- Comparisons based on the number of properties suggest that total costs are broadly similar in Australia, the Netherlands and England and Wales. Some companies report total cost levels significantly below the England and Wales average. The differences in costs for these would require further investigation to decide whether this is a result of greater efficiency or relates to the operating environment. US companies report very high costs per property.
- Comparisons of volumetric unit costs suggest that Australian and many US companies provide water and sewerage services at a lower cost than companies in England and Wales, while costs in the Netherlands are higher. However, levels of water use distort comparisons.
- Adjusting unit costs for purchasing power parity (PPP) removes the effect of currency fluctuations. When comparing PPP-adjusted unit costs, the general conclusions above are still valid but the performance of companies in England and Wales appears better relative to Australia and the Netherlands on both a per property and water delivered basis.
- Companies in England and Wales appear considerably more cost-efficient than the Scottish water authorities.

4.7 Capital expenditure and network activity

Replacement of infrastructure is an issue receiving attention throughout the world as the industry looks to replace older infrastructure as efficiently and cost effectively as possible. In its international review of capital maintenance, WS Atkins found that activity levels for mains renewal were broadly similar across countries.

Table 51 gives an indication of relative levels of network activity in England and Wales, Australia and the Netherlands.

Table 51 Levels of network activity

Country/company[1,2]	% of total mains length replaced[3]	% of total critical sewer length replaced
E&W average	0.92	0.12
E&W range	0.17-1.72	0.02-0.36
BRB	0.18	-
CW	0.85	0.56
GC	0.11	0.16
SAW	0.01	0.02
SEW	0.56	0.16
WC	0.01	0.01
YVW	0.53	0.1
WML	0.93	-
WMN	0.52	-
NHO	0.82	-

[1] Source of Australia/Netherlands data: WS Atkins capital maintenance study for Ofwat (2002).

[2] England and Wales: ten-year average, Australia: five-year average, Netherlands: five-year average.

[3] England and Wales figures are for mains renewed.

Infrastructure activity levels are generally higher in England and Wales than Australia. The low level of mains replacement in Australia may be the result of the longevity of assets, relatively young asset age or low burst rates (see table 52). A comprehensive mains rehabilitation programme underway in England and Wales may also partly explain the difference in activity. The replacement activity for the Dutch companies is broadly equivalent to England and Wales. As companies in the Netherlands seek to eliminate chlorination their rates of renewal may increase.

WICS noted in its strategic review of charges that 34-66% of mains in Scotland were within 10-15 years of the end of their expected life compared to an England and Wales average of 12%. The sewer main equivalents were 12-32% and 10% respectively. Although these figures have since been considered slightly too pessimistic, the Scottish water industry is expected to replace/reline between 5% and 11% of water mains and rehabilitate 1% to 3% of sewers by 2006.

Table 52 shows burst rates in Australia and England and Wales. Australian data is for 2000-01.

Table 52 Water main burst rates

	England and Wales 1992-2002[1]		Australia 2000-01						
	average	range	BRB	CW	GC	SAW	SEW	WC	YVW
Mains bursts per 1000km	218	109-280	376	910	95	245	260	126	559

[1] England and Wales is a ten-year average.

The number of mains bursts generally appears higher in Australia, which might suggest that the underground network is in a worse condition than that in England and Wales. Differences in both soil type and the age of a network might contribute to relative performance. Equally, given the large variation in Australian data, it might be that differences are in part related to differing definitions.

Data provided to us during our review of international capital maintenance suggested burst rates of 100 and 70 bursts per 1000 km for two of the Dutch companies between 1996 and 2000. Survey work by the American Water Works Association in 1996 suggested an average burst rate in the US of 148 per 1000 km.

4.8 Financial performance

The financial performance of an organisation is important whatever its regulatory framework. In most cases companies need to borrow money from the relevant debt markets to finance capital investment. They therefore need to convince lenders that they can meet payments. Table 53 (page 70) sets out some key financial ratios, which provide an indication of a company's ability to finance its functions.

Australian companies prepare their financial accounts on a historic cost basis but, as in England and Wales, they also provide details on a current cost basis for comparative purposes. The Netherlands and US companies' accounts are prepared on a historic cost basis only with assets valued with reference to the purchase price, regardless of the passing of time and the level of associated inflation. This differing approach is reflected in depreciation.

Approaches to valuing capital bases vary. In England and Wales, values for capital employed are based on an initial value at privatisation, adjusted for subsequent depreciation and new investment. Companies also report MEA values: the estimated cost of assets of equivalent productive capability to satisfy the remaining service potential of the asset, less accumulated current cost depreciation. Australian companies report the current replacement cost of the asset in a similar way to the companies in England and Wales. Companies in the US and the Netherlands report overall capital employed.

Estimates of the capital base vary markedly between countries. US companies quote a value per property for the water service only, which is around the level of the combined water and sewerage service for England and Wales. Australian estimates of current replacement costs per property served are much lower than in England and Wales. The differences may reflect different accounting approaches and assumptions, as well as the lower value of assets per property required to serve the urban areas covered by WSAA*facts*. Estimates of capital employed by companies in the Netherlands are also lower than England and Wales.

Table 53 Financial indicators

	Net replacement cost (MEA) (£/prop) water and sewerage	Capital employed water service (£/prop)	Return on capital (MEA)(%)	Return on capital (estimated capital employed) (%)	Operating margin (%)	Dividend + interest / capital employed (%)	Current cost dividend cover	Current cost interest cover	Historic cost dividend cover	Historic cost interest cover
E&W average	8860*	1360* (Water and sewerage service)	1.0	6.6	30	5.9	1.2	2.2	1.6	2.7
E&W range	6886-11507*	993-2103*	0.8-2.5	5.9-11.7	18-41	2.7-21.6	0.3-1.6	1.1-9.7	0.5-2.1	1.3-13.7
BRB	4147 (5486)		4.6		52	1.8	3.6	4.8		
CW	1301 (1720)		8.7		45	7.1	1.0	7.0		
GC	2229 (2948)		7.4		56	6.8	0.9	6.6		
SAW	3106 (4109)		3.0		31	4.2	0.1	2.2		
SEW	1079 (1428)		4.7		26	5.8	0.5	3.3		
WC	4308 (5699)		3.5		44	3.1	0.5	11.0		
YVW	1160 (1534)		2.9		17	5.0	0.04	1.6		
DZH		500 (568)		7.8	30	3.8				2.1
AMS		430 (489)		3.5	12	3.4				1.0
NHO		660 (751)		5.3	23	3.5				1.5
VIT		433 (492)		3.3	12	3.2				1.0
WML		656 (746)		4.2	21	4.1				1.0
WMN		300 (342)		4.9	14	3.5				1.4
BRA		345 (392)		8.5	24	3.7				2.3
CAL		958 (885)		6.6	17	5.4			0.9	2.4
IND		1,393 (1,285)		8.4	38	5.8			1.0	2.7
MA		1,036 (956)		8.6	35	5.0			1.4	3.5
NJ		1,767 (1,631)		12.7	47	5.8			1.4	4.3
PEN		1,834 (1,692)		10.0	47	6.2			1.3	2.8
PH		1,768 (1,632)		11.2	52	5.0			2.2	3.7
SJ		1,134 (1,047)		8.3	22	4.6			1.4	4.1
SC		1,463 (1,350)		12.2	36	5.4			1.7	4.4
ET		2,361 (2,180)		9.6	48	3.2			1.7	22.7

*Water and sewerage companies only.

The use of historic and current cost accounting can vary between companies. For simplicity we have assumed a consistent approach within a country.

Figures in brackets are based on purchasing power parity. Australian data is for 2000-01. Net replacement cost data is indexed up using Australian 2002 inflation rate and converted into sterling using 2002 exchange or PPP rate.

The government owned enterprises in the Netherlands generally have lower operating margins and returns on capital than the privately owned companies in England and Wales. Generally public sector companies can support much lower levels of interest cover than private companies because of the lower risks associated with lending to the public sector. Evidence from the publicly-owned companies in the Netherlands appears to verify this. However, the publicly owned Australian companies show higher operating margins than in England and Wales, suggesting that there may be subsidies built into the Dutch charging system.

Australian companies' return on capital, based on the MEA, appears to be higher than England and Wales. This may reflect differences in assessing the MEA value and differences in the basis on which revenues are set – England and Wales for example earn a return based on the capital value rather than the MEA.

Conversely, operating margins and returns on capital are generally higher in the US than in England and Wales, despite US companies' relatively high estimates of their capital bases.

The levels of interest cover and cash indicators in England and Wales have decreased in recent years as companies have increased borrowing to fund their capital expenditure programmes. Levels of interest cover relative to England and Wales vary considerably between countries. Generally, they are higher in Australia and lower in the Netherlands, while in the US they are at around the same level as England and Wales.

Dividend cover provides a measure of the long-term sustainability of dividend payments and the ability of the companies to raise additional equity capital. The level of dividends paid by companies in the US, relative to profit levels, are roughly the same as England and Wales. Levels in Australia are generally lower than in England and Wales, as their government owners do not demand such high returns on their capital as private investors. The Dutch companies do not pay dividends.

Key conclusions

- Financial indicators across countries appear to be broadly similar to England and Wales, though there is significant variation between individual companies within each country.
- Methodologies used to estimate the capital base used when setting price limits vary between countries, but the levels of return on each of these are broadly similar.
- Accounting practices and assumptions between countries are likely to distort the ability to make direct comparisons.

5. Index of country references

Appendix 1 Data comparability

Sydney Water
Sydney Water submits its data to us as a reduced version June return. The confidence grade system used in June return submissions establishes a basis for companies to express their view on data reliability and accuracy. The confidence grade is a combination of reliability and accuracy bands (see appendix 4). In most cases, confidence grades of A2, A3, B2 or better are expected. Where confidence grades are below these levels, companies in England and Wales are expected to report and justify action plans for improvement.

Sydney Water's confidence grades are generally within those that companies in England and Wales achieve with one or two exceptions. Sydney Water's confidence grades are broadly similar to last year with a limited improvement in some areas. Water related data has generally higher grades assigned than sewerage.

This year Sydney Water employed a reporter to audit and challenge the data. Reporters bring a number of benefits to this process. They confirm the confidence grades that the company assigns to data and provide a valuable sense check on both data calculation and collation. Their involvement provides a useful source of comparison between the two regimes and additional comfort on comparability.

Other companies

The data in this report is based on trade association publications, annual reports and accounts. Consequently information might not be on a comparable basis to that set out in the June return that the Reporters audit.

Operating expenditure data
Operating expenditure may include work on capital equipment that a company's employees may undertake. We exclude such expenditure from our definitions and have, therefore, adjusted the Netherlands' figures.

Costs associated with providing services other than the provision of water and sewerage supply to third parties may be included. These are separately identified in June return tables. Costs associated with bulk supply arrangements may also be included which may impact on unit cost calculations if costs are associated with supplying properties outside the company's area. Although included in England and Wales data, bulk supplies are more common in other countries.

Contracting out increases operating costs at the expense of capital maintenance and the return on capital component. This is particularly the case for Build, Own and Operate (BOO) and/or Private Finance Initiative (PFI) arrangements for treatment works. This applies equally to comparisons between companies in England and Wales.

Capital maintenance charges data
Differing accounting standards affect the level of the depreciation charge. Current cost accounts tend to increase the capital maintenance charge, but may be a more accurate way of recording the depreciation requirement because historic cost depreciation fails to take account of inflation.

Return on capital data
Because the return on capital in this report represents a residual it is important that turnover is collected on a comparable basis. Turnover figures sometimes include income from the treatment of capital expenditure items, new connections and possibly unread meters. The Netherlands' accounts include some capital items that companies' employees produce. These appear as both a turnover item (for which the company charges itself) and an operating cost item. Adjustments have been made to remove this where possible.

In Australia, revenue for new connections is a turnover item. Other countries treat this item as negative capital expenditure. Some adjustments have been made, but in others turnover and, as a result, the return on capital item may be overstated.

Water delivered data
The water balance is important both in itself and for comparing costs. In England and Wales each component, including leakage, is estimated separately and then checked against top down estimates. Other countries, with extensive metering, take a different approach with one component (usually leakage) estimated as a residual. This has the risk that inaccuracies in other areas (e.g. meter under-registration or supply pipe leakage) may accumulate in the leakage estimate.

Other, more pressing circumstances may influence leakage levels. For example, there may be a need to maintain a certain pressure level or resource position.

Properties served data
Differences in interpretation affects unit cost comparisons. How a company treats blocks of flats and other, multi-household, buildings is particularly important especially for the Netherlands where there is a greater preponderance of such properties. Our June return guidance states that companies treat such properties as non-households. Other countries may regard such properties as a single connection (resulting in very high per property usage) or as multiple households.

Financial indicators data

The extent to which companies finance their assets rather than just operate them, will affect the operating margin that a company requires. A low capital value allows a lower operating margin to be sufficient.

The other main difficulty is exceptional and atypical earnings, such as profits made on the disposal of land or other assets. These have been removed from the analysis wherever possible.

Appendix 2 DG indicators

DG2 Inadequate pressure
The number of connected properties that receive during the year, and are likely to continue to receive, pressure below the reference level. The reference level is ten metres head of pressure at a boundary stop tap with a flow of nine litres per minute. This standard applies when demand for water is normal.

There are exceptions to this standard that allow for circumstances beyond a company's control. Customers' own plumbing, for example, may cause pressure problems. In reality, it is impractical to measure the pressure and flow at the boundary of every customer's property. Companies may therefore report against an alternative reference level of 15 metres head of pressure in the distribution main supplying the property.

Companies must maintain registers identifying those properties at risk of receiving low pressure.

DG3 Supply interruptions
The number of properties experiencing interruptions to their supply of greater than 3, 6, 12 and 24 hours which are the responsibility of the water company, but are neither planned nor warned. Companies can exclude incidents of supply interruptions that are:

- caused by a third party; or
- the result of planned maintenance work where customers were warned in advance.

Companies must maintain registers that identify those properties that supply interruptions affect.

DG5 Flooding from sewers
Measures numbers of properties experiencing and at risk of internal sewage flooding. Companies assess the risk of flooding due to sewer capacity using two categories of risk:

- more than once in 10 years; and
- twice in 10 years.

Companies also report on sewer flooding incidents in two causal categories – overloaded sewers, and other causes (temporary problems).

DG6 Billing contacts
The total number of written and telephone billing contacts a company receives and the number dealt with in 5, 10, 20 and more than 20 working days. A billing contact is

any enquiry regarding a bill that is not a complaint (see DG7). Examples include an account query, change of address or request for alternative payment arrangements.

DG7 Written complaints
The total number of written complaints a company receives and the number dealt with in 5, 10, 20 and more than 20 working days.

A written complaint is any letter, however mildly worded, that draws attention to a service or action of the company or its representatives, which falls short of what the correspondent expects. The total must include all complaints, including those about general levels of charging or other policy issues, and complaints that are not justified.

DG8 Bills for metered customers
Percentage of metered customers who receive at least one bill during the year based on a meter reading undertaken by the water company or provided to the company by the customer (either in response to an estimated bill or as a result of a request to provide a meter reading).

DG9 Ease of telephone contact
The ease with which customers can contact their local water company by telephone. This monitors incoming telephone traffic on principal, advertised customer contact numbers that are linked to, for example, the customer service department or accounts section or the main switchboard. The indicator measures:

- the total number of calls a company receives on customer contact lines;
- the total number of calls the company answers;
- the number of calls the company answers within two time bands – under 30 seconds and over 30 seconds;
- the average time taken to answer calls; and
- all lines busy – that is, inability to make contact with the company.

Company performance (table 54) is set within three bands - good, acceptable, and needs improvement (for absolute assessments) or above average, average and below average (for comparative assessments). Regulatory action may be taken against those companies recording a needs improvement or below average assessment.

Table 54 Criteria for DG indicators

Indicator	Primary criteria	Secondary criteria
DG2	**Above average:** >50% better than the industry mean **Average:** +/- 50% of industry mean **Below average:** >50% worse than the industry mean	
DG3	Performance score (PS) based on percentage of connected properties subject to supply interruptions of >6 hours, >12 hours and >24 hours. PS calculated as (>6 hours x 1) + (>12 hours x 1) + (>24 hours x 2) **Good:** <0.5 **Acceptable:** 0.5-2.0 **Needs improvement:** >2.0	
DG5	**Above average:** >25% better than the industry mean **Average:** +/- 25% of industry mean **Below average:** > 25% worse than the industry mean	
DG6	% of billing contacts answered within five working days **Good:** >95% **Acceptable:** 90-95% **Needs improvement:** <90%	% billing contacts answered in over 10 working days and <1.5% and <3%
DG7	% of written complaints answered within10 working days **Good:** >98% **Acceptable:** 95-98% **Needs improvement:** <95%	% written complaints answered in over 20 working days and <1% and <1% or >1%
DG8	% of metered customers that receive a bill at least once a year based on a company or customer reading **Good:** >99.5% **Acceptable:** 98-99.5% **Needs improvement:** <98%	% unread for two years by the company and <0.15%
DG9	% of received calls answered within 30 seconds **Acceptable:** >=86% **Needs improvement:** <86%	

Appendix 3 Water econometric models

Table 55 summarises the four water models for operating costs. The overall water service operating efficiency assessment combines the results of the water service models including any adjustment for special factors.

Table 55 Actual operating expenditure relative to that predicted by models

Model	Explanatory factors
Resources & treatment	Population, no. of sources, Distribution Input, proportion of supplies from rivers
Distribution	Population, proportion of total mains length with diameter >300mm
Business activities	No. of billed properties
Power	DI, Average pumping head

Water resources and treatment
The explanatory variables of population, number of sources, distribution input and the proportion of supplies from rivers are taken into account. These ensure that efficiency bands take into account economies of scale at source level (costs will be lower if fewer sources are used) and the difficulty of treatment (river supplies will generally be more expensive to treat).

Water distribution
The proportion of large mains to small mains is the most important cost driver in this model. Repairs, maintenance and inspection on large mains incur much greater costs than on small mains.

Water power model
For most companies, power expenditure is almost entirely for pumping, although there are some water treatment processes which are energy intensive. The model takes the effects of terrain into account (companies in hilly areas will require more power to move water around), and the significant economies of scale associated with high power consumption.

Business activities model
Business activities include customer services and scientific services and the charge for doubtful debts. The model takes into account the economies of scale that are associated with high volume billing and customer service activities.

Table 56 summarises the four water models for capital maintenance.

Table 56 Actual capital maintenance expenditure relative to that predicted by models

Model	Explanatory variables
Water resources and treatment	Connected properties,
Distribution infrastructure	Length of main, burst rate, proportion of communication pipes that are lead
Distribution non-infrastructure	Pumping station capacity, service reservoir and non-infrastructure water tower capacity
Management and general	Billed properties, proportion of billed properties that are non-household

Water resources and treatment

Water resources and treatment comparison is unit cost based, using connected properties.

Water distribution infrastructure

The burst rate of mains is the most important cost driver in this model. Companies with higher burst rates might expect to incur higher costs in maintaining their distribution networks. A second explanatory variable, the proportion of communication pipes that are lead, helps to explain the additional costs associated with the opportunistic replacement of lead communication pipes when replacing mains.

Water distribution non-infrastructure

This model takes account of water tower and service reservoir capacity. The ratio of storage capacity to pumping station capacity helps to explain the higher costs of companies with relatively greater storage capacity.

Water management and general

The key cost driver in this model is the proportion of billed properties that are non-household. The model explains the higher unit costs that companies incur when faced with a greater number of business customers. Metering and billing requirements will be higher.

Adding together and comparing the results of the models provide an overview of each company's overall water service efficiency. As with operating expenditure, company-specific factors are taken into account.

Operating efficiency models were re-estimated using 2000-01 data. The capital maintenance models were also updated to incorporate a seventh year of expenditure data and to take into account different accounting practices between companies.

Even allowing for the explanatory factors taken into account in the econometric modelling, the operating costs of the least efficient companies are considerably higher than the most efficient companies. The least efficient companies in band E would need to reduce water service operating costs by about 40% to move to band A. For capital maintenance a company in band E would need to reduce its costs by about 35% to move to band A.

Within these operating and capital maintenance efficiency bands, the level of service provided by each company varies. One way to assess performance is to compare the efficiency results with those in the corresponding year of our publication 'Levels of service for the water industry in England and Wales'. There is evidence that good standards of customer service do not necessarily require higher costs.

Special factors

The econometric models take into account factors that describe the size or operating environment of different companies. But, there are other factors that are company specific and cannot be incorporated into an econometric model. Such company-specific special factors typically lead to higher operating or capital maintenance costs that are outside management control. Legal requirements or circumstances peculiar to an individual company's area of operation are examples of such special factors.

Companies submitted claims, providing verifiable costs, for special factors individually as part of the 1999 periodic review process. We reviewed these claims and, where justified, made adjustments to the relative efficiency assessments. These claims were resubmitted in 2000-01. The most significant types of special factors allowed in the assessments of relative efficiency were:

- unusual water resources and treatment costs;
- unusual sludge and sewage treatment costs;
- legal requirements;
- high level of meter penetration;
- costs of operating in London and the surrounding area;
- scale of sewerage service business activities;
- industrial customers;
- summer peak demand; and
- regional power costs.

Appendix 4 Information quality

Companies must provide reliable and accurate information if meaningful comparative assessments are to be made. The quality of information has improved markedly in recent years but we continue to work with companies and Reporters to improve the consistency and comparability of information. We wish to be able to differentiate between companies who achieve a high level of performance, based on sound information, and those companies whose performance is based on less reliable data.

The reliability and accuracy of information submitted to Ofwat is assigned a confidence grade. These have two parts: a reliability band reflecting how companies gather data and a number indicating its likely range of error.

Data reliability bands

A Sound textual records. Procedures, investigations or analysis properly documented and recognised as the best method of assessment.

B As A, but with minor shortcomings. Examples include old assessment, some missing documentation, some reliance on unconfirmed reports, some use of extrapolation.

C Extrapolation from limited samples for which grade A or B data is available.

D Unconfirmed verbal reports, cursory inspections or analysis.

Accuracy bands

1 ±1%
2 ±5%
3 ±10%
4 ±25%
5 ±50%
6 ±100%
X Very small numbers where accuracy cannot be calculated or the error could be more than 100%.

Information for some measures of service is more difficult to obtain than for others. Thus confidence grades might appear to be much better for some measures compared to others. We expect companies to achieve a high degree of accuracy (B2 or better in most cases) for measures which involve simple tasks such as counting the time taken to respond to letters. On the other hand it would be unreasonable to expect the same level of accuracy for those measures requiring detailed knowledge of the sewerage or water distribution systems. Generally, we would consider a company to be doing well if it provides reliable information (B) to an accuracy of 10% or better (B3).