

Public Utilities Regulatory Commission
Review of the performance of Ghana Water
Company Limited 1998-2003
February 2005

Public Utilities Regulatory Commission
Review of the performance of GWCL 1998-2003

February 2005

Contents

Chairman's Message	1
1 Introduction.....	2
2 Background	3
3 Key findings of this review.....	4
4 Proposed regulatory action	6
5 Detailed analysis	7
6 Water quality.	16
7 Complaint handling.....	19
8 Performance of other water utilities.....	20
Appendix 1 – Comments from GWCL and subsequent PURC responses.....	21
Appendix 2 – GWCL response attachments	30

Tables

Table 1 – Performance data.....	8
Table 2 - Water distribution water quality percentage compliance.....	17
Table 3 - Complaints analysis (Jan 2003 – Jun 2004)	19
Table 4 - Comparative performance	20

Figures

Figure 1 – Annual water production and paid for water (Mm ³).....	10
Figure 2 - Annual water production and paid for water (%).....	10
Figure 3 – Billing and collection performance (Mcedis, real end 2003 prices).....	11
Figure 4 - Billing and collection performance (%).....	11
Figure 5 – Real average tariff (end 2003 prices).....	12
Figure 6 – Direct unit operating costs excluding energy	12
Figure 7 – Real energy cost per unit of water produced and sold (cedis/m ³).....	13
Figure 8 – Real cost per unit of paid for water (end 2003 prices)	13
Figure 9 – Real total cost analysis (end 2003 prices)	14
Figure 10 – Real cost / income analysis (end 2003 prices).....	14

CHAIRMAN'S MESSAGE



To be inserted

A handwritten signature in black ink, appearing to read 'Kwame Pianim'.

Kwame Pianim
CHAIRMAN

Public Utilities Regulatory Commission
February 2005

1 INTRODUCTION

- 1.1 As a key part in the restructuring of the utilities sector in Ghana the Public Utilities Regulatory Commission (PURC) was established by Act 538 of the Parliament of the Republic of Ghana to regulate and oversee the provision of utility services to consumers by public utilities.
- 1.2 As a further part of the restructuring process The Ghana Water Company Ltd. (GWCL) was created from the former Ghana Water and Sewage Corporation to provide water supply services to consumers in the urban areas in Ghana.
- 1.3 PURC therefore has a statutory duty to regulate and oversee the provision of water supplies by GWCL.
- 1.4 The aim of restructuring is to improve the performance of the sector in terms of its economic efficiency, through cost reduction and service improvement. These should be achieved continuously over time.
- 1.5 Since 1998 PURC has monitored the costs and performance of GWCL. Each year, when setting water rates, it has published performance targets which have been agreed with GWCL, aimed at improving its performance. For instance, if leakage is reduced more water can be delivered to consumers. If collection of income is improved then more money is available to invest in new and improved services.
- 1.6 In July 2002 PURC agreed to a significant increase in water rates which would be adjusted in line with inflation to maintain their real value, provided that service targets were met. At that time PURC also confirmed its intention to undertake a major review of water rates at the end of 2004. This will now take place early in 2005.
- 1.7 This report traces the trend in the performance of GWCL over the period 1998-2003 inclusive. 1998 is used as the base year for the following five years, the period over which PURC has regulated GWCL.
- 1.8 It is published in accord with PURC's policy to be open and transparent in carrying out its duties. Prior to publication of this report an earlier draft was passed to GWCL for its comments. These comments have been appended to this report together with PURC responses. As a result of the comments from GWCL several items in the report have been amended from the original draft.
- 1.9 The report will also provide a focus for analysis of the GWCL business plan submission to PURC, which will initiate the water rate setting process. It should also assist GWCL in prioritising its operational maintenance and investment programmes.
- 1.10 Although the review covers the five years since the establishment of PURC, the costs and performance for the two years prior to the base year are shown in the data table for purposes of information only.

2 BACKGROUND

- 2.1 The functions of PURC are inter-alia to:
- examine and approve rates chargeable for provision of utility services;
 - monitor standards of performance for provision of services;
 - initiate and conduct investigations into standards of quality of service given to customers;
 - conduct studies relating to the economy and efficiency of public utilities.
- 2.2 Since its formation PURC has worked with GWCL to establish performance targets. These would, in return for tariff increases (aimed at achieving full recovery of efficient operating and capital maintenance costs, and providing a small (< 1%) return on capital), be achieved incrementally through year on year efficiency improvements. The performance targets concentrate on reducing leakage and the number of illegal connections, and on improving billing/collection efficiency, water quality and complaints handling.
- 2.3 The objective of PURC is to provide GWCL with achievable aims, which are based on the performance of similar water utilities in the region, and to create a framework within which management can prioritise its tasks and incentivise its employees.
- 2.4 It was projected that GWCL could over a period of five years reduce losses from leakage and illegal connections from 50% to 40% of water produced and increase the collection of money from 77% to 95% of charges billed. Had PSP taken place in the form of enhanced lease contracts, it was projected that losses from leakage and illegal connections could have reduced to 25% of water produced.
- 2.5 If those targets were met the resultant outcome would be that GWCL would significantly increase its income from water charges with no increase in tariff. It is clearly more economically efficient to convert a higher proportion of water produced into income than to produce more water.
- 2.6 In 2002 PURC instituted a tariff determination which included an automatic adjustment of tariffs each quarter to protect the financial viability of GWCL by maintaining full recovery of its operation and maintenance costs in US\$ until the end of 2004. At that time it was confirmed that PURC would carry out a major tariff review at the end of this period.
- 2.7 GWCL has for a number of years provided quarterly information to PURC covering its costs and performance. PURC reviews this information internally and with GWCL but does not publish its conclusions. This report uses the information supplied by GWCL both in its quarterly reports and in its annual report and accounts. Inflation data has been obtained from the Ghana Statistical Service (GSS). In future years PURC intends to publish its assessment of the performance of GWCL on an annual basis rather than five-yearly.

3 KEY FINDINGS OF THIS REVIEW

- 3.1 The volume of water produced has increased by 21.6 Mm³ (or 11.8%) from 183.6 Mm³ in 1998 to 205.2 Mm³ in 2003.
- 3.2 Over that time the volume of water sold has remained at best static. Sales have declined from 91.53 Mm³ (49.85% of production) in 1998 to 88.13 Mm³ (42.95% of production) in 2003 despite an increase in capacity due to the Weija expansion in late 2001. This highlights that the main priorities for investment must be leakage control and the repair of infrastructure, not further water production.
- 3.3 The losses between source and tap have increased by 25.0 Mm³ from 92.07 Mm³ in 1998 to 117.07 Mm³.
- 3.4 The 21.6 Mm³ extra water produced has been more than taken up by higher losses of 25.0 Mm³.
- 3.5 The proportion of bills collected has not improved over the review period. The chief reason for this has been a reduction in governmental payments from 2002. 75.8% of bills issued were collected in 1998 and although this improved to 87.8% in 2000 it declined to 75.5% in 2003. The collection rate for non-governmental customers dropped sharply after the tariff increase in 2002, but has now recovered to a level close to the 2001 performance (93%).
- 3.6 This means that the headline efficiency of GWCL **expressed as the percentage of water produced which is converted into income collected** has reduced from 37.8% in 1998 to 32.4% in 2003, with a low point in 2002 of 30.7%. The best performance of 42.7% was achieved in 2000. Although government now makes payments using an off-set mechanism, it would be preferable if it paid bills on time.
- 3.7 Over the same period the average tariff charged has increased in real terms from 2 284 cedis per m³ to 4 813 cedis per m³ (based on end 2003 prices) or a doubling of the average tariff. The surprising feature of the data is that headline efficiency peaked in 2000, the same year that the real terms average tariff was at its lowest. It is clear that these tariff increases have not resulted in higher efficiency.
- 3.8 The real increase in average tariff is a result of the determination of PURC to place GWCL on a firm financial base. The PURC policy is to fully recover, in the water tariff, the efficient costs of operating and maintaining the assets of GWCL. The company undertook to make significant progress towards achieving the operational targets of 60% of water produced to be delivered to consumers and billed, and 95% of bills collected as income.
- 3.9 If GWCL had fulfilled its performance improvement undertaking, its headline efficiency would have improved to 57% with a resulting significant increase in income.
- 3.10 In 2000 GWCL achieved a minimum direct unit operating cost excluding energy, of water sold and paid for (expressed in real terms) of 1 837cedis/m³. There was deterioration in performance in each of the following years, leading to a much higher unit cost of 2 961cedis/m³ by 2003.
- 3.11 The quality of water supplied “at the consumer’s tap” is an important measure of performance, and one in which PURC is taking a keen interest in view of the continuing poor performance of GWCL in maintaining satisfactory water quality. Over the five years of this report only Brong Ahafo and Eastern Regions of GWCL have performed satisfactorily. PURC has promoted an improvement process

- known as “Drinking Water Quality Planning” and is leading a pilot project in a key supply system (Weija), to demonstrate how it can be introduced in all GWCL supply systems.
- 3.12 Consumer service performance is measured for the purpose of this report by complaints made to PURC. Any consumer who is not satisfied with the response of GWCL under the complaints procedure can refer the case to PURC. There is a statutory process, which PURC has to follow to try and achieve closure. The record of PURC in achieving a satisfactory outcome for consumers leaves room for improvement and PURC will address its own shortcomings as well as continuing to monitor GWCL complaints handling performance. In future years GWCL will provide data to PURC on the total number of complaints it receives and responds to. This will provide a more meaningful picture on levels of dissatisfaction with water service.
- 3.13 Data showing the headline efficiency of a number of other utilities and country water supply sectors, both public and privately operated, is provided in Table 4. The 2003 data from GWCL is also shown in the table for ease of comparison. There is considerable scope for GWCL to improve its headline efficiency by reducing leakage, finding and stopping illegal connections, and improving collection of water bills.

4 PROPOSED REGULATORY ACTION

- 4.1 PURC is arranging to meet with the Board and Directors of GWCL and with its shareholders, including the Minister of Finance and Minister of Works and Housing, to present the review. It will seek their collaboration in meeting the challenges faced by the company to ensure improved performance in the delivery of safe drinking water.
- 4.2 The major tariff review that will be carried out early in 2005, will use the cost and performance data in this report as a basis for projecting cost and performance improvements over the next five year period.

5 DETAILED ANALYSIS

- 5.1 Table 1 sets out the data taken from the Annual Reports of GWCL, year by year in both nominal and real terms. The real terms data has been derived using end year consumer price index (CPI). For example in 2003 the nominal tariff has been derived from water supplied and billed month by month. The real terms tariff has brought the value to 31.12.03 price levels.
- 5.2 Figure 1 and Figure 2 show the annual water production and the water sold in Mm³ and water sold as a percentage of water produced, respectively. The difference represents the volume of water lost through leakage, illegal connections or used for legitimate purposes such as fire fighting, but not able to be billed to the user. Water losses in a very efficient system run at around 15%. In a normally efficient system in West Africa, such as those which have been operated by private companies, water losses are managed to less than 25%. For example, in Senegal the reported figure is 17%. In GWCL losses are regularly in excess of 50% and in 2002 reached 58.54% of the water produced. There is clearly much scope for improvement.
- 5.3 Figure 1 and Figure 2 also show the year by year difference between the annual water produced, sold and paid for in Mm³ and as a percentage of water produced. This percentage is referred to above in the key findings as “headline efficiency”. It peaks in the year 2000 at 42.7%, but there was a low of 30.7% in 2002.
- 5.4 These results compare with a “normally efficient” African water service provider, for example the three Water Boards in Malawi, which display headline efficiency figures of 65.4%, 68.6% and 78%. Further comparisons are provided in Table 4 - Comparative performance.
- 5.5 Figure 3 and Figure 4 show the billing and collection performance year by year in real and percentage terms. Over the review period the year 2000 stands out as by far the best performance. 87.8% of the water billed was collected in income. The difference between billing and collection represents the level of collection efficiency. In an efficient system over 95% of the water billed will be collected as income. In a normally efficient system in West Africa, collection efficiency is managed to a level exceeding 90%. GWCL almost achieved that level in 2000 and should be able to repeat that level of performance with diligent application.
- 5.6 Figure 5 shows the average annual tariff in real terms (end 2003 prices). In 2000 the real terms tariff decreased to 2 614c/m³ from 2 668c/m³ in 1999. The subsequent increases leading to an average tariff of 4 813c/m³ in 2003 have not resulted in performance improvements. Indeed headline efficiency has decreased over that time from 42.7% to 32.4%.
- 5.7 Figure 6 shows the direct operating costs, excluding energy per unit of water paid for, expressed in real terms in cedis/m³. From a minimum cost of 1 837c/m³ in 2000 there has been an increase to 2 961c/m³ in 2003, largely attributable to declining revenue collection performance. This is in stark contrast to the decrease in the real terms tariff which occurred in 2000 and the subsequent increases referred to in Section 5.6.
- 5.8 Figure 7 shows the comparison of the unit cost of energy used per m³ of water produced and water paid for, both expressed in real terms in cedis/m³. It illustrates the issue of how best to build energy costs into water rates. There has been a dramatic divergence in these two unit costs since 2000 when they were at 404 cedis/m³ and 948 cedis/m³ respectively. In 2003 the comparable costs were 699 cedis/m³ and 2 155 cedis/m³. This divergence is primarily due to the widening gap between water production and water sold and paid for.

Table 1 – Performance data

Category	Reference	Description	Unit	Formula	1996	1997	1998	1999	2000	2001	2002	2003
Base operating statistics	1	Water Produced	Mm3	input	191.00	186.00	183.60	194.56	184.95	188.25	205.00	205.19
	2	Water sold	Mm3	input	82.00	87.00	91.53	87.91	89.97	89.97	85.00	88.13
	3	Revenue water	%	2/1	42.93%	46.77%	49.85%	45.18%	48.65%	47.79%	41.46%	42.95%
	4	Billing (nominal)	Mcedis	input	37 187	39 489	82 714	106 881	125 789	212 090	303 096	403 992
	4a	Billing (real)	Mcedis	4*27	160 613	123 239	209 062	233 632	235 206	310 979	355 889	424 192
	5	Collection (nominal)	Mcedis	input	36 443	34 176	62 721	86 116	110 382	166 448	224 412	304 949
	5a	Collection (real)	Mcedis	5*27	157 400	106 658	158 529	188 242	206 397	244 056	263 500	320 196
6	Average tariff	cedis per m3	4/2	454	454	904	1216	1398	2357	3566	4584	
6a	Average tariff (real)	cedis per m3	6*27	1 959	1 417	2 284	2 658	2 614	3 456	4 187	4 813	
Financial data	7	Direct operating cost (including energy) (nominal)	Mcedis	input	37 196	48 057	76 347	111 439	117 579	200 428	260 905	324 119
	7a	Direct operating cost (including energy) (real)	Mcedis	7*27	160 652	149 978	192 970	243 595	219 854	293 880	306 350	340 325
	8	Energy (electricity and fuel) (nominal)	Mcedis	input	8 743	12 010	22 211	39 051	40 009	66 027	106 827	136 504
	8a	Energy (electricity and fuel) (real)	Mcedis	8*27	37 762	37 481	56 139	85 362	74 810	96 813	125 434	143 329
	9	Depreciation (nominal)	Mcedis	input	13 334	12 565	0	16 255	87 431	80 335	68 809	68 809
	9a	Depreciation (real)	Mcedis	9*27	57 591	39 213	0	35 532	163 482	117 792	80 794	72 249
	10	Total operating cost (nominal)	Mcedis	7+9	50 530	60 622	76 347	127 694	205 010	280 763	329 714	392 928
10a	Total operatingcost (real)	Mcedis	10*27	218 243	189 192	192 970	279 127	383 336	411 672	387 144	412 574	
Direct operating unit cost analysis including energy	11	Direct unit operating cost of water produced (nominal)	cedis per m3	7/1	195	258	416	573	636	1 065	1 273	1 580
	11a	Direct unit operating cost of water produced (real)	cedis per m3	11*27	841	806	1 051	1 252	1 189	1 561	1 494	1 659
	12	Direct unit operating cost of water sold (nominal)	cedis per m3	7/2	454	552	834	1 268	1 307	2 228	3 069	3 678
	12a	Direct unit operating cost of water sold (real)	cedis per m3	12*27	1 959	1 724	2 108	2 771	2 444	3 266	3 604	3 862
	13	Direct unit operating cost of paid for water (nominal)	cedis per m3	7/(2*5/4)	463	638	1 100	1 573	1 489	2 839	4 146	4 872
	13a	Direct unit operating cost of paid for water (real)	cedis per m3	13*27	1 999	1 992	2 780	3 439	2 785	4 162	4 868	5 116
Energy analysis	14	Direct unit energy cost of water produced (nominal)	cedis per m3	8/1	46	65	121	201	216	351	521	665
	14a	Direct unit energy cost of water produced (real)	cedis per m3	14*27	198	202	306	439	404	514	612	699
	15	Direct unit energy cost of paid for water (nominal)	cedis per m3	8/2	109	160	320	551	507	935	1 697	2 052
15a	Direct unit energy cost of paid for water (real)	cedis per m3	15*27	470	498	809	1 205	948	1 371	1 993	2 155	
Direct operating unit cost analysis excluding energy	16	Direct unit operating cost of water produced (nominal)	cedis per m3	(7-8)/1	149	194	295	372	419	714	752	914
	16a	Direct unit operating cost of water produced (real)	cedis per m3	16*27	643	605	745	813	784	1 047	883	960
	17	Direct unit operating cost of water sold (nominal)	cedis per m3	(7-8)/2	347	414	591	823	862	1 494	1 813	2 129
	17a	Direct unit operating cost of water sold (real)	cedis per m3	17*27	1 489	1 293	1 495	1 800	1 612	2 190	2 128	2 235
	18	Direct unit operating cost of paid for water (nominal)	cedis per m3	(7-8)/(2*5/4)	354	479	780	1 022	983	1 903	2 448	2 820
18a	Direct unit operating cost of paid for water (real)	cedis per m3	18*27	1 529	1 494	1 971	2 234	1 837	2 791	2 875	2 961	

Category	Reference	Description	Unit	Formula	1996	1997	1998	1999	2000	2001	2002	2003
Total operating unit cost analysis including energy	19	Unit cost of water produced (nominal)	cedis per m3	10/1	265	326	416	656	1 108	1 491	1 608	1 915
	19a	Unit cost of water produced (real)	cedis per m3	19 *27	1 143	1 017	1 051	1 435	2 073	2 187	1 889	2 011
	20	Unit cost of water sold (nominal)	cedis per m3	10/2	616	697	834	1 453	2 279	3 121	3 879	4 459
	20a	Unit cost of water sold (real)	cedis per m3	20*27	2 661	2 175	2 108	3 175	4 261	4 576	4 555	4 681
	21	Unit cost of paid for water (nominal)	cedis per m3	10/(2*5/4)	629	805	1 100	1 803	2 597	3 976	5 239	5 907
21a	Unit cost of paid for water (real)	cedis per m3	21*27	2 716	2 513	2 780	3 941	4 855	5 830	6 152	6 202	
Performance ratios	22	Ratio of UfW to production	%	(1-2)/1	57.07%	53.23%	50.15%	54.82%	51.35%	52.21%	58.54%	57.05%
	23	Ratio of collection to billing	%	5/4	98.0%	86.5%	75.8%	80.6%	87.8%	78.5%	74.0%	75.5%
	24	Ratio of collection to production	%	(5/4)*(2/1)	42.1%	40.5%	37.8%	36.4%	42.7%	37.5%	30.7%	32.4%
Inflation data	25	CPI	Index	input		100.00	118.24	133.24	162.62	219.39	248.98	
	26	Annual inflation			46.6%	27.9%	18.2%	12.7%	22.1%	34.9%	13.5%	10.0%
	27	2003 price conversion factor (from mid year to end 2003)			4.319	3.121	2.528	2.186	1.870	1.466	1.174	1.050

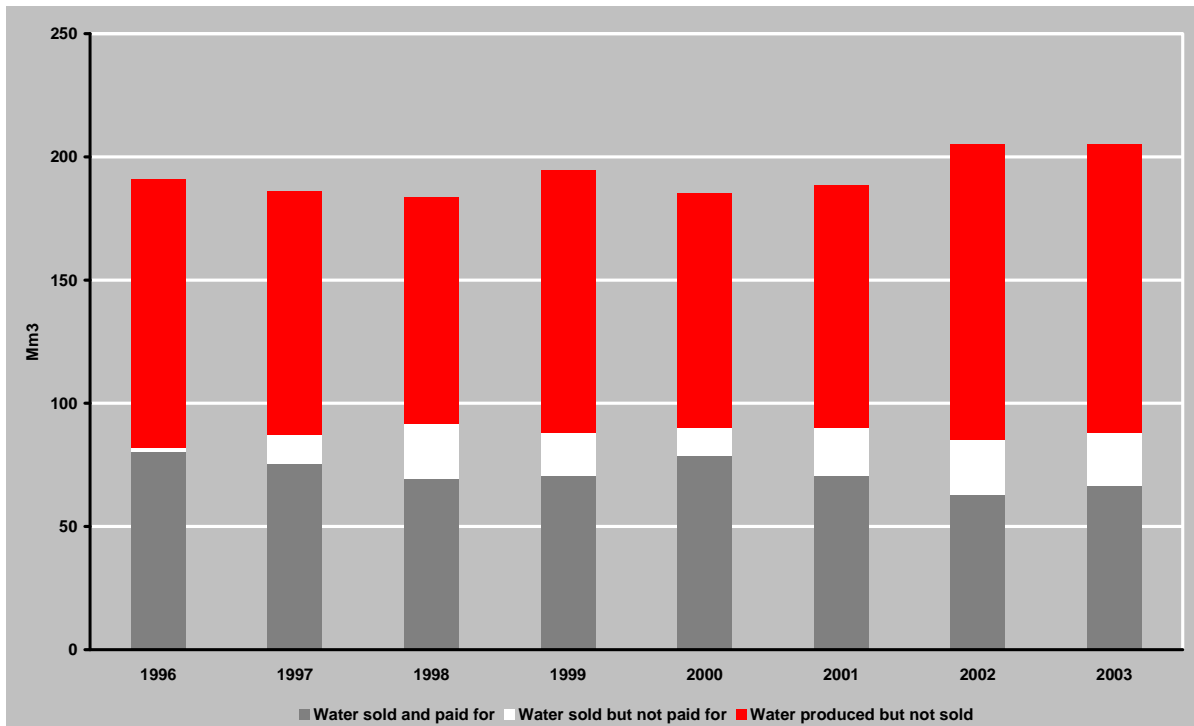


Figure 1 – Annual water production and paid for water (Mm³)

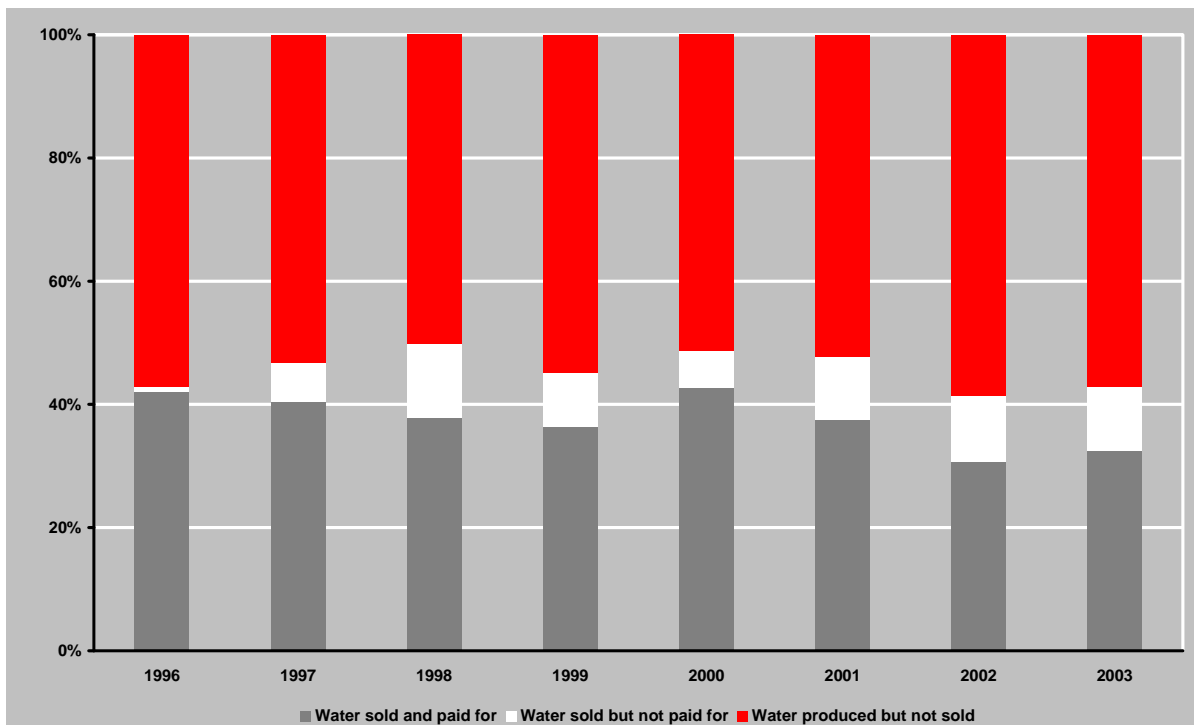


Figure 2 – Annual water production and paid for water (%)

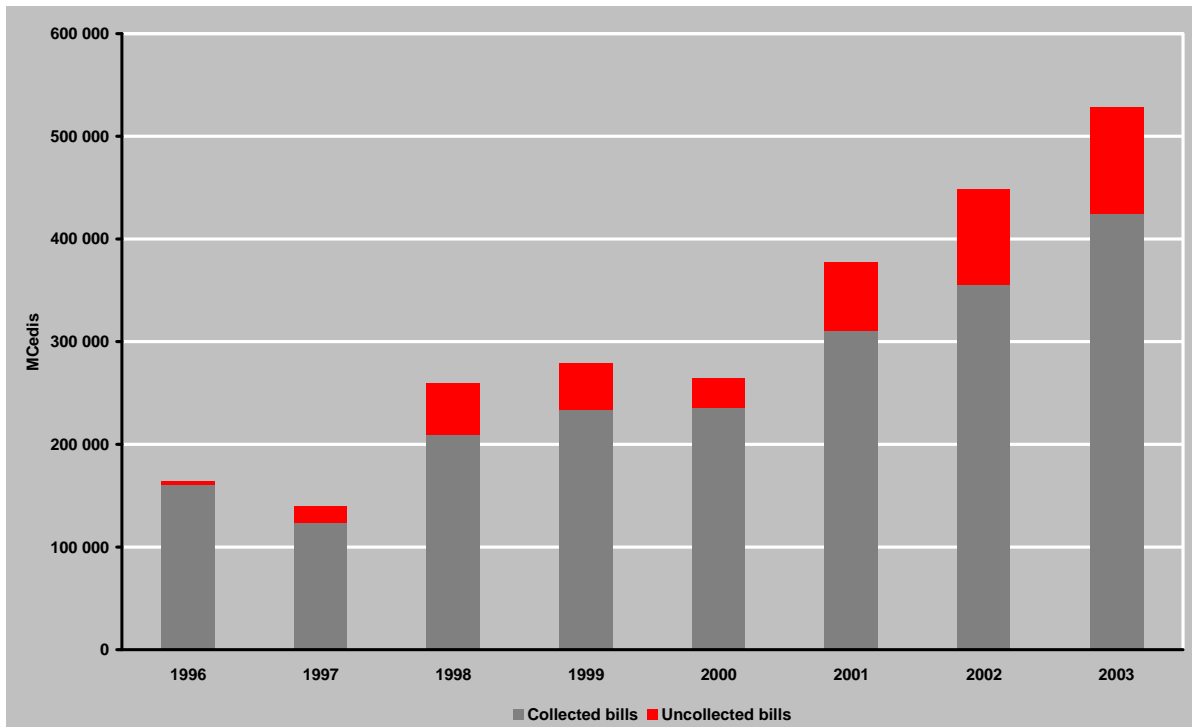


Figure 3 – Billing and collection performance (Mcedis, real end 2003 prices)

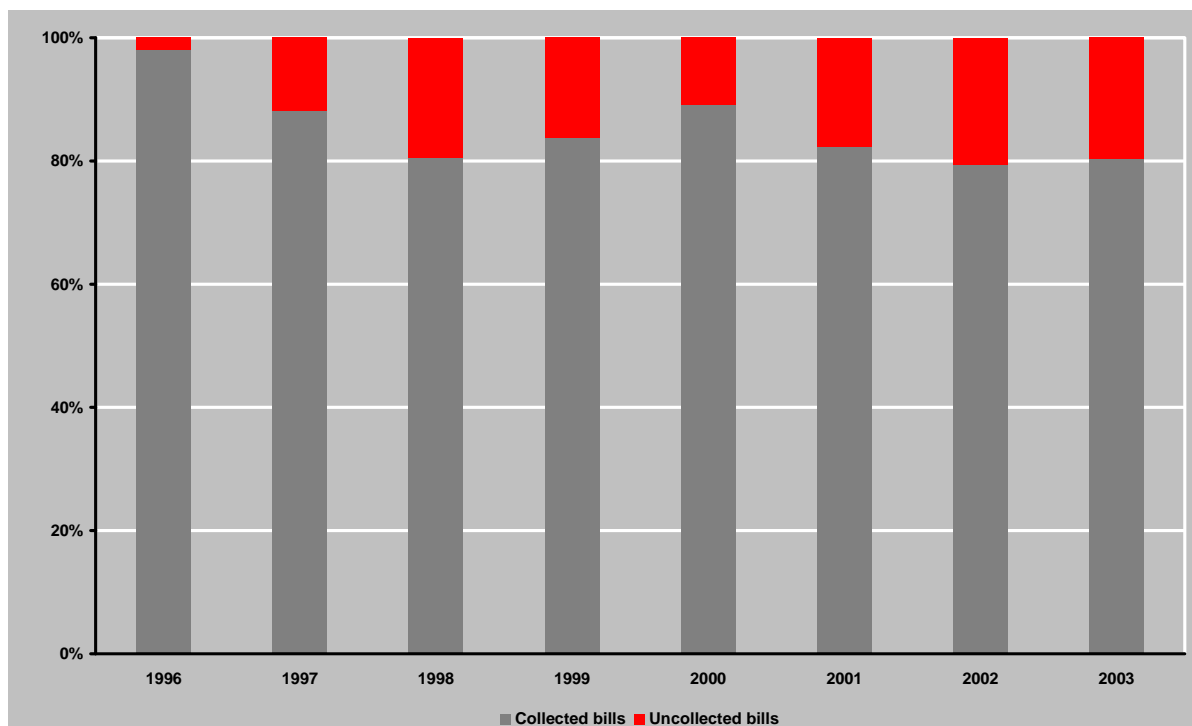


Figure 4 – Billing and collection performance (%)

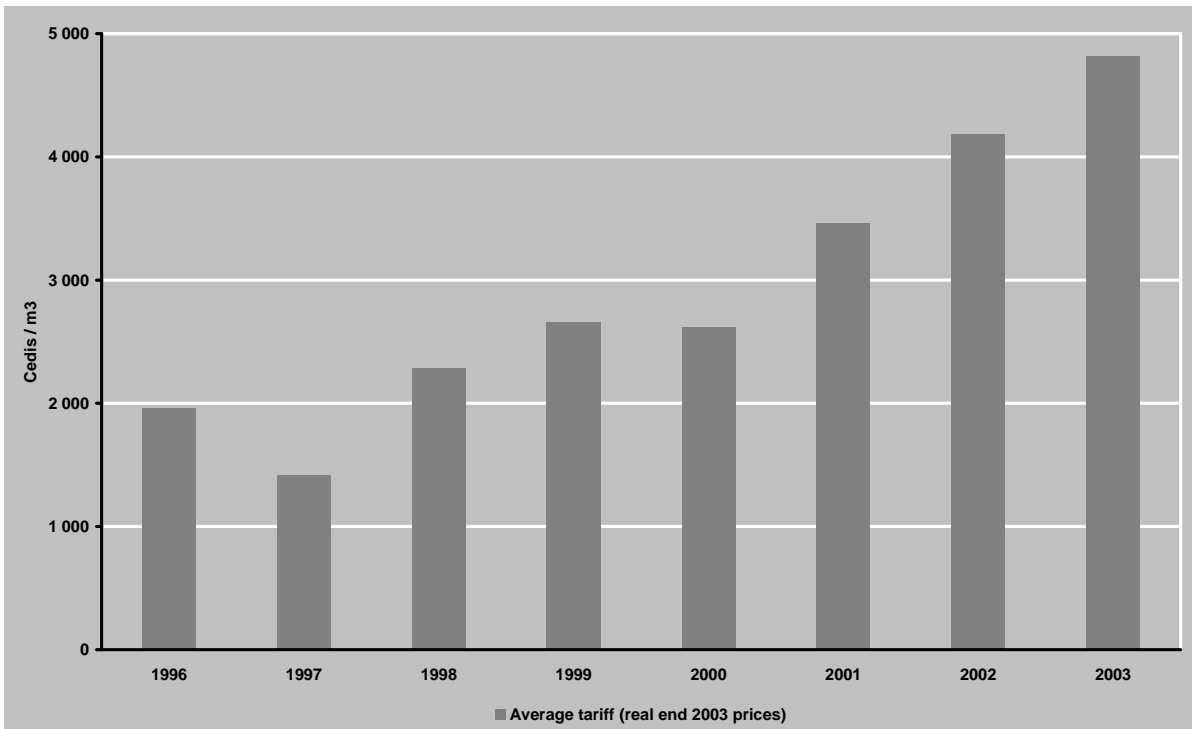


Figure 5 – Real average tariff (end 2003 prices)

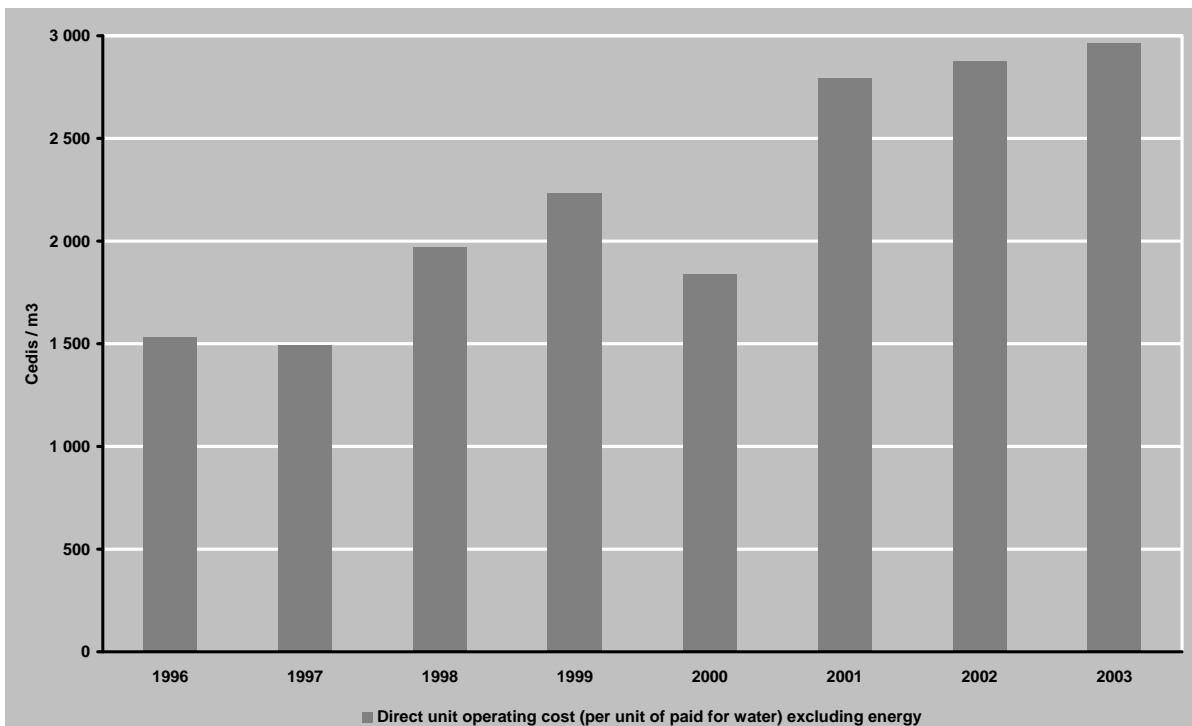


Figure 6 – Direct unit operating costs excluding energy

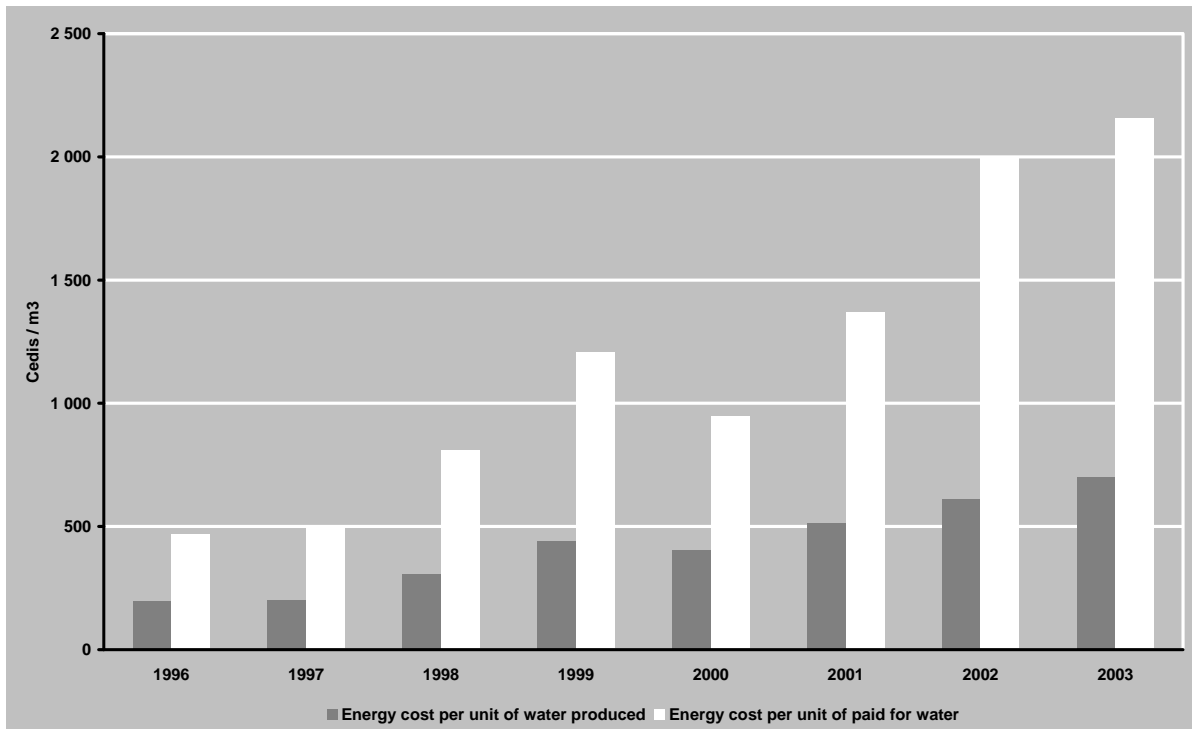


Figure 7 – Real energy cost per unit of water produced and sold (cedis/m³)

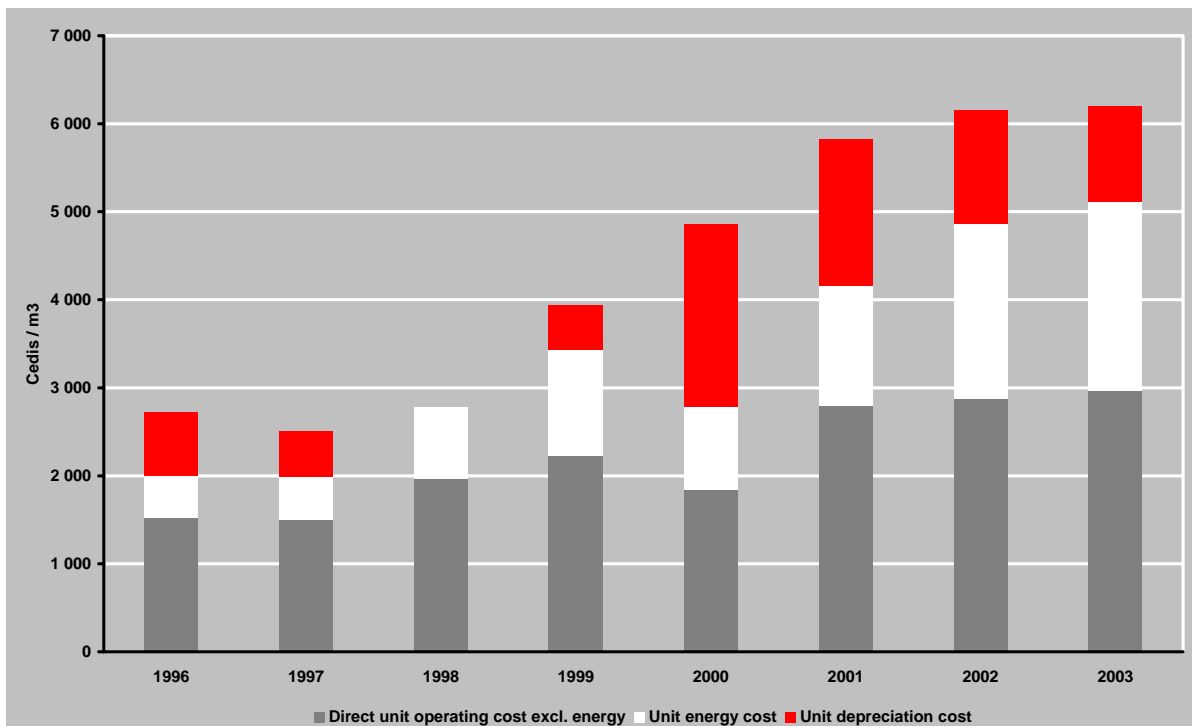


Figure 8 – Real cost per unit of paid for water (end 2003 prices)

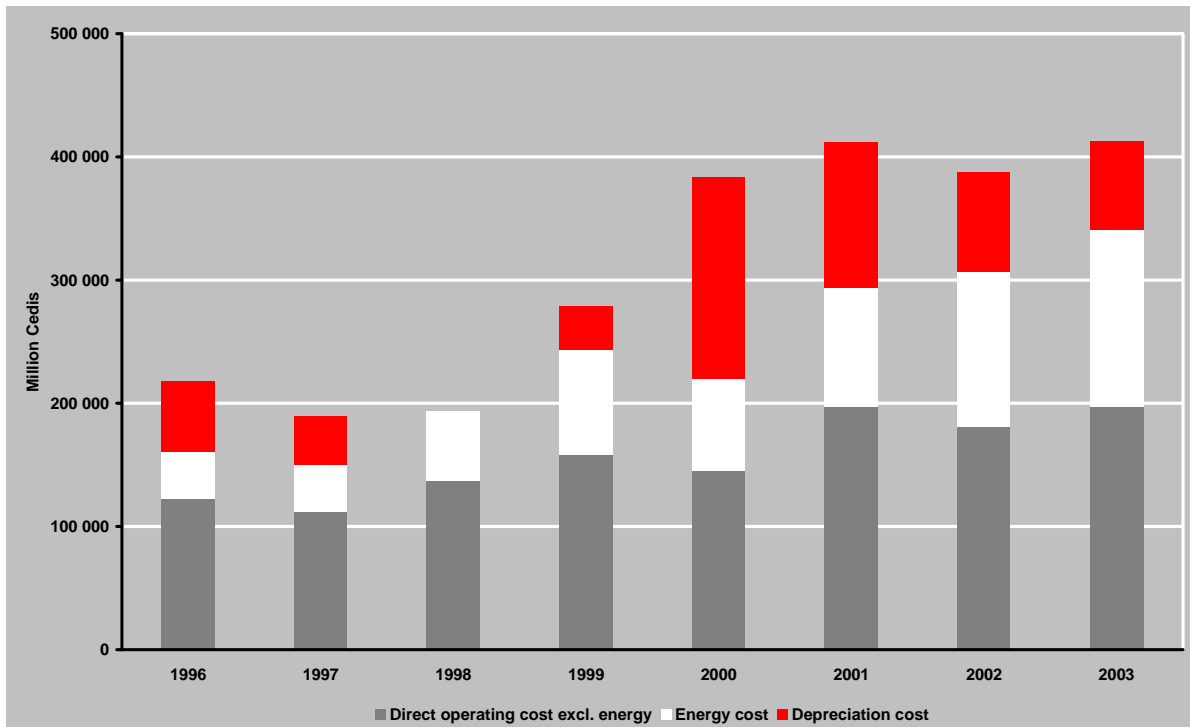


Figure 9 – Real total cost analysis (end 2003 prices)

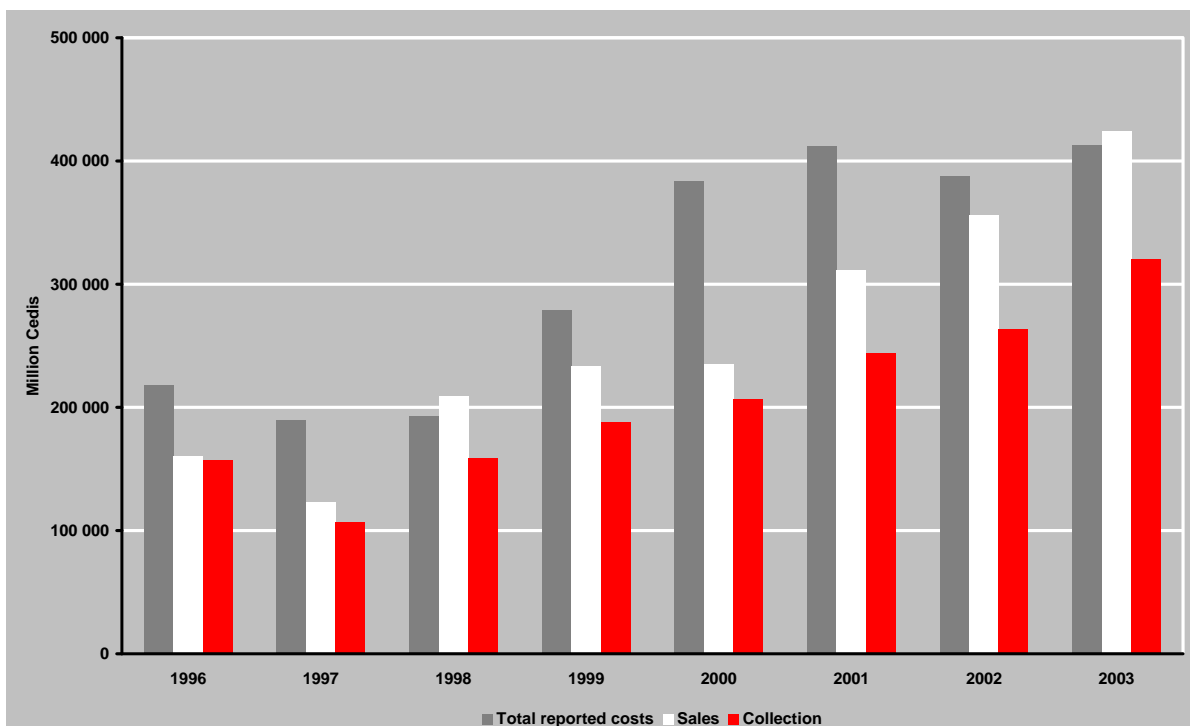


Figure 10 – Real cost / income analysis (end 2003 prices)

- 5.9 Figure 7 shows the comparison of the unit cost of energy used per m³ of water produced and water paid for, both expressed in real terms in cedis/m³. It illustrates the issue of how best to build energy costs into water rates. There has been a dramatic divergence in these two unit costs since 2000 when they were at 404 cedis/m³ and 948 cedis/m³ respectively. In 2003 the comparable costs were 699 cedis/m³ and 2 155 cedis/m³. This divergence is primarily due to widening gap between water production and water sold and paid for.
- 5.10 Figure 8 combines the data from Figure 6 and Figure 7 plus reported depreciation to arrive at a total unit cost (c/m³) in real terms (end 2003 prices).
- 5.11 Figure 9 shows the breakdown of total annual costs in M.Cedis real terms, between operating, energy and depreciation. It shows a lack of consistency in reporting depreciation, which appears to be adjusted year to year in a non-systematic way. Energy costs increased from less than 20% of total operating costs in 2000 to almost 35% in 2003.
- 5.12 Figure 10 shows a comparison between costs, sales as billed and income collected. It shows that recent increases in water rates provided the opportunity to GWCL to improve its infrastructure, and to balance its books. Indeed in 2003, even though losses amounted to 57% of water produced, GWCL billed more income than its total operating costs. However its poor collection efficiency resulted in a significant shortfall in covering its costs.
- 5.13 The data provided by GWCL shows that over the period of this report the volume of water delivered to consumers has reduced. Over the same period both total operating costs and average tariff have more than doubled in real terms.

6 WATER QUALITY.

- 6.1 PURC has a duty under its Act to monitor standards of performance and to protect consumers from poor water quality by taking the regulatory actions, which are provided for under the Act. In particular, it can initiate legal action to support its duty to protect consumers.
- 6.2 Ghana Standards Board (GSB) has, with the involvement of all interested parties, issued Drinking Water Quality Standards and sampling procedures covering the quality of water supplied by Public Water Utilities in Ghana. GWCL is legally required to maintain those standards. In respect of some parameters, however, GWCL tries, for operational reasons, to maintain higher standards than GSB has set.
- 6.3 PURC as regulator responsible for overseeing standards of service has, in its Water Rate Setting Guidelines, set out its approach to regulating water quality. PURC undertakes its role through a process of audit and information collection. GWCL provides PURC with water quality performance data assessed against its own standards in respect of pH, bacteriology, colour, turbidity and sampling. It has also been found that better progress can be achieved in improving water supplied to consumers by working with GWCL to identify problems in water quality and to develop action plans to solve the problems and to see that they are carried out. These action plans, known as “Drinking Water Quality Plans” are currently being piloted on the Weija Supply System.
- 6.4 Table 2 sets out year by year, from 1999 to 2003, the performance of GWCL in respect of compliance with the number of samples demanded by the GSB Standards and with bacteriological and aesthetic water quality parameters. It should be noted that the data for 1999 covers only the 4th quarter which was when reliable data became available to PURC.
- 6.5 PURC believes that it should concentrate its efforts on ensuring that water, which is supplied at consumers’ taps, is safe to drink. The focus is on the distribution system. Data is presented for each region, but excludes Upper West, which is not available. There are also some gaps in the data. The findings in the following analysis are on a regional basis.
- 6.6 In ATMA the picture gives considerable cause for concern. There is a trend over the five years of deterioration in some aspects of water quality. This starts with a reduction in the number of distribution samples analysed. In 1999 (4th quarter) there was 89% compliance with the number of samples required. This reduced to 54.9% in 2001 and recovered a little to 69% in 2003. Compliance with the bacteriological standard was only 93.3% in 2003. There was a low level (15.3%) of compliance with the residual chlorine standard in 2003. This suggests that much of the water supplied to consumers in ATMA is unable to resist even the lowest contamination at the point of supply and is therefore not of potable quality. The results for pH and colour are satisfactory.
- 6.7 The other regions together account for twice the number of samples as ATMA. They show a variable pattern. The number of samples analysed shows a tendency to improved compliance with targets but Northern, Western, Upper East, and Central Regions are well below the required number of samples. A major effort should be made in these areas to achieve the targets set.
- 6.8 Bacteriological samples fall below the compliance standard in Western, Eastern and Upper East Regions. This is at its worst in Western Region where urgent action is needed to solve the problems in the treatment and distribution systems.

Table 2 - Water distribution water quality percentage compliance

Samples taken	1999	2000	2001	2002	2003
ATMA	89.0	72.9	54.9	57.8	69.0
Ashanti	92.0	91.5	74.3	72.3	92.2
Central	88.0	82.0	64.0	77.5	77.4
Western	32.0	63.0		42.3	87.9
Eastern		97.0	99.0	93.3	97.3
Brong Ahafo		96.0	98.3	99.8	99.3
Volta		62.0	89.7	83.0	77.5
Northern	44.0	74.0	87.7	40.0	57.3
Upper East	95.0	55.0	86.7	55.5	91.5
Bacteriological	1999	2000	2001	2002	2003
ATMA	97.0	100.0	99.5	100.0	93.3
Ashanti	100.0	100.0	96.0	100.0	100.0
Central	95.0	100.0	100.0	100.0	100.0
Western	90.0	98.0		87.3	88.5
Eastern		97.0	99.0	93.3	97.3
Brong Ahafo		96.0	98.3	99.8	99.3
Volta		100.0	99.8	99.3	100.0
Northern	100.0	100.0	100.0	96.3	97.0
Upper East	95.0	95.0	71.0	86.0	96.5
Residual Chlorine	1999	2000	2001	2002	2003
ATMA	36.0	60.0	25.0	34.5	15.3
Ashanti	90.0	90.0	70.0	64.0	71.6
Central		46.2	92.0	70.3	46.9
Western				18.0	20.5
Eastern		93.5	97.0	98.0	97.8
Brong Ahafo		100.0	100.0	100.0	100.0
Volta		100.0	91.3	40.0	86.3
Northern	50.0	60.0	71.7	82.4	95.3
Upper East	100.0	100.0	43.0	73.0	91.0
pH	1999	2000	2001	2002	2003
ATMA	82.0	94.5	94.4	97.5	97.0
Ashanti	98.0	73.0	82.2	64.9	80.5
Central	92.0	54.0	62.7	72.5	66.7
Western	95.0	88.0		93.5	68.7
Eastern		94.0	93.0	94.5	98.5
Brong Ahafo		100.0	96.7	99.5	100.0
Volta		100.0	97.7	96.5	100.0
Northern	75.0	55.0	95.3	96.3	95.3
Upper East	100.0	86.0	78.7	86.0	93.0
Colour	1999	2000	2001	2002	2003
ATMA	76.0	62.5	93.8	99.5	100.0
Ashanti	100.0	95.6	60.2	75.2	77.0
Central	75.0	75.0	72.7	60.0	60.0
Western	33.0	100.0		94.0	65.3
Eastern		97.5	100.0	92.0	98.0
Brong Ahafo		100.0	97.3	98.6	100.0
Volta		100.0	98.3	100.0	100.0
Northern	55.0	85.0	98.7	92.3	100.0
Upper East	40.0	100.0	53.3	93.5	49.0

- 6.9 Lack of compliance with the residual chlorine standard is widespread and of concern. Only Brong-Ahafo and Eastern Regions show an acceptable situation. Other regions show a surprising inconsistency between bacteriological compliance and residual chlorine.
- 6.10 The pH and colour results show modest levels of compliance in Ashanti, Western and Central Regions and demonstrate the need for pH correction treatment in those systems.
- 6.11 Overall the water quality performance in Brong-Ahafo and Eastern Regions is satisfactory. Attention should continue to be paid to improving bacteriological quality.
- 6.12 In all other regions there is serious failure in one or more aspects of water quality. GWCL needs to address these failures as a matter of high priority. The drinking water quality plans will help to optimise and prioritise investment in water quality improvement. But operational improvements should not wait.

7 COMPLAINT HANDLING

- 7.1 PURC has a duty under its Act to investigate complaints which it receives in respect of services provided or charges made by a public utility. It also has a duty to protect consumers from poor service given by providers of utility services. Its policy on complaints has been implemented in regulations, which have been issued as a Legislative Instrument.
- 7.2 The procedure places the onus on complainants to attempt first to resolve their complaint directly with GWCL. If that is not possible there is recourse to PURC. The process, which PURC follows, is set out in the procedure, and in a simple explanatory pamphlet. There is an ultimate remedy in the PURC Act for the Commission to give a direction about the determination of a complaint. Such a direction is enforceable by application to the High Court.
- 7.3 PURC has been compiling information on the number of complaints, which it has received under the procedure, since the beginning of 2003. Table 3 gives the number in each category received in each half year since then, indicating the number which have been resolved.

Table 3 - Complaints analysis (Jan 2003 – Jun 2004)

Category	Jan 03 – Jun 03		Jul 03 – Dec 03		Jan 04 – Jun 04	
	Recorded	Resolved	Recorded	Resolved	Recorded	Resolved
Payment	3	2	1	1	0	0
Quality of Service	4	3	3	1	9	5
Billing	9	7	6	3	17	1
Disconnection	3	3	3	3	2	0
Metering	4	3	4	4	1	0
Total	23	18	17	12	29	6

- 7.4 The number of complaints which reach PURC is surprisingly small; a total of 69 over 18 months. The majority of complaints are about billing, which is as expected. It is however worrying that there are still unresolved complaints which are up to 18 months old. There seems to have been a marked deterioration in PURC's ability to resolve complaints in the last six months. Only six out of 29 received during that time have been resolved to the satisfaction of the complainant.
- 7.5 The complaints procedure which PURC has established is clear and powerful if used to its full extent. In the last few months the performance of GWCL in resolving complaints which PURC has asked it to resolve has been most unsatisfactory. Closure of these outstanding complaints will be pursued by PURC as a priority. Where appropriate, a direction of the Commission will be sought and followed through due process if necessary.
- 7.6 Assessing consumer service performance by looking only at complaints made to PURC does not present a full picture of consumer satisfaction. In future years GWCL will provide data to PURC on the total number of complaints it receives and the number responded to in a reasonably substantial and satisfactory manner.

8 PERFORMANCE OF OTHER WATER UTILITIES

- 8.1 Reference has been made in this report to the performance of other water utilities and how GWCL compares in terms of headline efficiency. This section provides some data and comments on it.
- 8.2 The data has been obtained from various sources and for different time periods. It should therefore be regarded as indicative of performance only.
- 8.3 It shows that a range of different water utilities, operated under both public and private sector management, achieve levels of headline efficiency of between 65 and 83%. These compare with the best headline efficiency of 42.7% achieved by GWCL in the year 2000 and 32.4% in 2003.
- 8.4 There is considerable scope for GWCL to improve its performance by comparison with similar water utilities. The headline efficiency of water utilities in other developing countries in Africa and elsewhere can match that of developed countries.
- 8.5 The information set out in Table 4 has been obtained from various sources. Its direct comparability with the data on GWCL is open to scrutiny. However it does provide external benchmarks, and gives PURC confidence to make projections about the scope for GWCL to improve its efficiency, for tariff setting purposes.
- 8.6 More reliable data for the future could be collected systematically from the published annual reports of several utilities in the West African Region. It should be possible to set up arrangements to exchange more detailed data for example on water quality, complaints, and service measures such as access and reliability. Where there is a regulatory body in place such exchange of data might be facilitated by contact with the regulator.

Table 4 - Comparative performance

Utility	Year	Physical losses %	Commercial losses %	Overall water efficiency %
GWCL ¹	2003	57	11	32
Senegal ³	2000	17	3	80
Blantyre, Malawi ¹	2001	N/A	N/A	66
Lilongwe, Malawi ¹	2001	N/A	N/A	68
Central region, Malawi ¹	2001	N/A	N/A	78
Santiago, Chile ³	2002	22	6	73
Gdansk, Poland ¹	2001	20	2	78
France ³	2002	20	2	78
UK ³	2002	25	2	73
Germany ²	2002	15	2	83

¹Public operators

²Mixed public/private operators

³Private operators

APPENDIX 1 – COMMENTS FROM GWCL AND SUBSEQUENT PURC RESPONSES

GWCL comments have been made against the 4TH draft dated 29.10.04

Note that paragraph numbers in the first column have been revised to match the most recent version of the 5-year review report.

Para.	GWCL comment	PURC response
2.2	<p><i>Para renumbered from 3.2</i></p> <p>Tariff increases embarked on by PURC aimed at achieving full recovery of efficient operating and capital maintenance cost, and providing a small (%) return on capital. When the last tariff proposal (2002) was submitted, the tariff figure computed to attain that goal was adjusted downwards to take into account the affordability syndrome.</p> <p>Unfortunately, it is based on the adjusted tariff figure that the Automatic Adjustment Formula is operating. In effect, the formula is based on a wrong premise and full cost recovery cannot be attained unless new proposal based on the above set goals are submitted.</p>	<p>Whilst affordability was a concern, it was not a primary issue for PURC. The tariff set in 2002 was sufficient to meet operational cash flow requirements at current levels of efficiency and was also sufficient to achieve Full Cost Recovery if GWCL attained PURC's reasonable efficiency Improvements.</p> <p>Efficiency targets set were to improve revenue collection from 75% to the target 95% and reduce non-revenue water from 50% to targets of 45% (2002) and 40% (end 2003).</p> <p>The adjustment formula simply indexes the cash flows for inflation (including exchange rate fluctuation).</p>
2.3	<p><i>Para renumbered from 3.3</i></p> <p>PURC's objective to provide GWCL with achievable aims based on the Performance of similar water utilities in the region was laudable. Unfortunately utilities in the region are not operating in the same environment in terms of the age of the infrastructure, and that makes comparison a bit misleading.</p>	<p>PURC believes it is important to make benchmarking comparisons to understand how other utilities are performing and to use comparisons to inform regulatory actions and adjustments. PURC recognises differences between utilities when making comparisons.</p>
2.3	<p><i>Para renumbered from 3.4</i></p> <p>Reducing water losses (technical and commercial) to 25% of water produced has never been a target set for GWCL in view of the age of the infrastructure. With the existing infrastructure, GWCL's target has been set to progressively reach 40% in 2003 as evidenced by the Performance Contracts signed with SEC over the years. The 25% target was set for a new operator to attain after being in operation for five years after the infusion of capital for replacement of old infrastructure. The urban water project due to commence in 2005 clearly spells this out.</p>	<p>PURC set tariffs in 2002 based on an assumption that GWCL would meet the target of 40% water losses by the end of 2003. The 25% target was projected to be achieved by GWCL with PSP contracts in place and has been used as an illustration of what might be achieved in the future. Water produced but not sold (PURC's simple definition of water losses) has actually been closer to 60%. Nevertheless the percentage of non-governmental collections has recovered from the impact of the tariff increase in 2002 and is now nearly back to the 2001 level (93%).</p> <p><i>Changes have been made to the final document to reflect this.</i></p>

Para.	GWCL comment	PURC response
2.5	<p><i>Para renumbered from 3.5</i></p> <p>Without the capital injection, there was no way the 25% water loss target could be attained. In the same vein attaining more than double the income is not feasible. To assume doubling GWCL's income even without tariff increase is an exaggeration. Looking at the water production for 2003 and the performance at a yield of 43% (excluding authorised usage but with tariff increase the results are as shown in Attachment A₁¹).</p> <p>With a yield of 60% i.e. non-revenue water level of 40% which has been our goal, and an average tariff as in 2003 the result is shown in Attachment A₂¹. Even with a yield of 75% the result is equally not positive as shown in Attachment A₃¹ but for the loan relief.</p> <p>From the two attachments¹ it could be seen that in each case there is a loss on every cubic meter of water sold. The two attachments buttress the fact that GWCL's revenue need not necessarily double and similarly GWCL cannot in any way balance its books as stated in the section.</p> <p>¹. <i>GWCL has provided alternative calculations in support of its arguments. Copies of the calculations are attached</i></p>	<p>PURC has changed the wording from “more than double” to “significantly increase” in the main report.</p> <p>Some improvements in revenue collection and physical loss reduction can be made without capital injection – revenue collection is a major component of losses and does not require capital for improvement. Physical losses can be reduced through leakage management and maintenance activity.</p>
2.7	<p><i>Para renumbered from 3.7</i></p> <p>It is highly recommended that conclusion be publicised annually for effective response instead of a 5 year period basis.</p>	<p>PURC intends annual publication and looks forward to cooperation from the company in the timely provision of information.</p>
3.2	<p><i>Para renumbered from 4.2</i></p> <p>Volume of water produced increased by 11.8% but water sold remained at best static. From reports, water production varied inversely with water sales simply because of the aged infrastructure.</p> <p>With weak transmission mains, any increase in pressure resulting from increased water production ended up with more pipe bursts. That was exactly what happened after the completion of the Weija expansion in late 2001. The issue was more prevalent in 2002 when with a water production of 204.6 mm³, water sales recorded 85.08mm³. This phenomenon was in fact reported to PURC. This is why the replacement of old and weak mains and rehabilitation of water supply systems are a major component of the urban water project due to commence with an injection of \$103m over a five year period starting from 2005.</p>	<p>The Weija experience highlights that the main priorities for investment must be leakage control and the repair of the infrastructure, not further water production. (<i>This statement has been added to the report</i>).</p> <p>The situation has arisen because of failure to identify appropriate priorities for national investment in the past.</p>

Para.	GWCL comment	PURC response
3.3	<p><i>Para renumbered from 4.3</i></p> <p>The collection ratio deteriorated after 2000 because Government collections were not forthcoming. This the Management therefore took up and negotiations started.</p> <p>The end result was that Government receivable to Ghana Water Company Limited, Volta River Authority and Electricity Company of Ghana were eventually set off during 2004. The outcome of the negotiation is the reinstatement of the Clearing House System for Ghana Water Company Limited, Electricity Company Limited and Volta River Authority. Government bills are then deemed 100% paid. The current picture is depicted in attachment A. From the attachment it would be seen that the performance for 2003 compared favourably with that of 2000 recording 94%.</p>	<p>GWCL calculations assuming 100% government payment are correct.</p> <p>Although Government now makes payments using an offset mechanism, it would be preferable if it paid bills on time (<i>statement put into para 4.6 in main report</i>).</p> <p>The collection rate for non-governmental customers dropped sharply after the tariff increase in 2002 but has now recovered to a level close to the 2001 performance (93%). More effort in these private collections will see GWCL achieving the PURC target of 95%. <i>This statement has been added to para. 3.5 in the main report.</i></p>
3.6	<p><i>Para renumbered from 4.4.</i></p> <p>With the 100% Government Collection, the headline efficiency of Ghana Water Company Limited is as shown in attachment B ranging between 40% and 45%.</p>	<p>GWCL calculations are correct based on this assumption. Copies are attached.</p>
3.7	<p><i>Para renumbered from 4.5.</i></p> <p>The observation that tariff increase does not result in increased billing has been noticed by Management. This phenomenon was perpetrated by some unscrupulous revenue officers who unilaterally reduced the average charge without approval of their supervisors when there was tariff increase and when unmetered consumers complained of high charges. The issue is being seriously tackled with constant monitoring and the on-going consumer survey will help address the situation.</p>	<p>PURC intends to publicise its tariffs – better understanding of tariffs by consumers will assist GWCL in avoiding these practices.</p>

Para.	GWCL comment	PURC response
3.11	<p><i>Para renumbered from 4.9</i></p> <p><i>Quality of Water Supplied</i></p> <p>The clause “The continuing poor Performance of GWCL in maintaining satisfactory water quality has forced PURC to become more involved in achieving improvements that would be correct” needs to be explained.</p> <p>On careful scrutiny of Table 2 of the report, one cannot say the performance is poor.</p> <p><i>Percentage of samples taken</i></p> <p>On the average percentage of samples taken is above 80. Breakdown of vehicles, unavailability of water at sampling points at particular times as a result of the diversion of water for rationing purposes account for the failures.</p> <p><i>Bacteriological quality</i></p> <p>95% compliance is the standard. For the years 1999 – 2001 all the regions fully complied except Upper East which failed to achieve the accepted 95% - reasons being equipment failure which has since been rectified. All regions complied.</p> <p>Year 2002 saw an improvement in the performance of all the regions with regard to bacteriological quality of the supplied water. There were only 9% and 7.7% failures in Upper East and Western Regions respectively. Western Region had a “weak leaking” transmission mains from Daboasi through Inchaban Headworks to Takoradi and that accounted for the failures. This called for the laying of new transmission mains from Daboasi through Inchaban to Takoradi. The project which started in 2003 is due to be completed by end of 2004.</p> <p>In year 2003 all the regions complied with the Bacteriological quality with exception of 1.7% and 6.5% failure for ATMA and Western Region respectively.</p>	<p>The wording has been amended in the latest revision of the 5-year review report.</p> <p>GWCL provides PURC with water quality performance data assessed against its own standards in respect of pH, bacteriology, colour, turbidity and sampling. GWCL has agreed to provide information in future which compares performance both against the GWCL internal standards and the National Standards set by the Ghana Standards Board.</p> <p>GWCL has been unable to supply historical information comparing its performance against the National Standards for inclusion in this first 5-year review report, and consequently PURC’s commentary is based upon the data available. PURC is looking forward to the availability of more data in future. In particular improvement in sampling methods will impact on performance assessment.</p>

Para.	GWCL comment	PURC response
	<p data-bbox="297 213 517 240"><i>Residual Chlorine</i></p> <p data-bbox="297 261 1202 507">With the rationing of water in most of our systems and the vast spread of distribution lines, chlorine demand in the pipe lines increased. This, coupled with the leakages in customers' service lines and poorly maintained reservoirs and overhead tanks, it was very difficult to maintain a good residual at the far end of the distribution system. The solution for the water rationing is to increase production capacity. The issue has been discussed with Government and plans are far advanced for the expansion of the Kpong Headworks.</p> <p data-bbox="297 523 1202 644">With the poor maintenance of customers' reservoirs and overhead tanks and leakages in service lines, an educational programme has been put in place by Commercial Department, Public Relation and Water Quality Departments to address the issue.</p> <p data-bbox="297 660 479 687"><i>pH and Colour</i></p> <p data-bbox="297 708 1202 798">The Company's pH requirement in the distribution system is ≥ 7 which is higher than the National Standard of 6.5 – 8.5. All samples complied with the National Standard in terms of pH and Colour</p>	<p data-bbox="1225 261 2130 320">Implementation of an active leakage control strategy will address this issue and help to minimise the need for water rationing.</p>

Para.	GWCL comment	PURC response																		
	<p data-bbox="297 213 1200 336">It is pertinent to know that GWCL's own set standard for monitoring is more stringent than the Ghana National Standards Board set standards for Drinking water. This is so because of the condition of the existing distribution network. This fact has been made known to PURC.</p> <p data-bbox="297 352 651 379">The standards are as follows:</p> <table border="1" data-bbox="297 384 1182 651"> <thead> <tr> <th data-bbox="297 384 510 427"></th> <th data-bbox="510 384 846 427">Nat. Standard</th> <th data-bbox="846 384 1182 427">GWCL's Standard</th> </tr> </thead> <tbody> <tr> <td data-bbox="297 427 510 470">No. of samples</td> <td data-bbox="510 427 846 470">-</td> <td data-bbox="846 427 1182 470">Variable</td> </tr> <tr> <td data-bbox="297 470 510 513">pH</td> <td data-bbox="510 470 846 513">6.5 – 8.5</td> <td data-bbox="846 470 1182 513">≥ (dist) ≥ (plant)</td> </tr> <tr> <td data-bbox="297 513 510 557">Bacteriology</td> <td data-bbox="510 513 846 557">95% for Ocfu/100ml</td> <td data-bbox="846 513 1182 557">100% Ocfu/100ml</td> </tr> <tr> <td data-bbox="297 557 510 600">Colour</td> <td data-bbox="510 557 846 600">15 HU</td> <td data-bbox="846 557 1182 600">5 HU</td> </tr> <tr> <td data-bbox="297 600 510 651">Turbidity</td> <td data-bbox="510 600 846 651">5 NTU</td> <td data-bbox="846 600 1182 651">2 NTU (dist) 1NTU (plant)</td> </tr> </tbody> </table> <p data-bbox="297 667 1200 724">It should be noted that the assessment in the report is based on GWCL's Standards and not the National Standard.</p> <p data-bbox="297 740 1200 863">Compared to the National Standards, the failures are nominal and therefore the Company's Performance in terms of water quality is quite good on the whole. Improvement is on-going whilst full compliance will be attained when supply become adequate.</p>		Nat. Standard	GWCL's Standard	No. of samples	-	Variable	pH	6.5 – 8.5	≥ (dist) ≥ (plant)	Bacteriology	95% for Ocfu/100ml	100% Ocfu/100ml	Colour	15 HU	5 HU	Turbidity	5 NTU	2 NTU (dist) 1NTU (plant)	
	Nat. Standard	GWCL's Standard																		
No. of samples	-	Variable																		
pH	6.5 – 8.5	≥ (dist) ≥ (plant)																		
Bacteriology	95% for Ocfu/100ml	100% Ocfu/100ml																		
Colour	15 HU	5 HU																		
Turbidity	5 NTU	2 NTU (dist) 1NTU (plant)																		

Para.	GWCL comment	PURC response
3.12	<p><i>Para renumbered from 4.10.</i></p> <p>Assessing consumer service performance by looking only at complaints made to PURC is not a fair yardstick since most complaints come directly to GWCL. In fact most of the few complaints going to PURC are contentious and that is why their resolution takes time e.g. some consumers along the Kasoa road who were disconnected during the road construction were made to pay in full before they could be reconnected.</p> <p>Some of the affected consumers reported to PURC who insisted that they be reconnected. That line of action was at variance with our policy and could therefore not be carried out.</p> <p>It would be more realistic to consider complaints made to both PURC and GWCL since complaints are reported quarterly in the Quarterly Progress Report and complaint registers are available for confirmation.</p>	<p>PURC accepts the point made by GWCL. The text in the report now reflects this.</p> <p>GWCL is unable at this stage to supply the comprehensive information necessary to evaluate how it deals with customer complaints.</p> <p>In the absence of this information the report contains details of complaints referred to PURC.</p> <p>In PURC's view the majority of the complaints received are not contentious.</p> <p>PURC has reported a low rate of resolution of complaints referred back to the company for action.</p> <p>In future years GWCL will provide data to PURC on the total number of complaints it receives and responds to. This will provide a more meaningful picture on levels of dissatisfaction with water service. (<i>reflected in main text at para. 3.12</i>)</p>
3.13	<p><i>Para renumbered from 4.11.</i></p> <p>Table 3 rather shows complaints analysis and not headline water efficiency of other utilities. Headline water efficiency is shown in Table 4.</p>	<p>The table reference has been corrected in the latest version of the report.</p>
5.1	<p><i>Para renumbered from 6.1</i></p> <p>There is the need to cross check the figures for 1996 and 1997 especially water production and water sales. Refer to Page 5 of the Corporate Plan 1999-2001. (See attachment C). (There appears to be combination of gallons and meter cube)</p>	<p>Figures have been adjusted by PURC as indicated in the text of PURC's report.</p>

Para.	GWCL comment	PURC response
5.2	<p><i>Para renumbered from 6.2</i></p> <p>“Water losses in a very efficient system run at around 15%”. The statement needs further clarification since it would be misleading to compare utility companies with different levels of infrastructure. (Refer to Section 3.4)</p> <p>Apart from the level of efficiency, other factors which affect the level of water losses (i.e. technical and commercial) are:</p> <ul style="list-style-type: none"> • The type of system i.e. <ul style="list-style-type: none"> - BHS (Borehole) - CT (Conventional Treatment Plant) - PP (Package Plant) • The age of the infrastructure • The length of the distribution network • Supply time (i. e. number of hours that consumers are served in a day) <p>The issue of comparing water losses of utility companies with different systems and spread of distribution network was vigorously debated at the recently held 12th Congress of the Union of African Water Suppliers in Accra.</p> <p>Again it is worth noting that there is a difference between water losses and Non-revenue water as shown in attachment D. It appears in the report, reference was made to Non-revenue water, and accordingly quoted the NRW level of 2002 which was 58.42% and not the water loss (unaccounted for water) of 49.9%. The error should therefore be rectified.</p>	<p>PURC comparison acknowledges differences between systems. Table 4 provides the evidence of a large departure in performance from other utilities in Africa and elsewhere.</p> <p>PURC’s definition of losses in this analysis is simply the difference between water produced and water sold. PURC appreciates that this difference may include legitimate water use e.g. mains flushing, fire fighting etc, but it is also recognised that such legitimate use s are normally very small relative to production (<5%). As data becomes available the PURC definitions can be revised.</p> <p>It would be helpful if GWCL could provide evidence in support of the statement made. PURC stands by its current definition of losses as the difference between production and sales. Furthermore, even making a reasonable allowance for legitimate water use, such losses are still unacceptably high.</p>
5.4	<p><i>Para renumbered from 6.4</i></p> <p>Looking at Table 4, no information was given for Technical and Commercial losses for Malawi. The basis for the overall efficiency level needs to be provided for better appreciation.</p>	<p>PURC does not have available the information to break down these figures; PURC intends to do this in the future as data becomes available.</p>

Para.	GWCL comment	PURC response
5.11	<p><i>Para renumbered from 6.9</i></p> <p>The reporting on depreciation has been consistent as shown in the Annual Reports (Refer to Audited Accounts). The problem has been the revaluation of the assets which were effected in the accounts in 1995 and 2001. (Refer to attachment E). Recent increases in water rates is not enough to balance GWCL's book because when the 2002 tariff proposal was made there was a downward adjustment to accommodate "affordability" of consumers. (Refer to Section 3.2)</p> <p>Since the automatic adjustment formula is based on the adjusted tariff, there is no way the books can be balanced.</p> <p>GWCL water losses of 57% in 2003 is not correct. (Refer to Section 6.2)</p>	<p>From the data provided by GWCL, PURC has been unable to establish that a consistent methodology has been employed for depreciation calculation. PURC will work with GWCL to improve its understanding of the depreciation methodology and asset allocation.</p> <p>It is recognised that the major revaluation in 2001 did impact on total depreciation.</p> <p>Refer to PURC commentary on para. 5.2 above.</p>
5.12	<p><i>Para renumbered from 6.10, but commentary by GWCL is more general</i></p> <p>Access to mains water by consumers dependent, on GWCL is better assessed by the number of connections and volume of water sold. Customer strength or number of connections has been consistently increasing from 216,748 in 1996 to 316,160 in 2003 and to 328,000 in 2004. The volume of water sold on the other hand has been 43% in 2003 because of the low metering ratio of 46% in 2003 with most of the consumers on averages.</p> <p>In fact in reality more consumers are being served except that the non-metering of most consumers has distorted the water consumption figures and that is being addressed through the consumer survey and the programme to acquire and install more meters.</p>	<p>GWCL commentary refers to an earlier version of the report and customer numbers are no longer included.</p>

APPENDIX 2 – GWCL RESPONSE ATTACHMENTS¹

Attachment A – Billing and collection statistics

Year	Billing (billion cedis)			Collection (billion cedis)			Ratio (%)			
	Private	Government	Total	Private	Government	Total	Private	Government	Total	Total (100%)
1999	86.4	20.48	106.88	78.56	7.57	86.13	90.92593	36.96289	80.5857	92.66467
2000	104.392	21.39	125.782	97.26	13.12	110.38	93.16806	61.33707	87.755	94.32987
2001	177.8	34.77	212.57	144.69	21.75	166.44	81.37795	62.55393	78.29891	84.42395
2002	249.38	53.7	303.08	215.57	8.85	224.42	86.44238	16.48045	74.04646	88.84453
2003	329.79	74.2	403.99	303.79	1.16	304.95	92.1162	1.563342	75.48454	93.5642

NOTE: Total* = Collection ratio without set-off of government billing

Total (100%) = collection ratio with government billing set-off

¹ The attachments were received in hard copy format and have been retyped for inclusion in this report. Presentation format may have been modified but the content remains unchanged.

Attachment A1 - Analysis of Operating performance (January – December 2003)

Description	Unit	Consol	Head off.	ATMA	Ksi City	Sek City	C Coast	Eastern	Volta	Northern	Up East	Up West	B / A	Ash'rl	W rl	Cen rl
Water production	Mil m3	205	0	126	29	10	5	5	5	7	2	0	5	2	1	7
Water sales	Mil m3	88	0	48	14	5	3	3	3	4	1	0	2	1	1	3
Authorised water used	Mil m3	19	0	10	3	2	1	0	0	0	0	0	0	1	0	1
Collection	Mil cedis	304949	0	175969	48918	20245	9127	9742	7254	5344	3151	1142	8694	3577	2725	9060
Billing - water sales	Mil cedis	403992	0	231136	62378	23924	16068	12043	11075	9480	4846	1380	10319	4764	3392	13189
Billing - miscellaneous	Mil cedis	415236	2222	235292	62539	24231	16760	12248	11405	9624	5123	1486	10707	4816	3386	11702
Other income	Mil cedis	38	0	13	4	0	12	0	8	0	0	0	0	0	0	0
Total revenue	Mil cedis	415279	2222	235305	62543	24231	16772	12248	11413	9624	5123	1486	10707	4816	3386	11702
Operating expenditure	Mil cedis	426429	25437	191179	42780	22087	16127	19151	21192	19433	8015	3810	19859	10954	4022	13590
Total costs	Mil cedis	807959	357011	241136	42780	22087	16127	19151	21192	19433	8015	3810	19859	10954	4022	13590
Yield	%	43	0	38	49	48	66	78	53	50	58	75	51	55	58	35
Non-revenue water	%	57	0	62	51	52	34	22	47	50	42	25	49	45	42	65
Unaccounted for water	%	48	0	54	40	32	23	18	42	47	33	15	43	26	36	45
Average tariff / water sold	Cedis / m3	4584	0	4851	4454	4771	4886	3441	4261	2555	4454	4018	4314	4109	4632	4966
Average revenue / water sold	Cedis / m3	4712	0	4939	4466	4832	5100	3500	4391	2594	4710	4324	4476	4154	4624	4406
Operating costs / water sold	Cedis / m3	4838	0	4013	3055	4405	4904	5472	8153	5237	7368	11090	8302	9448	5492	5118
Total cost / water sold	Cedis / m3	9168	0	5061	3055	4405	4904	5472	8153	5237	7368	11090	8302	9448	5492	5118
Total cost / water produced	Cedis / m3	3938	0	1914	1482	2136	3251	4247	4341	2627	4289	8295	4229	4422	2884	1845
Profit (deficit) / water sold	Cedis / m3	-4456	0	-122	1411	428	196	-1973	-3762	-2643	-2658	-6766	-3826	-5294	-869	-711

Attachment A2 – Performance of GWCL assuming 40% NRW achieved (January – December 2003)

Description	Unit	Consol	Head off.	ATMA	Ksi City	Sek City	C Coast	Eastern	Volta	Northern	Up East	Up West	B / A	Ash'rl	W rl	Cen rl
Water production	Mil m3	205	0	126	29	10	5	5	5	7	2	0	5	2	1	7
Water sales	Mil m3	88	0	48	14	5	3	3	3	4	1	0	2	1	1	3
Water sales (60% yield)	Mil m3	123	0	76	17	6	3	3	3	4	1	0	3	1	1	4
Average tariff / water sold	Cedis / m3	4584	0	4851	4454	4771	4886	3441	4261	2555	4454	4018	4314	4109	4632	4966
Billing	Mil cedis	571280	0	366680	77140	29603	14541	9311	12481	11341	4995	1107	12155	6106	3876	21945
Operating expenditure	Mil cedis	426429	25437	191179	42780	22087	16127	19151	21192	19433	8015	3810	19859	10954	4022	13590
Total cost	Mil cedis	807959	357011	241136	42780	22087	16127	19151	21192	19433	8015	3810	19859	10954	4022	13590
Average tariff / water sold	Mil cedis	4584	0	4851	4454	4771	4886	3441	4261	2555	4454	4018	4314	4109	4632	4966
Operating costs / water sold	Cedis / m3	3464	0	2529	2470	3560	5419	7078	7234	4378	7147	13824	7048	7371	4806	3076
Total cost / water sold	Cedis / m3	6563	0	3190	2470	3560	5419	7078	7234	4378	7147	13824	7048	7371	4806	3076
Profit (deficit) / water sold	Cedis / m3	(1922)	0	1661	1984	1211	(533)	(3637)	(2974)	(1823)	(2694)	(9807)	(2734)	(3262)	(174)	1891

Note: Assuming 60% sales yield, i.e. 40% non-revenue water
Assuming average tariff as recorded in year 2003

Attachment A3 – Ghana Water Company Ltd – Water Tariff and Cost Absorption

	2002	2003
	Cedis x 1000	Cedis x 1000
<u>Turnover</u>		
Water sales	301,390,352	401,658,786
Other income	<u>14,098,346</u>	<u>13,577,140</u>
	<u>315,488,698</u>	<u>415,235,926</u>
Add 25% of abnormal loss (3/2 x 301,390,352)	<u>150,695,196</u>	<u>200,829,393</u>
Total expected income	466,183,894	616,065,319
Less operating expenditure	<u>343,081,159</u>	<u>430,072,695</u>
Operating surplus	123,102,735	185,992,624
<u>Less non-operating cost</u>		
Interest on loans	346,688,230	57,680,892
Exchange loss	<u>100,080,057</u>	<u>107,828,581</u>
Surplus (deficit) for the year	(323,366,552)	20,483,061
% of cost absorbed	<u>(466,163,894)</u> (789,849,446)	<u>(616,065,319)</u> (595,582,258)
	= 59.02%	=103.43%

Notes:

1. After the loan relief granted by the Government of Ghana to GWCL in 2003, interest on loan and exchange loss, i.e. cost of capital, reduced considerably.
2. It is doubtful that GWCL could achieve 25% non-revenue water given the present conditions of plant and machinery.

Attachment B – Computation of headline efficiency

	UNIT	1998	1999	2000	2001	2002	2003
Water production.	Mill m ³	183.6	194.56	184.95	188.25	205	205.19
Water sales	Mill m ³	91.53	87.91	89.97	89.97	85	88.13
Billing	Bill cedis	82.71	106.88	125.782	212.57	303.08	403.99
Collection*	Bill cedis	70.48	99.04	118.65	179.46	269.27	377.99
Headline efficiency	%	42.5	41.9	45.9	40.3	36.8	40.2

* 100% government collection

Attachment C – Extract from the 1999 – 2001 GWCL Corporate Plan

2.1.1 WATER PRODUCTION

A number of projects on the rehabilitation of GWCL's broken down water systems have been under implementation since 1990. The largest of these – the Water Sector Rehabilitation Project – now in the physical construction phase is nearing completion.. Increase in water production has therefore been marginal and fluctuated over the period as shown in the trend below:

Year	1994	1995	1996	1997
Production (MM ³)	187	186	191	186

2.1.2 WATER SALES

Water sales in cubic metres in 1994 was 82mm with a marginal increase of one per cent in 1995. The increase was mainly due to greater awareness in measuring consumption at the user levels through metering and improved estimation of average consumption for those not metered. Contrary to expectation, there was a decrease in water sales between 1995 and 1996. The decrease was the result of mass disconnection and the increase in defective meters in 1996. With further metering, water sales climbed back strongly to 87 mm in 1997.

Year	1994	1995	1996	1997
Water sales (MM ³)	82	83	82	87

Attachment D – Background information and definitions

Non-Revenue Water (NRW) and the IWA Water Balance

Although the term Non-Revenue Water is self-explanatory, its definition shall be given, along with IWA standard definitions that are relevant when talking about water loss reduction. Additionally, the new, standardised IWA water balance (Alegre H.et al., 2000, Hirner W.et al, 2000) demonstrates how NRW fits into this concept.

Definitions of principal components of the IWS water balance are as follows:

- *System Input Volume* is the annual volume input to that part of the water supply system to which the water balance calculation relates
- *Authorised Consumption* is the annual volume of metered and/or non-metered water taken by registered customers, the water supplier and others who are implicitly or explicitly authorised to do so, for residential, commercial and industrial purposes. It includes water exported.
- *Water Losses* is the difference between System Input Volume and Authorised Consumption. It consists of Apparent Losses and Real Losses.
- *Apparent Losses* consists of Unauthorised Consumption and all types of inaccuracies associated with metering.
- *Real Losses* on mains, service reservoirs and service connections, up to the point of customer metering. The annual volume lost through all types of leaks, bursts and overflows depends on their individual frequencies, flow rates and duration.
- *Non-Revenue Water (NRW)* is the difference between the System Input Volume and Billed Authorised Consumption. NRW consists of:
 - Unbilled Authorised Consumption (usually a minor component of the Water Balance)
 - Apparent Losses
 - Real Losses
- **Note:** *Unaccounted-for Water (UfW)* should not be used any more, since all losses can be accounted for. However if the term UfW is used, its definition is the same as NRW.

System Input Volume	Authorised Consumption	Billed Authorised Consumption	Billed Metered Consumption (including water exported)	Revenue Water
			Billed Unmetered Consumption	
		Unbilled Authorised Consumption	Unbilled Metered Consumption	Non- Revenue Water (NRW)
			Unbilled Unmetered Consumption	
	Apparent Losses	Unauthorised Consumption		
		Metering Inaccuracies		
	Water Losses	Real Losses	Leakage on Transmission and/or Distribution Mains	
			Leakage and Overflow at Utility's Storage Tanks	
Leakage on Service Connections up to point of Customer metering				

Figure 1: IWA 'Best Practice' Water Balance and Terminology (NRW and its components shaded grey)

Attachment E – Revaluation / depreciation of fixed assets

A Fixed Assets Revaluation Study was undertaken by Streskon Engineering Consultancy and Quans Inter-Continental Associates Limited in 1993. Their final report was published in November 1994 and the figure for the revalued assets went into our accounting records in 2001:

When assets are re-valued, the following are the effects:

- 1 There is an increase in the value of most fixed assets.
- 2 The difference between the old book value and the new value is transferred to Capital Surplus Accounts.

We wish to make the following declaration.

- 1 Our method of depreciation is the straight line and this has never changed.
- 2 Every year, there are a lot of additions to Fixed Assets through purchases and assets sold as scrap are deleted from the accounts.

The Fixed Assets Register is always updated and available in the Head Office.