

GHANA WATER COMPANY LIMITED



PROPOSALS FOR REVIEW OF AGGREGATE REVENUE REQUIREMENT AND TARIFF

APRIL 2022

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1. Introduction

1.1 Brief Background

Ghana is in a period of rapid urbanization. Ghana's urban population has more than tripled, rising from 4 million to nearly 17.5 million people over the last three decades. Ghana Statistical Service figures indicate that a little over half (56.7%) of Ghana's population live in urban areas. Migration from rural areas to towns and cities is driving urban growth.

The rapid rate of urbanization outstrips current levels of urban water supply. Ghana Water Company Limited (GWCL) which is the urban water utility currently operates ninety (90) urban water supply systems throughout the country with an average production of about 881,711m³ per day as against a daily potable water demand estimated at 1,574,799m³ per day. Water is therefore rationed to costumers due to the high demand for water services.

The existing water supply infrastructure (treatment facilities and pipelines) and water sources are old and inadequate hampering full capacity production. A number of water supply systems are over 50 years now. The yields from supply sources are thus no longer able to meet current demand. The quality of water resources and abstraction points are also increasingly being degraded as a result of encroachment, poor agricultural practices, housing, river and small scale illegal mining ('Galamsey'), sand winning, commercial and industrial activities. Following this, rainfall variability has increased with dry seasons becoming more pronounced. This leads to reduction in production volumes during these periods.

Other issues and challenges facing the urban water supply sector include:

- Difficulty in full setting full cost recovery tariffs.
- Inadequate revenue and investment, in large part of overaged facilities e.g. Kpong-Tema distribution line designed to last for 30 years is now 55 years.
- Low service quality and tariffs not linked to levels of service.
- Huge legacy debt that has become a barrier to capacity expansion works.
- Lack of integration of spatial planning with water provision.

In urban areas, populations with access to basic drinking water services increased between 2013 and 2015, with the highest coverage being 88% in 2015, representing 3.5 million additional people covered compared to 2014. This immense increase was a result of the completion of major urban water rehabilitation and expansion works. However, 1.4 million people in urban areas still lack access to basic drinking water services and 6.7 million lack access to safely managed drinking water. Many of those without access to basic and safely managed drinking water live in peri-urban areas and urban poor communities¹.

The Water Sector Strategic Development Plan (2012-2025) which acknowledges the need to chart a strategy for providing water services to these areas is helping to address the growing phenomenon of inadequate safe water delivery in peri-urban settlements. `

¹ Safe Water Network (2017), 'Ghana Sector Review: Scaling Small Water Enterprises'

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Similarly, among the urban poor, water can be a critical resource in short supply. GWCL has therefore set up a Low-Income Customer Support Department (LICSD) to deliver improved services to targeted low income urban poor areas.

The Government of Ghana is committed to expanding access to safe water supply services in urban areas with particular focus on improving water production and expansion of distribution systems and ensuring sustainable financing of the sector. It is estimated that about \$2billion will have to be invested in water production to help increase current urban coverage to 100% country-wide by 2025².

Notwithstanding the challenges mentioned above, it is important to consider the broad sectoral focal areas that impact on water operations. These include sustainable water sources, access to potable water, sustainable financing, improved public private partnerships, capacity building, good governance, good research and development, monitoring and evaluation, water safety and customer interest/education.

GWCL therefore has embarked on an image redeeming mission, for transformation into a "world class utility company". We therefore call on our Regulator, the PURC, to provide every necessary support to enable us turn things around.

1.2 Rationale/Objectives Underpinning Tariff Submission

Like any utility, GWCL is expected among others to:

1. Provide services that are safe, desirable, and affordable to consumers; and
2. Ensure an institutional and commercial system capable of recovering costs.

GWCL must at least recover its costs if we are to sustain our operations. Over the years, however, the approved tariffs have not been full cost reflective. This has led to the inability of GWCL to raise enough revenue to finance the much needed capital investment projects, with a consequent unsatisfactory level of service.

Below are some major issues which have prevailed since the last tariff adjustment, and which have necessitated this review.

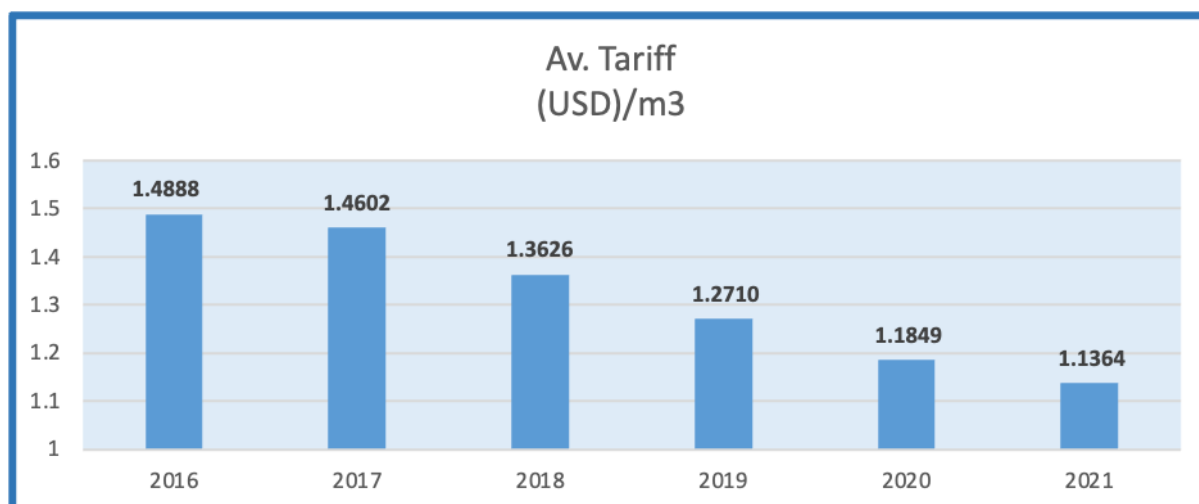
Inadequacy of tariff to carry out urgent repairs of assets and minor extensions

Unlike the previous years where the Automatic Tariff Adjustment Formula (ATAF) has been applied every quarter, PURC has not applied it for some time now. In real terms the average tariff per cubic meter in 2019 was USD 1.27, but has reduced to USD 1.13 as a result of the cedi depreciation over the period as shown in the figure below. This has affected our ability to carry out repairs and replacement of aged and obsolete equipment and pipelines, and other critical assets as would be expected and has given rise to high levels of NRW. As part of this proposal GWCL has included measures to reduce NRW for the consideration of PURC.

The PURC should also play a significant role in making water services available to low income dwellers in the country through the review and approval of a "GWCL Low Income Distribution Extension Fund". The terms which should cover this arrangement would be that GWCL shall extend pipelines to low income communities and new consumers.

² GWCL Corporate Plan, 2018-2022, Accra

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The current domestic tariff (0-5m³) of GHS 3.29 per m³ is still lower than what the poor in the rural areas pay, which is about GHS 10 per m³ on the average. In peri-urban areas in the cities, the poor are reported to pay more than the lifeline tariff. The inadequacy of the tariff is reflected in low Operating Cost Coverage Ratio and a low Assets Turnover ratio as well as mounting indebtedness as described below:

Re-valuation of Assets

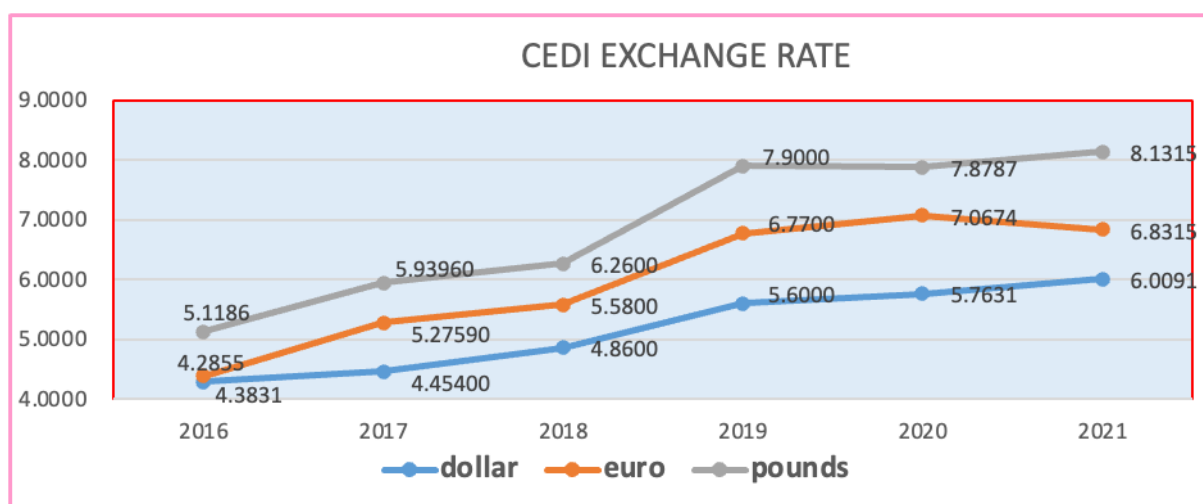
Prior to 2018, GWCL's assets base was very low because the assets had not been revalued since 1999. In 2018, GWCL carried out a re-valuation of its assets. The revalued assets (up from about GHS 2.2 billion to GHS 17.2 billion) which now reflect true replacement/fair value will enhance the value of the company as well as serving as potential collateral to raise credits for the expansion of the company in the areas of building new water supply systems and extending the distribution network to the underserved populace.

This will afford the opportunity to get a fair return on the assets when establishing the tariff, since the return will be calculated on the fair value of the asset. When the tariff is adequately adjusted to reflect recovery of GWCL's full costs, GWCL will be able to borrow from financial institutions to embark on viable projects.

Exchange rate fluctuation/ Depreciation of the cedi

Since the last major tariff adjustment in 2019, the Cedi exchange rate of all the major trading currencies with Ghana have consistently depreciated. For instance, the dollar cedi exchange rate has increased from 5.60 (end of 2019) to 6.0 (end of 2021) according to the Bank of Ghana inter-bank foreign exchange rate. The trend is depicted in the graph below.

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Source: GCB Bank

On-lending of Grants and Loans by Ministry of Finance (Debt Overhang)

Ministry of Finance (MOF) continues a policy on Grants and Loans contracted for or guaranteed for Projects to SOEs of which GWCL and Water Sector projects are of no exception. By this policy, MOFEP signs loan agreements with GWCL at an interest rate of LIBOR plus 4% interest rate over a period not exceeding 15 years. Seven (7) such on-lending project agreements have been signed with MOFEP totaling USD 1,037,117,727.30 or GHS5,973,798,109.25) at the rate of 5.76 at the beginning of 2021 and now gradually increasing to GHS6,222,706,364.8 at the rate of 6.00 in December 2021.

Currently we are saddled with a monthly loan repayment of US\$ 7.93 million (GHS47.58 million) which is 47.15% of average monthly revenue collection of GHS100.90 million.

Considering this, GWCL has no option but to recover such Loans and Grants through the tariff for onward payment to MOF.

Below is a table detailing the on-lend loans;

<u>LOAN NAME</u>	<u>PURPOSE OF LOAN</u>	<u>DATE OF LOAN</u>	<u>TENURE OF LOAN</u>	<u>LOAN AMOUNT</u>	<u>BIANNUAL REPAYMENT</u>	<u>INT RATE</u>
AKIM ODA	WATER SUPPLY PROJECT	25-08-15	15 YEARS	165,615,426.00	7,912,714.32	5%
WA	WATER SUPPLY PROJECT	25-08-15	15 YEARS	55,500,000.00	1,996,829.97	1%
GAMA WSP	WATER SUPPLY PROJECT	14-07-14	20 YEARS	50,800,000.00	1,968,404.15	2%
CAPE COAST WSP	WATER SUPPLY PROJECT	19-09-14	15 YEARS	7,288,704.30	242,956.81	0%
CHINA GHEZOUBA	WATER SUPPLY PROJECT	25-08-15	15 YEARS	276,250,000.00	10,704,166.28	2%
VARIOUS WATER PROJECTS	WATER SUPPLY PROJECT	02-11-15	15 YEARS	150,806,797.00	5,843,478.84	2%
URBAN WATER PROJECT	WATER SUPPLY PROJECT	25-09-14	20 YEARS	96,350,000.00	8,761,193.04	16.50%
3Ks	WATER SUPPLY PROJECT	28-08-15	15 YEARS	234,506,800.00	10,015,644.30	3.36%
				1,037,117,727.30	47,445,387.71	

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CAPITAL STRUCTURE

EQUITY	2018	2019	2020	2021
Stated Capital	1,250,000	1,250,000	1,250,000	1,250,000
Government Deposits for Shares	193,226,221	193,226,221	193,226,221	193,226,221
Developing Financing	1,772,403,020	1,044,807,142	186,308,186	502,908,993
Capital Surplus	9,406,577,302	8,690,567,451	7,988,740,691	7,200,099,135
Income Surplus	(94,838,330)	(136,398,978)	(1,990,301,178)	(2,756,017,051)
TOTAL EQUITY	11,278,618,213	9,793,451,836	6,379,223,920	5,141,467,298
 TOTAL LOANS	 1,127,138,685	 4,846,456,587	 4,213,028,812	 4,632,701,881
	<u>12,405,756,898</u>	<u>14,639,908,423</u>	<u>10,592,252,732</u>	<u>9,774,169,179</u>

Proportion of Capital Structure

Loan Capital	9%	33%	40%	47%
Equity/Share Capital	91%	67%	60%	53%

Land and Crop Compensation

In carrying out capacity expansion and pipe-laying projects, GWCL is usually confronted with the issue of compensation to landowners who are adversely affected by these projects.

GWCL had to make the payments from its revenues generated from the tariff in order to complete the projects although the approved tariff does not cover compensation for land and crops. To mitigate the effect of such payments on GWCLs finances, we have included the cost of crop and land compensation in this tariff build-up.

1.3 Highlights of Major Issues Which Describe Structure of Tariff Submission)

Domestic consumption constituted 67% of total volume of water sold. Commercial, Industrial and MDA consumptions accounted for 14% and 5%, and 10% respectively. In terms of customer strength, domestic customers make up about 87% of the total number of customers but contributed a mere 57% of our total billing.

Developing countries have often used the price of a first block as a social tariff or lifeline, so that the poor can have access to at least a minimum quantity of safe water at a subsidized price. Most of the policy debates over the impact of tariffs on equity revolve around this issue and whether it is actually benefitting the poor.

The current tariff, cater for lifeline tariff block of 0-5m³ for domestic consumers. Having operated this scheme for the past two years, we wish to propose that the current situation is maintained.

Water sold to ocean going vessels (by Ghana Ports and Harbor Authority)

The current tariff approved by PURC for water sold by GHAPHA to ocean going vessels is set at GHS 125.868266 per cubic meter. GWCL have concerns with consumptions supplied for billing ocean going vessels by GHAPHA. In 2021, Average monthly consumption for ocean going vessels supplied for billing was 882m³ for both Takoradi and Tema ports constituting only 4% of their average monthly bulk consumption (23,632m³). Based on the above GWCL is proposing one separate tariff for all ports and harbours authority nationwide to address the issue.

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Supply of Bulk Water to Community Water and Sanitation Authority

GWCL has entered into an agreement with Community Water and Sanitation Authority (CWSA) since June 2020 where GWCL supply bulk portable water to serve some communities in the Central Region at a negotiated rate of GHS 2.50 per cubic meter. The category of service assigned is 601 (Bulk Supply). As at December 2021 average volume of water GWCL supplied to CWSA was 58,811m³.

Domestic Category

GWCL proposes the renaming of domestic category to Residential.

Non-Residential

GWCL also proposes to regroup shops, churches and mosques from the commercial category and name them Non-Residential and apply one tariff.

Commercial Category

GWCL is proposing to merge Special Commercial and Sachet Water Producers with Commercial category.

2. Initiatives Undertaken

To ensure adequate and up-to date water systems to meet the demand for water supply in the urban /peri-urban areas of the country, GWCL has undertaken a number of projects including capacity expansion, service delivery improvement projects and system loss reduction projects. A detailed list of all completed and on-going projects are outlined below.

The projects valued are shown in the table below.

Project Status	No.	Total Amount GHS (million)	Total Amount USD (million)	Total Amount British Pound (million)
Completed	20	20.85	821.93	178.58
Ongoing	11	16.21	213.04	2.19
Total	31	37.06	1,034.97	180.77

However, water infrastructural growth rate has not kept pace with economic and population growth, thereby making it impossible to satisfactorily serve the needs of our customer.

Projects which are at pre contract signing stage have also been defined below;

2.1 Projects Undertaken

COMPLETED PROJECTS

Several water supply projects were completed from 2011 to June, 2020 in the Greater Accra, Eastern, Central, Brong Ahafo and Ashanti Regions of Ghana.

Details of individual projects and their respective impact on GWCL's systems and level of service rendered to customers are provided herein.

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No.	Project Name	Description	Cost	Areas Served
1	Koforidua Water Supply Project (Phases I, II & III)	Construction of 4.2 million gallons/day (19,200m ³ /day) water treatment plant, laying and reinforcement of transmission lines as well as improvement and extension of the distribution network	51.25 million Euros.	Okrase, Otoko, Ada, Effiduase, Jumapo, Asokore, Suhvien and all villages along the transmission line from Oterkpolu to Koforidua.
2	ATMA Rurals Water Supply (North & South of Kpong)	<p><u>North of Kpong</u> Construction of 14,000m³/day water treatment plant, supply and laying of transmission pipeline, supply and laying of distribution pipelines</p> <p><u>South of Kpong</u> Construction of 28,000m³/day water treatment plant, supply and laying of transmission pipeline (59km of 600mm and 7km of 400mm), distribution improvement works (51km of 100mm) and construction of 4No. reservoirs.</p>	<p><u>North of Kpong</u> 19,698,000 USD</p> <p><u>South of Kpong</u> 41,029,000 Euros</p>	Kpone, Prampram, Old Ningo, New Ningo and Dahwenya, Michel Camp, Afiencya, Doyum, Kodiabe, Agomeda, Medie, Ayornya, Ayikuma, Menyum, Dodowa, Balawshi, Oyibi, Amrahia, Amanfro, Oshiyie, Frafraha, Abokobi, Pantang, Akrade, Senchi, New Senchi through Atimpoku, Juapong, Frankadua, Apeguso to Aboasa and then from Agomanya, Odumasi, through Somanya to Sra, Ogome, Akorley, Asesieso to Akwamufie, Apirede, Adukrom, Awukugua, Dawu, Akropong, Mamfe, Amanokrom, Mampong, Tutu, Obosomase, Ahwerease, Aburi, Gyankama, Kitase, Berekuso, Peduase and Ayi Mensa
3	Kwanyaku to Kasoa Interconnection Water Supply Project	Transmission of water from Kwanyaku Treatment Plant to a reservoir in Kasoa	12.23 million Euros.	Greater Accra Metropolitan Area (GAMA), namely East Legon, Madina and Adentan.
4	Mampong Water Supply Project	Rehabilitation of existing water treatment plant (2,500m ³ /day) and construction of a new water treatment plant (10,500m ³ /day)	23,112,000 USD	Darmang, Daaho, Basafour, Besease, Kyeremfaso, Krobo, Mpenya, Dadease, Bonkron, Nsuta and Beposo

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5	Kpong Water Supply Expansion Project	Construction of a new 186,000m ³ /day water treatment plant, supply and laying of new transmission mains from Kpong through Dodowa to Accra	273 million USD	Adenta, Madina, Kwabenya, Ashongman, North, East, and West Legon, Ashaley Botwe, Haatso, Boi, Asofaa and Dome
6	Kpong Intake Rehabilitation and Expansion Project	Rehabilitation of the existing Kpong intake station and installation of 15,000m ³ /day water packaged plant.	16.57 million Euros	
7	Teshie-Nungua Desalination Plant Project	Installation of 60,000m ³ /day Sea Water Reverse Osmosis (SWRO) plant.	115 million Euros	Teshie, Nungua, Burma Camp, GREDA Estates, Spintex, Baatsona, Sakumono, parts of La-Dadekotopon Lashibi,
8	Essakyir Water Supply Project	<u>Phase 1</u> Construction of new water treatment plant of capacity 3.2 million gallons per day, laying of 38km transmission mains and distribution network improvement works (15km) <u>Phase 2</u> Distribution pipeline improvement works	23.49 million Euros	Ekumfi Otuam, Mumford, Dago, Mbroboto, Ekuampoano, Muna, Aboano, Sefara, Esuehyia, Akra, Asaafa, Etwaa, Nakwa, Asokwa, Abeka and Ekumfi Swedru.
9	Peri –Urban Water Supply Project at Berekum	Drilling and mechanization of boreholes (506,000 gallons per day), supply and laying of 8.52km transmission and 19.62km distribution pipeline and construction of 41 No. stand pipes	1.41 million Euros	
10	Kumasi Water Supply Project (Additional Works)	Construction of 27,000m ³ (6million gallons) a day water treatment plant at Barekese, transmission/distribution pipeline improvement works and reforestation.	13 million Euros	

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11	Five Towns Water Supply Project	Installation of 4 No. water packaged plants (totaling 1.54 million gallons per day) and transmission / distribution pipeline improvement works.	7.9 million Euros	Osenase, Apedwa, Anyinam, Kibi and Kwabeng.
12	Civil and Electro Mechanical Works for the Rehabilitation and Expansion of Breman Asikuma, Dunkwa - Offin Water, Tamale, Wa, Navrongo, Bawku, Berekum, Kpando, Peki, Aboso, Bogoso, Elubo, Axim, Agona and New Edubiase Prestea and Suhum Supply Systems	Construction of a Water treatment plants with transmission, distribution pipelines and mechanization of Boreholes in the selected townships.	83.62 million Dollars plus 10.34 million Ghana Cedis	Breman Asikuma, Dunkwa - Offin, Tamale, Wa, Navrongo, Bawku, Berekum, Kpando, Peki, Aboso, Bogoso, Elubo, Axim, Agona, New Edubiase Prestea and Suhum Supply Systems
13	Nsawam Water Supply Rehabilitation and Expansion Project - Phase I	Construction of a new 1.7 million per day treatment plant and distribution improvement works.	11.7 million Euros	Nsawam and its environs
14	Kwahu Ridge, Konongo and Kumawu (3Ks) Water Supply Project	rehabilitation of the Kotoso water treatment plant (WTP) to its installed capacity, and expansion of the Konongo WTP, construction of a new WTP at Kumawu and transmission /	252 million USD	Kwahun Konongo and Kumawu

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		distribution pipeline improvement works		
15	Wa Water Supply Project	Construction of a 15,000m ³ /day (3.3 million gallons per day) water treatment plant, 35km transmission pipelines and 32km distribution network improvement works	55.50 million USD	Wa Metropolitan Area, University for Development Studies Campus, Jamgoasi, Kong, Guo, Pase, Dorimon, Boro, Siriyiri, Bamaho, Boli, Buro, Chaira, Kolongo and Kperisi.
16	Cape-Coast Water Supply Project	Construction of approximately 19.5km of 500mm Ductile Iron pipeline, construction of approximately 23.5km transmission extensions of 200/315/500mm diameter HDPE pipelines, construction of reservoirs and booster stations	20 million Euros.	Cape Coast, Moree, Abura, Mempeasem, Brimsu road (Akaikrom), Kwaw Pro, Apewosika, Amamoma, Kwesi Pra, New Ebu, Abakrampa, Yesunkwa, Bronibima Estate Annex, Sanka, New Abina/SSNIT, Yayakwano, Jukwa
17	Pipeline Replacement and Reservoir Maintenance Works		9.91 million Ghana Cedis	Nationwide

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18	Akim Oda, Akwatia and Winneba Water Supply Project	Constructio of 35,000m3/day capacity water treatment plant Rehabilitation of the Winneba Water Treatment Plant to its original capacity of 3 million gallons a day.	164.94 million USD	<p><u>Akim Oda</u> Akim Manso, Atiankama Nkwanta, Aboaboa and Batabi</p> <p><u>Akwatia</u> Bawdua, Topreman, Bamenase, Ghana Consolidated Diamond Camp, Asubone Camp No 4, Anhwiaso and Moframfadwen.</p> <p><u>Winneba</u> Mpota, Gyahadze, Okyereko, Nsuekyir, Esubonpanyin, Pomadze, Ansafu, Bewadze, Gomoa Mampong, Dag, Mankoadze, Mprumem, Nkroful, Onyadze, Otsew, Simbrofo, Ankamu and Apam.</p>
19	Greater Accra Metropolitan Area (GAMA) Sanitation and Water Project	Supply and laying of approximately 290km of pipeline works of sizes varying from 110mm to 630mm in GAMA, particularly, low income urban communities. Procurement and installation of 40,000 water meters	51 million USD	Manmomo, Gbegbeyise, Chorkor, Manponse, Glefe, Teshie-Nungua, Adjei Kojo, Tema, Ashaiman, Bankuma, Zinginshore, Taifa, Dome, Madina, Pantang, Sapeiman, Amasaman, Olebu, Amamorley, Pokuase, Tetegu, Amanfrom, etc
20	Pipeline Replacements, Reinforcements, Mains Extensions and Reservoir Maintenance Works	Replacement of pipe works such as steel, HDPE and uPVC material with sizes ranging from 110mm to 1050mm totaling approximately 761km. Maintenance works on storage reservoirs Repair works for treatment plants nationwide.	Out of GHS 126,2,381.83 only GHS77,214,167.29 has been paid	

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ON-GOING PROJECTS

In our bid to expand our existing systems to meet the water demand of customers and also to reduce system losses and bring it to the minimum allowable loss of 30%, GWCL is embarking on a number of projects.

No.	Project	Description	Completed Year	Cost	Population/Towns Served	Status
1	Sogakope-Lome Water Supply Project	411,873m ³ /day of potable water will be produced and about 80% will be delivered to Lome. 20% of the remaining production will be used by the communities located along the coast and main highway from Agordome to Aflao		Preparatory phase 2,195,000.00 Euros	5.8 million population (Ghana and Togo) will be served by the year 2040 Communities to be Served Agordome, Sogakope, Abor, Agbozume, Akatsi, Dzodze, Denu and Aflao in Ghana and Greater Lomé area plus cities of Akepe, Noepe, Badja, Keve and Assahoun (Ave Prefecture) in Togo	Procure Contractor before February 2022
2	Keta Water Supply Project	Rehabilitation of existing water treatment plant to restore it to its installed capacity of 7,200m ³ /day and Construction of a new water treatment facility of capacity 35,044 m ³ /day to meet the current and future water requirements of the people up to the year 2030.	32 months after commencement	93 million USD	Agordome – Sogakope, Keta, Anloga and all communities located along the highway between Agordome and Keta.	Contractor is currently on site carrying out detailed designs for the works implementation

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3	Upper East Region Water Supply Project	Construction of 20,000m ³ /day water treatment plant, 63km transmission and distribution network to improve upon the reliability of water supply within the Bolgatanga, Navrongo, Paga and Bongo areas As part of the project, the existing water supply system in Veia will be rehabilitated to produce 5,000 m ³ /day water to augment supply to Bongo and the northern part of Bolgatanga		37,683,266 Euros	Tono, Gia, Navrongo, Paga, Bolgatanga, Bongo and its environs.	An addendum to the existing contract has been approved to provide 53km distribution pipelines to extend water supply to the people of Zuarungu and its environs at an additional cost of 7,012,498 Euros.
4	Techiman Water Supply Rehabilitation and Expansion Project	Rehabilitation of the existing 4,500m ³ /day capacity water treatment plant Construction of a new 17,000m ³ /day water treatment plant, 27km of transmission pipelines and 147km of distribution pipelines	36 months after commencement	100 million Euros	Tadieso, Kuntunso, Ahansua, Techiman, Tacofiano, Tuobodum, Gyama, Krobo, Akrofrom, Aworowa, Akurugu Daboo, Tanoso, New Techiman, Afrantwo, Akomadan, Nkenkasu.	Parliamentary Approval has been given for the loan agreement and the selection of Consultant for the design of the project is in process.

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5	Sunyani Water Supply Project	<p>Phase 1 Construction of a new intake with capacity 57,500m³/day (12.8MGD), new water treatment plant with capacity 55,000m³/day (12.1MGD), 93km of transmission pipeline extension, 16,250m³ of storage facilities, distribution network expansion of various diameters totalling 100km and 49No. standpipes including the supply and installation of 2500No. individual household connections.</p> <p>Phase II Construction of a 21m high and 1000m long dam on the Tano River, distribution pipeline extension of 210km, 147No. standpipes including the supply and installation of 7500No. individual household connections.</p>	Phase 1 36 months after commencement	Phase I 133,332,500.00 Euros	Sunyani and its environs (Target population of 405,093 people by 2040)	Phase 1 Parliamentary approval has been granted for the commercial contract
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6	Sekondi – Takoradi Water Supply Rehabilitation and Expansion Project	<p>Phase 1 Construction of a new weir and intake with capacity 220,000m³/day (48.9MGD), new water treatment plant with capacity 100,000m³/day (22.2MGD), 0.6km of raw water transmission pipeline, distribution pipeline expansion of various diameters totaling 25km and 5,000m³ of storage facilities.</p> <p>Phase II Construction of a new water treatment plant with capacity 100,000m³/day (22.2MGD), 47km of transmission pipeline extension, distribution pipeline expansion of various diameters totaling 273km, 25,000m³ of storage facilities, 150no. standpipes including the supply and installation of 10,000no. individual household connections.</p>	40 months after commencement	Phase I 70 million Euros	Sekondi-Takoradi and its environs (target population 1,417,081 people by year 2040)	Phase 1 Parliamentary approval has been granted for the commercial contract and sod cutting has been done for the commencement of the project
7	Rehabilitation and Upgradation of Potable Water System in Yendi	Construction of a new intake with capacity 16,000m ³ /day (3.5MGD), new water treatment plant with capacity 15,000m ³ /day (3.3MGD), 27km of transmission pipeline, booster station with a ground reservoir and 4 new elevated water reservoirs, distribution network of various diameters totalling 50km and standpipes.	36 months after commencement	30 million USD	Yendi (Target population 133,000 people by year 2040)	Detailed designs is substantially completed pending procurement of a contractor for the works implementation
8	Wenchi Water Supply Project	Construction of 10,700m ³ /day water treatment plant, transmission and distribution pipeline works	36 months after commencement	32.7 million Euros	Wenchi (target population 93,000 people by year 2040)	Cabinet and parliamentary approvals have been secured. Legal opinion

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						obtained from Attorney General's Office.
9	Damongo Water Supply Project	Construction of a high lift pumping station with a design capacity of 9,600m ³ /day (2.2MGD), 115km of transmission pipeline extension, 4,000m ³ of storage facilities, distribution network expansion of various diameters and the supply of water	18 months after commencement	49.0 million USD	Damongo and its environs (target population of 80,000 people by year 2040)	The contractor, M/s Biwater International has subsequently completed the development phase of the project and submitted the outputs for a Value for Money audit which is currently ongoing.
10	Tamale Water Supply Project	Construction of a new intake with a design capacity of 145,300m ³ /day (32MGD), a new water treatment plant with a design capacity of 135,000m ³ /day (30MGD), 45km of transmission pipeline extension, 40,000m ³ of storage facilities, distribution network expansion of various diameters totalling 426km and the supply and installation of 10,000No. individual household connections material	36 months after commencement	223,287,979.50. USD	Tamale and its environs (target population 792,000 people by year 2040)	The contractor, M/s Biwater International has subsequently completed the development phase of the project and submitted the outputs for a Value for Money audit which is currently ongoing.

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11	Nationwide Water Network Management Enhancement Project	i. Supply of office equipment, vehicles, GPS equipment, leak detection & repair material ii. Renovations of 11 offices plus the construction of 2 new office buildings iii. Piloting of hydraulic network modeling in Tema Region, leakage management in Kaneshie district and prepaid metering in Accra East district.	December 2021	8.0 million Euros	Nationwide	
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Completed Production Improvement Works

GWCL has made significant investments to improve water production activities at various systems nationwide. A summary of the major interventions undertaken in the various regions (from 2019 to 2021) and its associated cost are detailed in the table below.

No.	REGION	DESCRIPTION OF ACTIVITY	MONTH/ YEAR	STATION/ LOCATION	COST (GHS)	IMPACT ON PRODUCTION
1	ATMA Productio n	Replacement of bridge wheels for seven (7) number clarifiers	Sept. 2019	Adam Clarke/Weij a	102,403.00	Increased water production due to improved performance of clarifiers.
2	ATMA Productio n	Rehabilitation of 2No. Raw water pumps for China Ghezouba Plant	Nov 2019 – Dec 2020	China Ghezouba Plant	240,000.00	Improved upon plant capacity utilisation.
3	ATMA Productio n	About sixty (60) number Filtrate Gate valves at the New Works Plant have been completely replaced	Nov. 2020	New Works/Kpo ng		Smooth operations of the plant due to replacement of the defective valves.
4	Brong Ahafo	Borehole pump replacement (3No.)	Jan. 2020	Berekum	21,945.00	Improved production activities
5	Brong Ahafo	Repair works on walls of reinforced concrete sedimentation tanks	2020	Abesim Headworks	377,315.00	Ensured sustainability and reliability of production
6	Central	Upgrading of Old works Air Blower	2019	Kwanyako	45,000.00	Reduction of backwash time which also improved water supply.

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7	Central	Installation of Automatic Voltage Regulators at both New works and Old works Highlift Stations	2019	Kwanyako	4,803,057.50	Stabilised power supply and eliminated down time due to low and high Voltages.
8	Central	Installation of Automatic Voltage Regulators at both New works and Old works Highlift Stations	2020	Brimsu	3,690,750.00	Stabilised power supply and eliminated down time due to low and high Voltages.
9	Central	Rehabilitation of 4No. old works filters (Replaced Nozzles, filter media and Valves)	2020	Brimsu	179,960.80	Improvement in filtration rate which improved old works production by 8%.
10	Central	Installation of Wash Water Pump at the Old Works	2020	Brimsu	97,000.00	The effective time for filter backwashing has reduced because of the superior efficiency of the new pumps.
11	Central	Dredging of Intake	2019	Sekyere Hemang Headworks	106,388.30	Increased the volume of the intake reservoir for smooth operations due to raw water availability.
12	Central	Replacement of all internal rotating parts (Impellers, shafts etc.) in all three Lowlift pumps	2019	Sekyere Hemang	190,000.00	Downtime due to breakdown of worn out parts was reduced.
13	Central	Replacement of 3No. Low lift pumps with complete new pumps	2020	Sekyere Hemang	2,352,960.00	The new pumps ensured continuous raw water abstraction hence increase in water production
14	Central	Installation of Automatic Voltage Regulators at Lowlift, Highlift and Mawukpor Booster Station	2019	Sekyere Hemang	5,663,900.00	Stabilised power supply and eliminated down time due to low and high Voltages.

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15	Central	Installation of Automatic Voltage Regulator at Highlift Station	2019	Baifikrom	500,000.00	Stabilised power supply and eliminated down time due low and high Voltages.
16	Central	Dredging of Intake	2020	Baifikrom	99,000.00	Increased volume of raw water available to pump into the IDA Dam
17	Central	Replacement of 2 No. Lowlift pumps	2020	Baifikrom	198,953.80	Improved water supply into the IDA Dam for further transmission to the treatment plant.
18	Central	Installation of 2No. Soft Starters for Lowlift Pumps	2020	Baifikrom	71,709.00	Reduced mechanical stresses which leads to pump failure. Improved availability and reliability of the pumps for increased production.
19	Central	Dredging of Intake	2019	Winneba	99,000.00	Increased the volume of the intake reservoir and made it possible for the plant to continue operation due to raw water availability.
20	Ashanti	Installation of Actuator drive valves	Jun. 2019	Barakese WTP, Achiase Booster	190,999.40	The installation of the Actuator Drive Valves improved operations of the Treatment Plant and saved large volumes of water that hitherto goes to waste as a result of worn out valve tongue and spindle nut of manually operated valves

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21	Northern	Replacement and upgrading of the defective raw water pipeline and rehabilitation	2018-2021	Salaga/ NR	360,276.40	Improved water production.
22	Northern	Dalun Raw Water pump rehabilitation	2018-2020	Dalun/NR	1,900,000.00	Increased water production
23	Volta	Installation of 2No. Submersible Dewatering Pump and Repair Kits.	Jan. 2020	Kpeve Headworks	339,000.00	Maintained Reliability of Supply.
24	Volta	Installation of 1No. 800KVA Automatic Voltage Regulator (AVR).	Jan. 2017	Kpeve Headworks	325,950.00	Improved stability of power supply
25	Volta	Installation of 2No. Submersible Dewatering Pump and Repair kits.	Dec. 2020	Agordome Headworks	181,187.64	Improved Reliability of water supply.
26	Volta	Installation of 3No. Centrifugal pump and VFD.	Aug. 2017	Anloga Booster	254,058.64	Improved Reliability of water supply.
27	Volta	Installation of 1No. Submersible pump and 30kw control panel.	Oct. 2020	Hohoe Headworks	198,254.00	Enhanced production activities
28	Volta	Installation of 2No. control panels.	Jan. 2020	Juapong Headworks	100,217.20	Ensured smooth and efficient operations of the plant

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29	Volta	Installation of 2No. Control panels (30kW and 45kW).	Jul. 2019	Juapong Headworks	98,845.00	Ensured smooth and efficient operations of the plant.
30	Volta	Installation of Automatic Electric Valves.	Aug. 2020	Kpeve Headworks	5,985,848.44	Optimized performance of filters and improved process reliability.
31	Eastern	Installation of 2No. submersible intake pumpset	2019	Begoro PCI	65,000.00	Improved water production in the region.
32	Eastern	Installation of 2No. Lowlift pumpset	2020	Densu intake - Koforidua	984,000.00	Increased production from an average monthly of 880,000m ³ to 1,000,000.00m ³)
33	Eastern	Installation of 4No. frequency drives	2020	Bukunor WTP	2,453,200.00	
34	Eastern	Replacement of 9No. non- return valves	2020	Bukunor WTP		
35	Eastern	Installation 2No. submersible intake pumps	2020	Bukunor WTP	939,978.00	
36	Eastern	Replacement of 14No. mechanical seals and 14No. shaft protection	2019	Bukunor WTP	281,877.40	

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37	Eastern	Installation of 2No. Lowlift pumpset	2020	Asamankese WTP	259,853.90	
38	Eastern	Installation of 2No. Feeder pumpset	2020	Asamankese WTP	190,636.00	
39	Eastern	Replacement of faulty communication system (remote operation of intake station)	2020	Kotoso WTP	50,000.00	
40	Eastern	Dredging of Nsawam raw water source	2020	Nsawam	294,456.00	
41	Eastern	Installation of 1No. submersible raw water pump	2021	Nsawam	197,000.00	
42	Western	Installation of 2NO. Air blowers	Feb. 2020	Inchaban Headworks (Filtration station)	1,044,994.00	Enhanced production process
43	Western	Installation of 2No. Wash water pumps	Feb. 2020	Inchaban Headworks (Filtration station)		Enhanced production process
44	Western	Installation of Control Panel for the Air blowers and the Wash water pumps	Feb. 2020	Inchaban Headworks (Filtration station)		Enhanced production process

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45	Western	Dredging of the intake area	Jan. 2019	Daboase and Bosomase intake stations	57,780.00	Volume of water abstraction Increased and affected production positively
46	Western	Replacement of broken headshaft of Daboase intake pump No.1	Oct. 2019	Daboase intake Station	120,203.00	Enhanced reliability of production equipment.
47	Western	Replacement of 2.5 MVA transformer to 5 MVA transformer and improved 11KVA mobile Transformer for intake	Nov. 2019	Daboase Substation		Enhanced utilization of production system
48	Western	Installation of 1No. additional Ritz vertical pumpset with its Variable Speed Drive control panel	Jan. 2020	Daboase Intake Station	4,780,427.00	Improved water production and reduced plant down-time
49	Western	Installation of Wash water and Air blower pumps were done	Jan. 2020	Daboase filter house	3,904,856.00	Volume of water abstraction Increased and affected production positively
50	Western	Dredging of Daboase Intake area	Feb. 2020	Daboase Intake Station	63,616.00	Improved raw water quality for enhanced production
51	Western	Replacement of 12No. 12 inches filter valves	Mar. 2020	Daboase Filter Station	547,776.00	Prevented highlift pumps from reverse rotation
52	Western	Desilting of Intake of accumulated Silt	Jan. 2019	Bonsa/Hea dworks		Increased volume of water produced (Improved Raw water flow from Intake)

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53	Western	Borehole Pumps & Panels Installation	Jun. 2019	Prestea		Increased volume of water produced (Increased production from Boreholes)
54	Western	30Hp/22kW Pumpset Installation	May. 2020	ABA Booster/ Tarkwa		Improved supply regime to supply areas.
55	Western	315KVA Transformer installation	Nov. 2020	Tamso Booster/ Tarkwa		Improved power supply for production
56	Western	Repaired faulty control panel	Dec. 2019	Elubo borehole 2		Reduced plant downtime and improved water production
57	Western	Replacement of burnt submersible pump	Sept. 2020	Elubo borehole 2		Improved water production
58	Western	Installation of new pumps and dosing pumps	Aug. 2020	Axim Headworks low lift and high lift	896,080.00	Reduced downtime due to equipment failure.
59	Western	Installation of submersible pump	Dec. 2020	Axim borehole 7		Improved water production
60	Eastern Region	Installation of 1No. out of 2No. pumps with Control Panels	2021	Nsawam Old Intake.	300,000.00	To enhance production

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61	Eastern Region	Rehabilitation of 1No. High Lift pump	2021	Kotoso WTP	253,000.00	For an improved water supply regime
62	Eastern Region	Installation of chemical dosing pumps and stirrers	2021	Various plants in the Eastern Region	2,507,520.02	For efficient chemical dosing processes
63	Eastern Region	Installation of 1No. High Lift pump-set and 2No. Low Lift pump-sets	2021	Dodi WTP	390,000.00	To improve upon water supply to supply areas
64	Volta Region	Rehabilitation of 1No. out of 2No. sand filters	2021	Kpeve Headworks	357,000.00	For efficient water filtration process
65	Northern Region	Provision of 3No. AVR's	2021	Nawuni intake, Dalun Headworks Bagaba Booster Station	2,610,423.00	For stable power supply for improved production.
66	Upper West Region	Rehabilitation of High Lift and IPS pumping equipment with new bearings.	2021	Jambusi Headworks	205,000.00	Improved pumping regime to supply areas

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67	ATMA Production	Supply and installation of 1No. Automatic Voltage Regulator (AVR) at Sowutuom Booster Station.	Jun. 2021	Sowutuom Booster Station	344,308.00	To improve water supply to distribution system at Sowutuom and its environs
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Completed Distribution Improvement Works

Mains Extensions

A total length of 661.4km mains extensions were developed between the years 2019 to 2021 at a total cost of GHS59,523,656

The table below shows breakdown of completed pipeline extension works on Regional basis.

Region	Length (m)	Amount (GHS)
Central	87,800	4,893,869
Tema	103,300	13,049,098
Volta	10,120	1,288,996
Upper West	22,700	1,805,216
Upper East	400	15,892
Northern	51,880	10,840,273
Ashanti North	73,600	5,848,103
Western	4,300	187,767
Accra West	165,800	10,200,676
Accra East	87,550	6,737,900
Eastern	51,950	4,410,815
Ashanti South	2,000	245,051
Total	661,400.00	59,523,656

New Service Connections (NSCs) increased from a monthly average of 3,950 to 4,400 in 2020 and 2021 respectively, representing 11% increase in service connections within the stated period.

Repair, Replace and Rehabilitate pipeline infrastructure

A total length of 12.63km of the distribution network are being replaced at a cost of GH¢4,186,288.61 to improve on flows to supply areas. The table below shows details of pipeline improvement works that were procured and undertaken in the year 2020.

Region	Areas	Length	Amount (GH¢)
Accra East	Doku, Maye Hot, Ashale Botwe, Ritz, East Legon, Kade	3,300	2,347,141.06
Accra West	Nyanyanor, Communis Maternity Area	9,000	709,406.55
Tema	Ashaiman Roundabout, Tema Community 9 Area, Free Zones area TEMA	330	1,129,741.00
Total		12,630	4,186,288.61

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Faulty/ Obsolete Meter Replacement

GWCL in 2019 planned to install 150,000 number mechanical domestic meters at a cost of GHS 30,750,000 and 80,000 smart meters at a cost of 65.41 million Euros respectively to replace faulty and obsolete meters nationwide. This was to ensure that all connections are metered in order to attain PURC benchmark of 100% metering ratio.

The replacement exercise temporarily stalled in 2020 due to the advent of the COVID-19 pandemic which limited accessibility of staff to customer premises from imposed Government restrictions on movement in the country.

As at 2021, 51,000 mechanical meters and 12,000 smart meters have so far been installed.

Zonal Metering

As part of GWCL's metering policy, 20 number bulk electromagnetic meters and sensors have been installed to measure flow to and from the three operational regions of GWCL (i.e. Accra East, Accra West & Tema).

In addition, a Control Room was set up for receiving, transmitting, and displaying the data from field devices. An online dashboard for data display and presentation has also been created which is available not only at the control room, but to all designated Engineers and officers of the company on their Mobile or Computer.

GWCL is now able to accurately determine volume inputs across its three operational regions.

Creation of District Metered Areas

GWCL in collaboration with WaterWorX (i.e. a partnership programme between GWCL and 10 Dutch Utilities Operators), has also piloted the creation of District Metered Areas (DMAs) Santeo (Tema) and Amasaman (Accra West) to accurately determine System Input Volume (SIV) and water sales in order to effectively manage NRW at the aforementioned Districts.

From August 2020 to December 2021, NRW declined from 72% to 19% and 56% to 23% in Santeo and Amasaman district respectively.

Various training programmes on NRW have also been held at the districts to create awareness and develop strategies for reduction based on the estimated levels of NRW.

We intend to further develop DMAs in other areas using the knowledge acquired from the pilot projects in GAMA.

Response to Bursts and Leakages

To enhance reliability of water supply to all supply areas, GWCL has identified the need to improve upon the response time for repairs of bursts and leakages. To this end in the 3rd quarter of 2020, GWCL procured sixty (60) number Isuzu trucks at total cost of GH¢15,480,000 which were allocated to all regions.

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Similarly, seventy-five (75) number double cabin pickups have been procured and allotted for District Operations as well as thirteen number (13No.) pickups for Non-Revenue Water Management Activities. It is expected that the acquisition of the new trucks and pickups would significantly reduce the response time and further minimize physical losses associated with these bursts and leakages in the distribution network.

Bursts and leakages Reporting System

GWCL has also initiated steps to integrate a leakage reporting system (i.e. collector app for ArcGIS) to accurately capture data on response time for repairs of bursts and leakages. The Collector App will help improve upon the current reporting structure for bursts and leakages and effectively monitor the activities of the districts from the aforementioned reports.

In 2021, a training programme was carried out involving staff from Head Office and the regional level. Subsequently, plans have been put in place to procure the required devices for full deployment of the App to all districts nationwide.

Availability of valves and fittings for mains extensions and repair works

GWCL has implemented the first phase of its framework contract with suppliers, to keep minimum stock levels of high quality valves and other fittings that are commonly used in mains extensions and replacement works. It is expected that, delays in maintenance/repair works due to unavailability of spares on-shelf would be curtailed during execution of the framework supply agreement.

Completed Transmission Improvement Works

Replacement of weak and perforated sections of Transmission Network

GWCL has carried out a number of transmission pipeline improvement works. The works include replacement of sections of 1,050mm diameter Kpong-Tema transmission pipeline, 315mm diameter Inchaban-Kojokrom to Sekondi Transmission pipeline, 400mm diameter Inchaban-Essipong to Sekondi Transmission pipeline and 315mm diameter Bonsa-Tarkwa Transmission pipeline.

See below details of transmission mains replacement works carried out in the Regions.

Transmission Pipeline	Length (m)	Diameter (mm)	Pipe Material	Cost (GH¢)
Bonsa-Tarkwa (Lot 1)	5,850	355	HDPE	4,564,129.00
Bonsa-Tarkwa (Lot 2)	5,850	355	HDPE	4,500,676.50
Bonsa-Tarkwa (Lot 3)	4,000	315	HDPE	3,209,305.65
Inchaban-Kojokrom-Sekondi	10,000	315	HDPE	8,754,800.88
Inchaban-Essipong-Sekondi	11,000	400	HDPE	14,738,579.8
Kpong-Tema	120	1,050	HDPE	1,200,000.00
Total	36,820			36,967,489.80

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Other Initiatives

New District Offices/Customer Service Centre

In order to bring services closer to customers and improve efficiency in service delivery, steps have been taken to split hitherto big districts into smaller and manageable units with full complement of staff and office and operational support equipment. The table below refers.

Region	No. of Districts (2019)	No. of Districts (2021)
Accra West	10	12
Tema	11	12
Volta	7	8
Eastern	10	11
Northern	6	7
Total	44	50

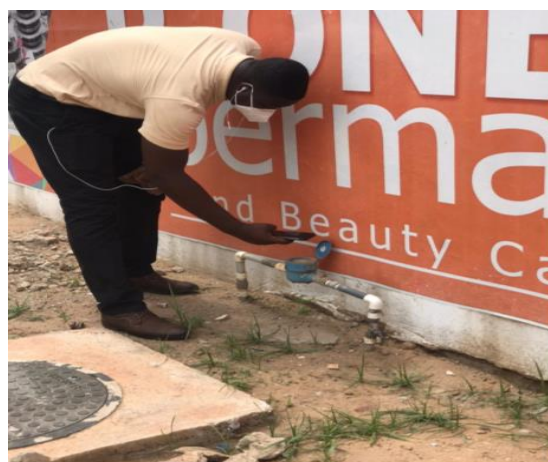
Management has opened more revenue collection points and electronic collection media for ease of payment of bills by customers. Apart from the company's own collection points manned by GWCL staff, management is also engaging more third party collectors to collect payments on its behalf.

Anti – Theft Measures Implemented

Ghana Water Company Limited has intensified its effort to reduce significantly the thievery in the activities of the company.

- GWCL will continue to use plastic cased customer meters to totally eradicate the stealing of meters.
- The introduction of smart meters allows reading to be taken remotely with the aid of software within a specific distance without getting into the customers' premises.
- The introduction of electronic billing has ensured effective and efficient monitoring and evaluation of meter reading activities, billing and collection processes to prevent fraud and connivance.

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A meter reader reading a meter with an android mobile phone

ELECTRONIC BILLING (E-BILLING)

Electronic Billing System introduced in the commercial operations of the company since 2015 has improve efficiency in the billing process by reducing the many human interventions that existed in the Old billing system. E-billing ensures

- Customers receive their bills via e-mails and SMSs. Hard copy (paper) bills will gradually be eliminated.
- Meter readings are taken at premises of customers and transmitted electronically. (A picture of the meter and GPS coordinates are used to validate to ensure the field officer is indeed at the premises of the customer).
- Drastic reduction of the time between meter readings and billing. Ultimately billing will be instant.

Components of the Electronic Billing System includes:

- Electronic Payment Application
- Cloud based billing system (SMS and Emails)
- Meter reading and monitoring applications
- Customer Relationship Management
- Customer /User application
- Software as a service

1. ELECTRONIC PAYMENT(E-PAYMENT)

With the rolling out of the electronic payment system, a Virtual Private Network (VPN) has been created through which payments made at authorized banks, mobile network operators and some 3rd party vendors outside GWCL are credited and monitored in real-time, SMS and E-mail receipts generated and sent to customers after payment. Currently Payments could be made through the following channels shown in the table below;

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Payment Source and Payment System Type

Payment Source	Payment Channel	Payment System
GWCL designated paypoints	238 Paypoints nationwide	Manual, Electronic but not in real-time
Mobile Network Operators	MTN, AirteIigo, Vodafone	Electronic and in realtime
Partnered banks	Absa, Access, Bank of Africa, Cal, Ecobank, Fidelity, First Atlantic, GT, NIB, Prudential, Republic, SG, Stanbic, UBA, UMB, Zenith	Electronic and in realtime
Authorized 3rd Party Collectors	Emergent, Expresspay, Nsano, Sydepay	Electronic and in realtime
Authorized Regional 3rd Party Collectors	257 nationwide	Manual, Electronic but not in real-time

2. SUITE OF APPLICATIONS

The mode of reading meters, payments and monitoring are all done through mobile applications. The under listed android and web based applications have been developed for use and constantly being improved to suit the changing needs of the company and ensuring customer satisfaction.

MOBILE APPs

- Customer Registration App (e-register)
- Meter Reading App (e-reader)
- Management App (e-manager)
- Customer App

WEB BASED APPs

- Web Portal

SECURITY

Security concerns have been paramount right from the conception of electronic billing, especially as the billing database contains sensitive information that must be very well protected.

- The first layer of protection is in the way the data is stored; as already stated in the cloud with redundant back-up systems in different sites in different countries. In addition, all the data is backed up on GWCL servers that are also very well protected from hacking and virus attacks.
- Ethical hackers regularly attempt to hack the system to identify weak points that may expose the system to hackers, security is then improved at these weak points.
- Before any party can connect to the system, they must do so through the secured VPN (Virtual Private Network) set up for that purpose.

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GWCL ensures that all parties with interest in connecting to this system adhere to security standards and regulations that govern their intended purpose, be it for collection or otherwise.

Bank of Ghana “Know Your Customer” (KYC) and Anti-Money Laundering guidelines regulate Mobile Money payments.

The Financial Conduct Authority (FCA) and Card Industry Security Standards Council also regulate Mobile Payments and other International Payments that have been signed on to the e-billing system.

These measures provide adequate security for the system in place and guarantee the safety of the system.

The Low-Income Customer Support Department (LICSD)

Pro-poor service delivery in Ghana Water Company originated from a Desk Office established in 2011 to promote and coordinate pro-poor activities within the utility. Two years later, the Low-Income Customer Support Unit (LICSU) was established and placed under the Corporate Planning Department.

In 2019 the LICSU made significant steps forward and developed itself into an institutional resource for facilitating pro-poor institutional change this was stimulated by Management decision that led to the Unit Manager reporting directly to the Managing Director.

LICSU in collaboration with its partners since its inception has achieved a lot with limited resources – especially widespread adoption of subsidised household connections and installation of standpipes, construction of distribution pipelines, high level concrete water tanks, rehabilitation of treatment plants, capacity building, knowledge management – though more is needed to counter the challenges caused by the ever-increasing urbanisation

In 2021, LICSU was elevated to a department thus Low-Income Customer Support Department (LICSD). Appendix A in this document outlines brief highlight of LICSD’s achievements.

2.2 Compliance with Directives of the Commission

GWCL complies with all PURC directives. For example, desalination issues and Consumer charter etc.

We look forward to further strengthening this collaboration that exist between the two parties.

3. Key Policy Issues for Tariff Consideration

On-lending of Grants and Loans by MoF:

Government requires GWCL to meet the exchange rate fluctuations, repayment of principal and interest on loans and grants. The allocation given in the last tariff approval was inadequate. There is therefore the need for adequate funds to service such facilities.

Pro-Poor Considerations

Pro-poor pricing should be designed to ensure that the poor have access to utility services at an affordable price. A pro-poor tariff which would require households to meet certain criteria to be eligible could be considered. This tariff system is necessitated by the large

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number of low-income dwellers who share connections as a result of the nature of housing (compound housing).

A Social Connection fund dedicated to subsidizing low income service, usually for the extension of pipelines and new service connections to the utility's mains could be considered.

4. Proposed Service Delivery and Efficiency Improvements During Tariff Period

In pursuit of our mission to supply adequate safe and reliable potable water to the urban population of Ghana, GWCL has set the following broad objectives:

- To ensure the Adequacy, Reliability and Quality of our main product of drinking water
- To ensure the Financial Sustainability of the company
- To improve on Customer Service and Branding
- To improve on HR Capacity

Planned Projects

There are a number of projects at various pre-construction stages and they include the following;

No	Project Name	Description	Projected Completion Year	Estimated Cost	Current Status
1	Kpong Water Supply Rehabilitation and Expansion Project – Phase II	Installation of low-lift pumps with a capacity of 196,000m ³ /day. Construction of 186,000m ³ /day new water treatment, 50km of transmission pipeline, 232km of distribution pipelines, construction 45,000m ³ reservoir, house connections and stand-pipes	42 months after commencement	373 million USD	Funding is currently being sourced for the project.
2	Asutsuare (DBFOT) Water Supply Project	It will involve the development of 360,000m ³ /day water treatment plant on PPP basis by a private developer, Messrs Denwater of Belgium.	Yet to be determined	Yet to be determined	Viability gap fund has been transmitted to Government for their review and support.
3	Berekum Water Supply Expansion and Rehabilitation Project	Design and construction of new water treatment plant of capacity 20,000m ³ /day to meet the 2040 water demand, installation of 56km of new transmission mains, construction of storage tanks, installation of 100km of distribution mains, house connections and provision of stand pipes.	36 months after commencement	48 million Euros	Negotiation is currently on-going.

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4	Fanteakwa – Begoro Water Supply and Expansion Project	Design and construction of new water treatment plant of capacity 18,000m ³ /day to meet the 2040 water demand, installation of 35km of new transmission mains, construction of storage tanks, installation of 300km of distribution mains, house connections and provision of stand pipes	36 months after commencement	100 million USD	Funding is currently being sourced for the project
5	Weiija Water Supply Rehabilitation Project	Rehabilitation of the 3No. existing Water Treatment Plants (Candy, Bamag and Adam Clark), rehabilitation of the dam, pipeline improvement works, construction of booster stations, construction of storage tanks, provision of house connections and stand pipes	36 months after commencement	112 million USD	Funding is currently being sourced for the project
6	Greater Kumasi Metropolitan Area Water Supply Expansion and Rehabilitation Project	Design and construction of 100,000m ³ /day, installation transmission mains, distributions, booster stations, house connections and stand-pipes	36 months after commencement	Yet to be determined	Funding is currently being sourced for the project
7	Atebubu-Amantin Water Supply Project	design and construction of new water treatment plant of capacity 28,000m ³ /day to meet the 2040 water demand, installation of new transmission mains, construction of storage tanks, installation of distribution mains, house connections and provision of stand pipes	36 months after commencement	153 million USD	Funding is currently being sourced for the project
8	Tarkwa Water Supply Project	design and construction of a new intake with a design capacity of 29,000m ³ /day (6.4MGD), a new water treatment plant with a design capacity of 27,000m ³ /day (6MGD), 19km of transmission pipeline extension, 6,000m ³ of storage facilities, distribution network expansion of various diameters totaling 116km.	36 months after commencement	65 million Euros	Funding is currently being sourced for the project
9	Essiama Enclave Water Supply Project	construction of 50,000m ³ /day water treatment plant and pipeline improvement works	40 months after commencement	350 million USD	Funding is currently being sourced for the project
10	Assin Fosu Supply Project	construction of 45,000m ³ /day water treatment plant, transmission and distribution pipeline works	36 months after commencement	175 million USD	Funding is currently being sourced from

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					Suisse Bank AG.
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Planned Production Improvement Works

GWCL has planned the following works at the various production systems to improve upon service delivery and efficiency during the tariff Period. The planned productions improvement works is estimated at GHS 333,575,903.02

No.	REGION	DESCRIPTION OF ACTIVITY	PROJECTED COMPLETION YEAR	STATION/ LOCATION	ESTIMATED COST (GHS)	EXPECTED IMPACT ON PRODUCTION
1	ATMA Production	Utilise the Siemens Plant to its full capacity and transport 15,000m ³ /day (3.3MGD) of water daily from it to the Ghezouba Clear well, activate the idle capacity at the New works and transport the excess water to the Ghezouba Clear well.	2021-2023	Kpong System	17,662,783.20	To provide an additional 40,716m ³ /day (8.96 MGD) which will be pumped through Dodowa to Accra East and Tema
2	ATMA Production	Reconstruction of 4No. failed & Rehabilitation of 8No. operational Gravity Sand Filters	2021 – 2025	Weija Adam Clark Plant	180,000,000.00	To improve upon production.
3	ATMA Production	Replacement of 3No. Soft Starters with new ones for New Intake Pumps No. 2, 3 and 4	2021 – 2022	New Intake/ Weija System	6,263,000.00	To improve upon power consumption and water production.
4	ATMA Production	(i). Replacement of 4No. Direct-on Line starters with Soft Starters. (ii). Replacement of 2No. Switchgears with new ones for Old	2022-2022	Old Intake/ Weija System	15,966,874.00	To improve upon power consumption and water production

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		Intake pums at Weija				
5	ATMA Production	Rehabilitation of Tema Booster Station with 4No. new pump-sets, soft starters, Variable Frequency Drives, switchgears and other accessories	2021-2022	Tema Booster Station	77,000,000.00	To improve upon water supply to distribution system (i.e. Tema and its environs)
6	ATMA Production	Rehabilitation/Dr edging of the Weija Dam.	2022-2024	Weija System	20,400,000.00	To improve upon raw water availability for production
7	ATMA Production	Refurbishment of 4No. High Lift motors	2021-2022	Kpong New Works	6,230,000.00	To improve upon power consumption and water production
8	ATMA	Supply and installation of 2No. pump-sets and 2No. control panels	2021-2022	Gbawe Booster Station	243,293.92	To improve water supply to distribution system at Gbawe and its environs
9	Western Region	Replacement of 3No. Transformers and 2No. Switchgears and accessories	2021-2025	Daboase Headworks	87,888,362.10	To improve upon power supply and water production.
10	Western Region	Installation of 2No. Pump-sets and Soft Starter Control Panels	2021-2022	Bosomase Raw Water Intake	5,742,030.00	To sustain production during dry season at Daboase Headworks.
11	Western Region	Provision of 5 No. maintenance Dredgers	Dec. 2022	Daboase Headworks	30,000,000	To improve upon availability of raw water for production
12	Central Region	Supply and installation of 2No. AVR's at each of the following stations	2022	Kwanyaku, Sekyere – Hemang and Brimsu headworks	13,874,512.50	To improve upon power supply for increased production

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13	Ashanti Production	Provision of 4No. AVR's at each of the following stations	2021-2022	Odaso, Konongo, Akyease Booster and Barekese Lowlift Station	15,370,269.00	To improve upon power supply for increased production
14	Ashanti Production	Installation of 3No. Low Lift pump-sets with soft starter panels and additional 4No. soft starter panels for High Lift pumps	Jul. 2021-2022	Odaso Headworks	7,300,000.00	To increase raw water abstraction for production
15	Ashanti Production	Provision of 2No. chlorinators	Jul. 2021	Barekese WTP.	930,000.00	To enhance dosing process
16	Ashanti Production	Rehabilitation of 1No. 5MVA, 3.3 kV transformer	May. 2021	Barekese Headworks	350,000.00	To improve upon power supply to the plant
17	Eastern Region	Installation of 2No. Booster Pumps with control panels	2021	Kibi WTP	567,000.00	To improve upon water supply to Kibi township
18	Brong Ahafo Region	Installation of 2No. High Lift pumps	2021	Biaso Headworks	320,000.00	To improve water supply regime
19	Volta Region	Installation of 2No. AVR's at Low Lift and High Lift pumping stations	2021 - 2022	Kpeve Headworks	4,763,070.00	Stabilization of power
20	Northern Region	Dredging of Nawuni Intake	2021-2022	Dalun/Nawuni	888,000.00	To increase availability of water for production.
21	Northern Region	Provision of 3No. soft starters for Dalun New Works plant.	2021-2022	Dalun New Works	6,283,048.00	To reduce energy consumption and its associated cost.
22	Northern region	Provision of 4No. chlorinators	2021-2022	Dalun and Yendi Headworks	4,888,000.00	For Improved chemical dosing processes
23	Upper West Region	Replacement of Clarifier Bridge wheels	2021	Jambusi Headworks	98,000.00	To improve upon performance of clarifiers for production

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24	Upper West Region	Repair of Scada System	2021	Jambusi Headworks	293,000.00	For efficient and effective operations of the Plant
25	ATMA Production	Replacement of bridge wheels for seven (7) number clarifiers	Sept. 2019	Adam Clarke/Weija	102,403.00	Increased water production due to improved performance of clarifiers.
26	ATMA Production	Rehabilitation of 2No. Raw water pumps for China Ghezouba Plant	Nov 2019 – Dec 2020	China Ghezouba Plant	240,000.00	Improved upon plant capacity utilisation.
27	ATMA Production	About sixty (60) number Filtrate Gate valves at the New Works Plant have been completely replaced	Nov. 2020	New Works/Kpong		
28	ATMA Production	Filter rehabilitation of adam clark (weija) 2No. filters; replacement of nozzles for 5No. filters at kpong new works	Nov. 2020	Adam Clarke & Kpong	16,000,000.00	To increase water production
29	ATMA Production	Rehabilitate of 16No. candy sedimentation tanks; construction of wet pits and accessories at kpong (3no) and weija (2no) treatment plants. Rehabilitation of candy & bamag alum wet tank(weija); roofing of candy & bamag hydrated lime dosing tanks(weija) and rehabilitation of bamag clarifier no. 1(weija).	Dec. 2022	Weija	900,000.00	
30	Brong Ahafo	Borehole pump replacement (3No.)	Jan. 2020	Berekum	21,945.00	Improved production activities

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31	Brong Ahafo	Repair works on walls of reinforced concrete sedimentation tanks	2020	Abesim Headworks	377,315.00	Ensured sustainability and reliability of production
32	Western Region	3No. Transformers and MV. Switch gear at Daboase Headworks	2022	Daboase Headworks	28,000,000.00	
33	Central	Upgrading of Old works Air Blower	2019	Kwanyako	45,000.00	Reduction of backwash time which also improved water supply.
34	Central	Installation of Automatic Voltage Regulators at both New works and Old works Highlift Stations	2019	Kwanyako	4,803,057.50	Stabilised power supply and eliminated down time due to low and high Voltages.

WEIJA & KPONG WATER TREATMENT PLANTS ENERGY EFFICIENCY RECOMMENDATIONS						
INVESTMENT GRADE ENERGY AUDITS FOR ATMA PRODUCTION (KPONG & WEIJA HEADWORKS)						
Location	Energy Efficiency Measures	Capital Cost (USD)	Annual Savings (USD)	Simple Payback (Years)	Percentage Improvement	Remarks
Weija Old Intake Pumps	Corrective Maintenance	1,053,136.00	6,696,984.00	0.19	53%	Immediate (0-1yr)
	Operation with variable Frequency Drives (VFDs)	749,557.00	56,054.00	13.37	3%	Short Term (2-3yrs)
	Replace Pumping Systems	5,265,679.00	8,724,088.00	0.6	61%	Long Term (3-5yrs)
Weija New Intake Pumps	Corrective Maintenance	2,337,815.00	5,744,651.00	0.41	18%	Immediate (0-1yr)
	Operation with variable Frequency Drives (VFDs)	1,663,913.00	88,703.00	18.76	4%	Short Term (2-3yrs)
	Replace Pumping Systems	11,689,074.00	7,387,259.00	1.58	23%	Long Term (3-5yrs)
Kpong New Works	Corrective Maintenance	471,072.00	10,273,367.00	0.05	26%	Immediate (0-1yr)
	Replace Pumping Systems	2,355,359.00	12,252,036.00	0.19	52%	Long Term (3-5yrs)
Kpong New Works High-Lift	Corrective Maintenance	4,821,996.00	8,926,556.00	0.54	29%	Immediate (0-1yr)
	Replace Pumping Systems	24,109,978.00	11,058,965.00	2.18	51%	Long Term (3-5yrs)

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Planned Distribution Improvement Works

Mains Extensions

GWCL intends to further expand the existing network by an additional 1,508 km by end of year 2026 (i.e. target is to increase 2% of total network coverage each year progressively from 2021 to 2027) in order to enhance accessibility to water supply and efficiently distribute water from the Water Treatment Plants that are projected to come on stream during the tariff period.

Presently, budgetary allocations have been made to undertake 2,089km of mains extensions estimated at GHS155,622,964 subject to availability of adequate funds. See below planned mains extension works for 2021 on regional basis.

PLANNED MAINS EXTENSION WORKS FOR 2021

Region	Pipe Diameter (mm)	Distance (Km)
Accra East	Various (100 - 700)	89.7
Accra West	Various (100 - 160)	92.5
Tema	Various (100 - 630)	845.5
Ashanti	100, 150 & 200	120.3
Ashanti	100 & 150	100.0
Central	Various (110 - 315)	320.7
Western	Various (75 - 450)	150.0
Volta	75 & 100	19.7
Eastern	Various (100 - 315)	192.2
Brong Ahafo	100 & 150	60.0
Upper West	100 & 150	50.0
Northern	Various (100 - 800)	33.3
Upper East	100, 150 & 200	15.0
Total		2,088.9

It is pertinent to note that, the proposed mains extension works will also impact on the overall capacity utilization of some treatment plants such as Odaso (Ashanti), Jambusie (Upper East), Sekyere Heman (Central) that are limited operationally by inadequate pipe network to supply areas.

Repair, Replace and Rehabilitate infrastructure

GWCL intends to further replace the ageing pipe infrastructure, particularly in the Western part of ATMA, where a large section of the network comprises of weak Asbestos Cement (AC) pipelines.

Assessment carried out in 2020 indicates that an estimated 14.9km length of the Accra West network needs to be renewed as a matter of urgency to mitigate the high cost incurred on the repairs of bursts and leakages and to ensure a hydraulically sound network. The aforementioned improvement works is estimated at GHS1,567,812.5. In total, there are over 800km of AC pipes within GAMA that are planned for phased replacement.

Below are details of priority list of mains improvement works to be carried out in various phases.

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Region	Pipe Diameter (mm)	Length of pipeline to be Replaced (m)
Western	Various (90 – 315)	19,290
Tema	Various (160 –	25,500
Accra East	Various (100 –	85,400
Accra	100 & 150	14,900
Northern	250	3,100
Total		148,190

Planned Transmission Improvement Works

Formation of Major Pipeline Maintenance Teams

GWCL has initiated steps to create Major Pipeline Maintenance Teams to undertake repairs/maintenance of transmission pipelines (i.e. diameter 250mm and above) in all regions.

It is intended that, the Maintenance teams would be established to provide quick response to bursts, leakages and proactive maintenance activities on major pipelines through reports from call centres, customers etc. as well as active leakage searches.

4.1 Service Delivery and Efficiency Targets

Performance indicator	2019	2020	2021	2022	2023	2024	2025	2025	2027
NRW %	50.75	39.14	45.66	49.0	48.0	47.0	46.0	45.0	44.0
Resolution of complaints-Commercial (hrs)	1	1	1	1	1	1	1	1	1
Resolution of complaints- Technical (hrs)	24	24	24	24	24	24	24	24	24
Resolution of complaints- Water quality (hrs)	24	24	24	24	24	24	24	24	24

The above table provides Service Delivery and Efficiency Targets which are now briefly discussed.

Non-Revenue Water Reduction

GWCL has intensified its resolve and actions on current and planned activities to reduce non-revenue water. Key activities currently ongoing among others are:

- Installation of bulk and zonal meters,
- Intensive leakage detection and quick repairs
- installation of both smart and mechanical meters
- Upgrade of meter workshop/laboratories,
- Behavioral change, training and capacity building of staff,
- Continuous use of GIS applications such as pipeline inventory and mapping.

The approach to Behavioral Change regarding NRW is to concurrently engage both top management and lower level staff on issues of NRW. The Chief Champion for the NRW Task force under the PIP, Chief Manager for Projects visits one district a week with the Managing Director to interact with the staff at that level on NRW issues.

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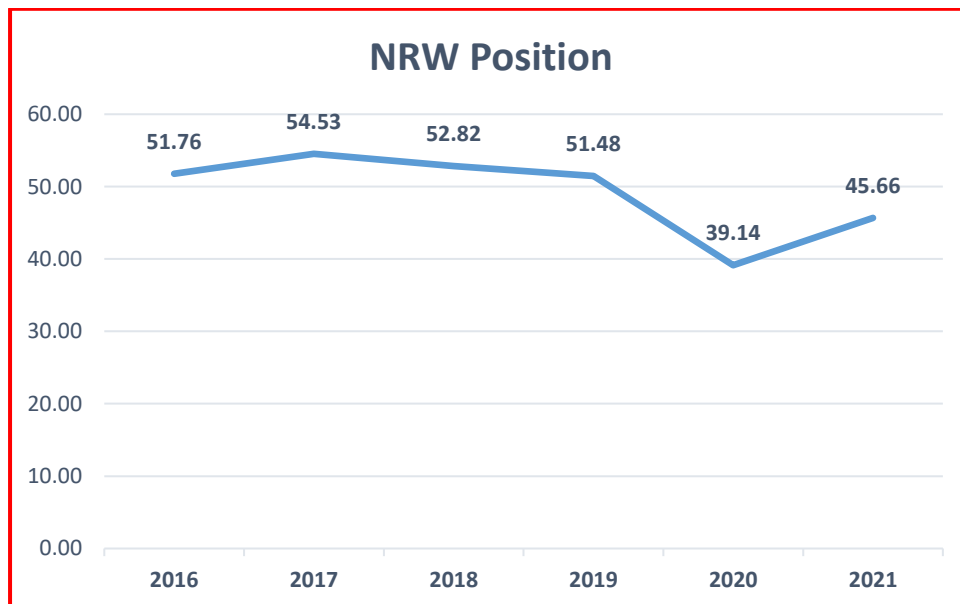
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Metering of boundaries of the GAMA regions is completed. GWCL is now able to accurately determine how much water is transferred across the three regions from all treatment plants.

GWCL has since 2019 installed smart domestic meters, a better alternative to mechanical meters. The table below shows the cost breakdown.

Cost of Smart meters	54.52 million Euros
Fittings	10.44 million Euros
Installation	0.45 million Euros
Total	65.41 million Euros

It is planned that all meters in Greater Accra Metropolitan Area (GAMA) operational regions are replaced with smart meters. An estimated 74,928 smart meters will be required on yearly basis for the next five years to replace at least 80% of all meters in GAMA. The unit cost of a DN 15 smart meter (with installation) is USD 254.50 that of DN 20 and DN 25 are USD 259.75 and USD 265.09 respectively. These 74,928 smart meters translates to USD19,147,850.40 per year for to the next five years.



Appendix B shows the NRW trend over the last 19 years and projections.

Complaints Resolution

Most complaints categories include billing related issues, Technical related issues, Quality of product, Meter related issues, Illegality and Customer Care. The table below shows details of complaints.

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BILLING		2017	2018	2019	2020	2021
Frequency of billing	#/year	12	12	12	12	12
Frequency of meter reading	#/year	12	12	12	12	12
Payment period after bill delivered	days	14days	14days	14days	14days	14days
NUMBER OF COMPLAINTS	#	50,749	97,888	183,394	8,929,381	574,779
Billing	#	12005	25867	11537	15672	585
Un-reflected payments	#	13430	24324	4426	616	6363
Quality of water	#	224	120	57	58	26
Wrong disconnection	#	1540	10450	9012	1325	3480
Metering reading errors	#	6980	12540	1895	10601	2987
others	#	16570	24587	156467	8,901,109	561338

The Communications Department will be resourced to effectively drive user friendly communication models to educate the public and project the GWCL brand. GWCL will work to win the understanding and sympathy of the company's publics. The main focus areas will be customer relations, stakeholder and corporate identity, and community and employee relations. The public will continuously be educated on their roles and responsibilities per the customer charter.

GWCL will draw up programmes to inform the public on new projects and the benefits thereof. These is very crucial in getting a positive corporate image.

4.2 Technical / Operating Performance Indicators/Indices

Performance indicator	2019	2020	2021	2022	2023	2024	2025	2026	2027
Capacity utilization (%)	84	88	85	85	86	86	86	86	86
Water produced (Mm ³)	300.5	317.1	321.8	325.5	332.2	338.9	438.7	673.3	673.3
Water quality compliance (%)	95	95	95	95	95	95	95	95	95

Raw water

The key challenges to water resources management are several, and include rainfall variability (Climate change, drought, flood), illegal mining activities (precious mineral, sand winning, etc.), rapid population growth, river pollution (agricultural activities close to the banks of the river course, aquaculture, and water plants, untreated waste water dumping, release of hazardous chemicals, etc.) and siltation.

The growing menace of illegal mining activities (locally known as Galamsey) has had adverse effects on water production at a number of our stations including Kibi, Osino, Anyinam, Bunso, Daboase, Obuasi, and Sekyere Hemang.

The Company will continue with the following strategies as part of the activities to overcome the challenges in order to achieve the stated goals.

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- 1) Closely collaborate with Water Resources Commission to achieve its mandate
- 2) Using existing planning documents to assess raw water adequacy and other measures to meet year 2030 demands.
- 3) Dredging/Desilting works would be undertaken at the worse affected intakes to improve raw water availability.
- 4) Working with stakeholders (including health officials, traditional rulers, EPA and other departments and Ministries) in meaningful raw water protection and preservation, GWCL will develop a model of continuous education on the ill effects of river pollution (through illegal alluvial mining and deforestation) to the local populace.
- 5) Cooperating with African water partners from Burkina Faso, Cote D'Ivoire, and Togo in management of riparian water resources
- 6) Capacity building through training to help the department use modern strategies to countenance pollution of rivers and other sources of raw water.

Treated water quality

In order to effectively tackle water quality challenges and to boost consumer confidence, the Central Laboratories will be upgraded and equipped to attain state-of-the-art status. It will also serve as a reference laboratory for the other regional laboratories. System laboratories will also be upgraded. This action will be preceded by auditing the laboratories to determine the adequacy and suitability of existing infrastructure, equipment, personnel, and other logistics in the regions for decision making. In particular, adequate means of transportation will be provided to improve the frequency of water quality monitoring and management in the distribution network.

The Company would pursue the building of capacity of the Water Quality Assurance department with the aim of achieving Certification and Accreditation of GWCL's Laboratories. Water Safety Plans would be developed and implemented for all water treatment plants nationwide.

Standard Operating Procedures (SOPs) for all components of water supply systems will be developed and implemented. Development and implementation of SOPs will go a long way to enhance general performance of the water supply systems, for example, reduction in the frequency of filter rehabilitation and maintenance, equipment breakdowns, waste of resources, breach in water quality standards and judicious use of water treatment chemicals. SOPs will also be developed for all methods, procedures and equipment, for Laboratory Protocols and equipment.

Studies to identify emerging trends and technologies for developing cost effective methods in water quality assurance and water treatment will be conducted. Waste water from all water treatment systems need to be treated before discharging to the environment to ensure environmental compliance and prevent recontamination of our source waters. To this end, all WTPs will be upgraded or optimized to include well-functioning sludge beds.

Efficient water treatment chemical dosing facilities will be procured and installed to replace obsolete and inefficient chemical dozers.

Management will put place strategic plans to ensure the all water treatment chemicals are available in adequate quantities and quality throughout the year to ensure continuous operations. This will guarantee un-interrupted supply to meet water production.

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Reserve Accounts for key Operational Procurements such as water treatment chemicals, Electro-Mechanical Parts, Pipes and Fittings; and Customs Clearance and Haulage will also be created to ensure availability of these critical inputs at all times. However, this will be evaluated and driven by budgetary allocation together with our operational and administrative critical needs.

Treatment plant operations

Customers want water as and when they need it. In order to ensure that water production is stable throughout the period, GWCL will carry out periodic technical audits of the production and distribution systems to identify snag items for prompt remedial action. By repairing broken equipment and making stand-by equipment and critical spare parts available at the production stations, the capacity utilisation can be maintained or improved.

All productions stations will prepare annual maintenance programmes, and will be monitored by H/O for strict compliance. The maintenance program must ensure that downtime attributable to electromechanical breakdowns are kept at a cumulative maximum of 24 hours in a month.

Security at our production stations will be assured by collaborating with the National Security Agencies. Quarter

4.3 Financial Performance Indicators/Indices

Performance Indicator	2019	2020	2021	2022	2023	2024	2025	2026	2027
Operating Cost per authorized consumption (GHS/m3)	28.643	16.675	24.456	28.196	30.319	31.229	26.227	18.276	19.038
Chemical cost per cubic meter (GHS/m3)	0.142	0.140	0.137	0.217	0.238	0.268	0.271	0.276	0.309
Electricity Cost per cubic meter (GHS/m3)	1.064	1.221	1.045	1.148	1.251	1.177	0.941	0.724	0.683
Labour productivity (GHS/staff)	838,829	653,135	821,906						
Operating ratio (%)	4.604	2.441	3.491						

Operation Cost

The Operating cost of the company is increasing with time. This is due to reasons elaborated earlier, which include GoG new policy on Grants and Loans contracted for or guaranteed for Projects; the relatively high bulk supply tariff which has to be paid to Messrs Befesa; the rising cost of energy; and the rapidly depreciating value of the cedi.

The Company will however continue in its efforts at cost optimization. Some of these initiatives include the following:

Reducing power consumption

Periodic Energy Audits will be carried out with the aim to reduce energy consumption. All faulty and energy inefficient equipment so identified will be replaced. Selection and timing of which equipment to replace will be prioritised based on cost benefit analysis.

A review of all energy consumption areas will take place focusing on where the power factor is low and thereby incurring cost. Where necessary power factor correction equipment will be procured, installed and monitored. Automatic Voltage Regulators (AVRs) are being installed to stabilize power and reduce energy cost. AVRs installed at Aframso

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water treatment plant resulted in an increase in average monthly water production from 24,735m³ in 2019 to 36,700m³ in 2021. Power factor improved from 0.75 in 2019 to 0.83 in 2021.

Existing procedures of verifying electricity bills in the Regions and the reporting of all energy consumed will be strengthened by implementation of electronic reporting system.

Obtaining Value for Money in procurement

GWCL will continue with the implementation of the following strategies to ensure that the company obtains value for money in its procurement and stores functions:

- Introduction of framework contracts for common user items with the aim of ensuring standardization and reducing total acquisition costs.
- Ensure efficient customs clearance and transportation of goods at the port devoid of delay and demurrage by stimulating competition among clearing agents and haulage companies.
- Provision of security cameras (CCTV) at central stores and other key storage points to prevent theft and pilfering.

Reducing cost of public announcements

The use of Public Address (P.A.) systems to send information to the public will continue to be encouraged in all the regions as against making radio announcements. The use of bulk short messaging service (SMS) and social media platforms would be intensified to reduce cost. Furthermore, the company will increase the use of press releases as against public announcements to ensure that several media houses use the information and also give an opportunity to PR managers to grant interviews to educate the public.

Budgetary Control

Other cost control measures that will be implemented include the following:

- Budgetary control and monitoring & tracking
- Adherence to budgetary control and operational mandates
- Prompt releases of adequate operational mandates for smooth running of the regions & units
- The continuous use of the Enterprise Resource Planning (ERP) Programme (Ebiz Frame) throughout the country will further minimise cost of information flow by eliminating inefficiencies and improving the timelines and quality of reporting such as consolidated financial data, monthly variance analysis and quarterly forecasting.
- Use of electronic means of correspondence as far as possible to minimise the cost of stationery.
-

Labour Productivity

At the end of December 2021, the total staff strength was Five Thousand, One hundred and Forty-Three (5,143). This was made up of Four Thousand, Eight Hundred and Fifty (4,850) regular staff representing 94.3%. The total number of non-regular staff was Three Hundred and Thirty (293).

Regular senior staff was One Thousand, Two Hundred and Fifty (1,280) representing 26% while regular Junior Staff stood at Three Thousand, Five Hundred and Seventy (3,570) representing 74% of the total regular staff.

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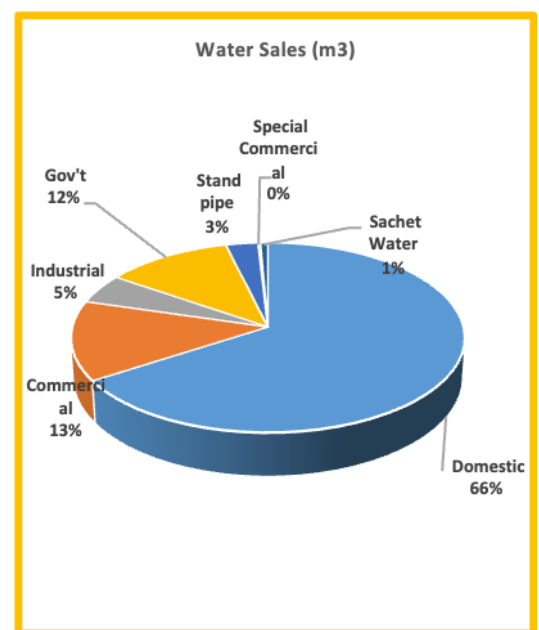
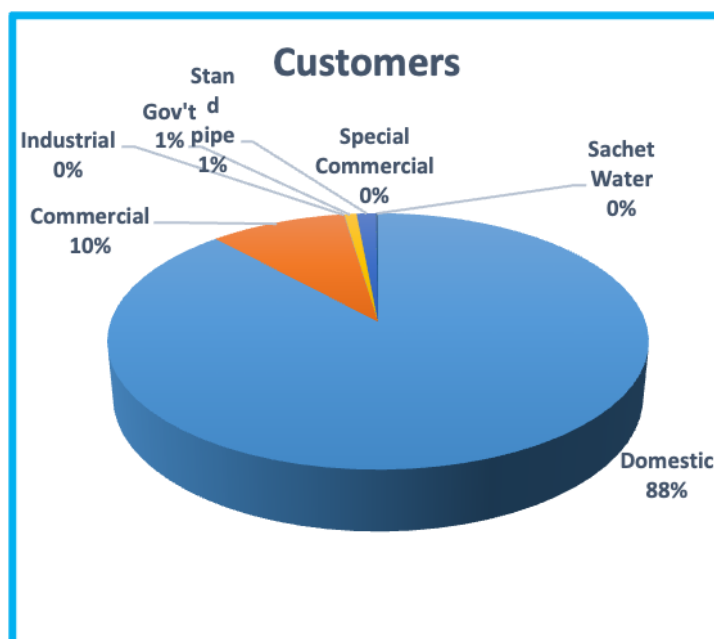
4.4 Commercial Performance Indicators/Indices

INDICATOR	2021	2022	2023	2024	2025	2026	2027
Water Sales (m3)	172,840,331	167,059,816	174,155,108	181,020,890	238,614,327	372,822,054	379,479,590
Private Billing (GHC)	1,059,388,291	985,911,751	1,027,763,175	1,068,265,734	1,406,903,260	2,195,815,870	2,230,265,458
MDAs Billing (GHC)	151,492,718	143,573,730	149,670,042	155,569,158	205,053,743	320,365,731	326,050,870
Private Collection (GHC)	892,083,316	966,193,516	1,007,207,911	1,046,900,419	1,378,765,195	2,151,899,553	2,185,660,149
MDAs Collection (GHC)	10,037,767	143,573,730	149,670,042	155,569,158	205,053,743	320,365,731	326,050,870
Private Collection Ratio %	84.21	98.00	98.00	98.00	98.00	98.00	98.00
MDAs Collection Ratio %	6.63	100.00	100.00	100.00	100.00	100.00	100.00
Total Collection Ratio %	74.50	98.25	98.25	98.25	98.25	98.25	98.26
Customer Strength No.	832,586	859,584	883,584	907,584	931,584	955,584	979,584
Billed Customers No.	655,556	684,688	709,888	735,088	760,288	785,488	810,688

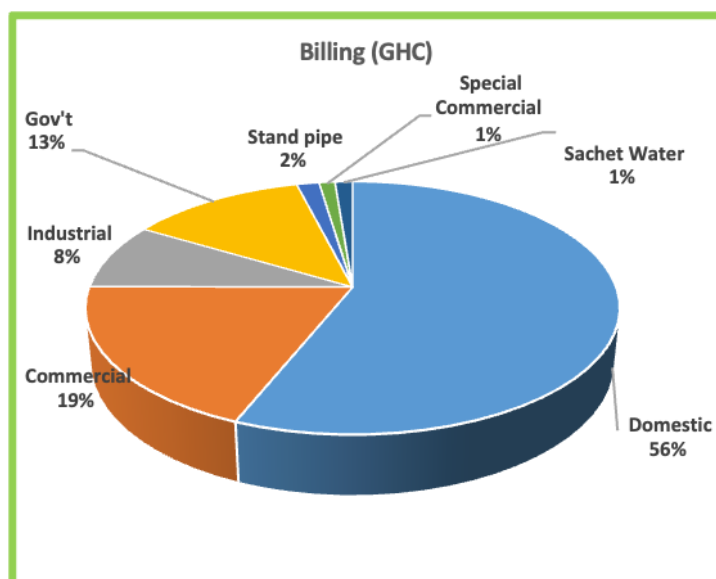
Water Sales and Billing

Categorization

Domestic Customers constitute 88% of total customer strength whilst in terms of sales volume it is 65.9%, it contributes only 56% of total billing.



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Water Sales

The customer meter is an essential tool for measuring water consumption and should be as accurate as possible. It is the 'cash register' the company uses.

A new metering policy has been prepared and adopted. Among others the policy seeks to ensure that measured consumptions are as accurate as possible. The meter shops will also be re-equipped and modernized, and the metering ratio will not only be increased from the current 75% to 100%, but there will be a strategic shift towards smart metering technology to ensure accurate meter reading for billing.

As at December 2021, 739,959 (90.28%) out of the total customer strength of 819,627 in our billing database has been verified. As such, customer survey exercises will be undertaken to identify the 9.72% unverified customer, investigate unbilled customers in order to clean up the customer database and to identify any illegal activities or visible leakages.

The New Service Connection policy is being reviewed to make it more customer-friendly and thereby eliminate wastes and losses that the implementation of the policy brings about. It will minimize all perceived barriers and lead to connections being effected within one week after payment.

A New Customer App for new service connection is at the advanced stage of development and will be deployed soon to enable customers apply and monitor progress of new service on-line

Collection

Availability of financial liquidity is important for a smooth operation cycle of a service provider. Collecting revenues from the consumers on time helps in self-financing expenses and costs of the GWCL. Low financial liquidity forces GWCL to take loans with high interest and additional costs.

Revenue collection efforts will be intensified to ensure that all consumers pay their bills in a timely manner. As mentioned earlier, payment applications have been deployed by GWCL, authorized partner banks, Mobile Network Operators (MNOs) and authorized 3rd parties through which customers can make payments electronically and be credited in real-time at their comfort.

Defaulting customers will be disconnected promptly to minimize arrears build up. Follow up action on disconnected customers will be intensified to ensure that the disconnection has been effectively done and that the customer has not been illegally re-connected and the arrears paid.

Legal action to recover arrears from recalcitrant customers will be undertaken as a last resort. GWCL will continue encouraging payment of bills through public education, sending demand notice (via SMS) and instituting reward schemes for loyal customers.

5. Key Challenges Likely to Impact Service Delivery

5.1 Electricity Supply

- ✓ Supply Side Management
 - Poor power quality accelerates the deterioration of water production equipment (electromechanical equipment).
 - Inadequate supply of electricity to meet customer forecasted demand.
 - Unreliability of power supply to meet future demand at the water treatment plants.
- ✓ Demand Side Management
 - Intermittent power fluctuations due to disturbances on the transmission/distribution lines affect water production.
 - Unexpected equipment fault from the supply authorities.
 - Frequent shut downs for major maintenance works on the distribution lines, transformers and switchgears have rippling effect on water production.
 - Prevalent power outages due to inefficient equipment.

GWCL operations is such that power interruptions adversely affect customers at the tail end of the distribution networks and on high elevations are deprived of their supplies.

5.2 Energy Consumption-Production Plants Electricity Usage

Energy constitute the highest cost element in GWCL operation cost build-up which was 27% of operating cost in 2020. This puts a lot of pressure on GWCL operations, if adequate measures are not put in to cushion us.

Even though GWCL is exempted by law from payment of taxes and other levies, we have been paying VAT and NHIL on energy supplied by ECG. It is therefore necessary for GWCL to be adequately compensated in this regard.

5.3 Availability of Chemicals and Laboratory Reagents

The company imports Aluminium Sulphate, Polyelectrolytes Coagulants, Hydrated Lime (Calcium Hydroxide, Liquefied Chlorine gas, Calcium Hypochlorite, Potassium Permanganate, Activated Carbon, Chlorine Tablets (Calcium hypochlorite Based), Sodium Hydroxide (Soda Ash) for water treatment. In order to ensure that water quality from source to end-user meets the set standards by the Ghana Standards Authority (GSA).

GWCL ensures that it always has sufficient stock of chemicals for water treatment and reagents for water quality testing.

5.4 Breakdown of Production Facility

Factors such as aged equipment, poor raw water quality and prevalent power outages leads to frequent breakdown of critical electromechanical equipment, even though the company carries out regular maintenance activities. The company is however unable to stock critical spare parts and replacement parts due to financial constraints.

When the current tariffs are approved as required, GWCL will carry out all the needed repair, rehabilitation, and replacement of the key production facilities to improve on plant availability and consequently the reliability of water supply to our customers.

5.5 Expansion of Production Capacity

The company operates about 90 water supply systems, most of which operate below their installed capacities due to the age of the equipment and plants. Generally, water infrastructural growth rate has not kept pace with economic and population growth, thereby making it impossible to satisfactorily serve customer needs.

As earlier noted, GWCL has undertaken a number of capacity expansion projects, in an effort to ensure adequate and up-to date water systems to meet the demand for water supply in the urban/peri-urban areas of the country.

5.6 Production Losses

Production losses include water used for backwashing and desludging at the production stations. Industry standards for production losses is 5-10%. GWCL strives to fall within the industry standards in most treatment plants. However, raw water quality challenges in galamsey prone areas result in high production losses at the affected stations. The Company will carry out the needed maintenance to ensure that high standards are attained.

5.7 Metering and Accounting

Proposal on Customer Metering

As at December 2021, billed customers stands at 697,918 out of 748,982 (90%) are metered. 356,464 are in the three regions (Accra East, Accra West, and Tema) of the Greater Accra Metropolitan Area (GAMA), making up nearly 50% of all GWCL connections. Sales figures (2021) show that 60% of the total sales of GWCL is made in the three regions of GAMA, which translates into an average monthly billing of GHS 728,296,932.

The foregoing dictates that it is prudent to target the three GAMA regions in any intervention to reduce apparent losses since that makes the most impact. GWCL has since 2019, installed smart meters to improve on the general accuracy of customer consumption measurements this was done as a matter of policy.

GWCL intends to install 74,928 smart meters on a yearly basis for new customers and replace defective ones in the GAMA. The estimated cost of the smart meter and installation is USD 19,147,850.40.

It is therefore proposed to replace all existing customer meters within GAMA over the next 7 years while using smart meters for all new service connections. The proposed meters have ultrasonic principle for measurement and an in-built throttle valve for remote open/close operations in case of default.

5.8 illegal Mining

Illegal mining leads to high turbidity of raw water and results in frequent plant shutdown at the following systems: Kibi, Bonso, Daboase, Bonga, Odaso, Konongo, Apedwa, Jambusi and Dalun. Aside this, siltation of raw water source from these mining activities affects availability of raw water for production.

Ghana Water Company is closely collaborating with the Water Resources Commission (WRC), Environmental Protection Agency (EPA), Ministry of Lands and Natural Resources (MLNR) to find a lasting solution to mitigate the impact of illegal mining activities on our operations. GWCL has also undertaken some dredging works at some systems to improve the availability of raw water for production for example, Bonga, Daboase, Winneba, Baifrikrom etc.

5.9 Billing and Collection

Abolition of CDCH

As has been noted earlier, the abolition of the CDCH system, coupled with the refusal of the MDAs to pay their bills, has adversely affected the company. Collection ratio for MDAs as at February was 4.1%.

5.10 Organizational Reform and Restructuring

Internal Reforms

Management in 2015 took a giant leap to turn the fortunes of the company around in a 100-day transformation project dubbed "High Impact Performance Improvement Programme (HIPIP)". This culminated in the signing of a Memorandum of Understanding (MOU) between the Ministry of Water Resources Works and Housing and the Board of Directors of GWCL who in turn signed an MOU with the Managing Director. The Managing Director also signed an MOU with all the Departmental Heads and the various Regional Chief Managers. The Regional Chief Managers in turn signed MOU's with their respective District Managers. In summary, the 100-day transformation programme was anchored on performance improvement within the short term as a transformation plan and establishing the foundation for sustainable future service delivery. The programme was aimed at addressing critical challenges faced by GWCL and greatly improving the operations and management of the utility.

The programme, which commenced in April 1 and ended on June 30, 2015, strengthened employee productivity, enhanced revenue generation, and fully changed the work culture of employees. This is due to the fact that it had a reward and penalty system for improving and failing to achieve results. Members of staff who achieved their goals were handsomely rewarded accordingly.

In order to sustain the gains made, the 100 Days Transformation Programme was succeeded by a 180-day programme dubbed "SHiP 180d-Sustaining High Performance" which was launched on July 24, 2015 with the signing of addenda by all the parties who signed the initial MOU. The programme, however started in August 1 and ended on January 2016.

Furthermore, in 2016 another programme succeeded the 180-day programme entitled "PUSH-UP 270 – People centered, effective Utilization of resources, improved Supervision, High Performance" whilst the word UP was included to encourage workers beef up their game. The programme started in April 1 and ended on December 2016.

Likewise, in 2017, a 300-day programme was launched and named "STEP-UP 300 – Sustaining The Excellent Performance with a United People) with it main focus being the

reduction in Non-Revenue Water and arrears, improvement in cash operating margin and customer care. The 300-day programme started in March 1 and ended on December 2017.

In 2018, “LIFT 2018– Leveraging Innovation and technology for Financial sustainability through Team work” started in May 1 and ended on December 2018. Then, in 2019 POST-LIFT continued until it ended in December 2019.

The 2020 Performance Improvement Programme (PIP) under the theme “Optimizing Operational Performance through Minimizing losses and Increasing Sales” was launched on the February 14, 2020. The theme led to most of the thematic teams working efficiently to achieve the best results in the year.

Currently, in 2021 GWCL in collaboration with the World Bank and Isle Utilities launched the new PIP on 9th April 2021. The first phase of the programme will cover 100 days based on agreed actions set between GWCL and its collaborators. This time the desire of GWCL becoming a Utility of the Future is key in attaining most of its SMART target. GWCL intends to roll out similar programmes in subsequent years. The reform programmes have reward and sanction mechanisms which go a long way to motivate all staff to give off their best to put the company on sound financial footing.

5.11 Commercial Customer Complaints and Dispute Resolution

The company operates a toll-free Call Centre which receives customer complaints 24/7. Complaints are logged and relayed to the appropriate office for necessary action. The complaints mostly relate to irregular or long periods of no water supply; leakages that have not been attended to; poor water quality (colored water); and e-billing and e-payment issues.

GWCL will continue to invest in the application of technology to ensure that customer complaints are resolved in a timely manner and modify its business operations to ensure that customers are served in the best possible way.

5.12 Resolution of Court Cases

The company still has some outstanding court cases relating to land and payment of compensations to project affected persons. Usually, parcels of land and farm lands are acquired during development of infrastructure to increase access to improved water supply. Government often delays in the provision of funds for the payment of compensations and other related activities and usually it leads to significant extension of the time for completion of our projects, a situation that usually increase project costs and delays commissioning of the projects.

In certain instances, land owners, whose compensations are unduly delayed or under contention, have mobilized people to impede our operations and institute legal actions.

5.13 Government and Public Sector Debts

Previously, there was a debt clearing arrangement amongst public utilities where all the public utilities set-off their charges levelled by either party against the other via an in-house clearing mechanism. Government has abolished the mechanism and the implication is that individual public utilities are now directly responsible to collect monies owed them by other public organizations.

The current arrangement has impacted on our revenue collection since many public institutions like the Ministries, Departments and Agencies (MDAs) are reluctant in paying their bills levelled against them in respect of water consumed. Many other institutions have mentioned that they have not made provision for payment of water bills in their prevailing budget.

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Government is to encourage all public sector agencies and institutions to adequately budget for utilities and also meet their payments of same. GWCL will also need the support of PURC in times when GWCL is fully applying sanctions to agencies which consciously are unwilling to meet the payment obligations in light of water consumed by them.

5.14 Surcharge and Subsidies

The Government through the Ministry of Finance is expected to support GWCL to carry out capital investments and also meet compensation and land issues. Budgets are on a yearly basis prepared by GWCL and sent to Government through our sector Ministry but funds are never committed to the budget to enable us carry out the all-important water supply activities.

5.15 Government Grants

GWCL relies heavily on foreign loans and grants for the development of its infrastructure but the quantum of the inflows has been inadequate, as such, we are unable to keep pace with the rate of population and economic growth.

Further, the Government of Ghana through the MoF has decided to on-lend all grants given us by donor partners, a move which puts pressure on our limited cash flow.

We expect that a full cost-reflective tariff will be approved to enable us meet the requirements of the MoF.

5.16 Access to Finance and Repayment of Financing Costs

Due to poor financial health of the company, we were unable to attract commercial funding. In addition, our assets base was very low because our assets were not revalued over eighteen (18) years. This historical value made GWCL assets unattractive to investors because they were grossly undervalued.

GWCL has since 2017 revalued its asset thus enabling the massive GWCL infrastructure and installations are very massive across the country to reflect their fair values in the financial statement.

Consequently, the revalued assets which now reflect true replacement/fair value will enhance the value of the company as well as use as collateral to raise credits for the expansion of the company in the area of building new water supply systems and increasing the distribution network to the underserved populace.

This will afford the Company an opportunity to obtain a reasonable return on the assets when establishing the tariff, since the return is calculated on the fair value of the asset. When the tariff is adequately adjusted to reflect recovery of GWCL's full costs, GWCL will be able to borrow from financial institutions to embark on viable projects.

5.17 Tariff Structure and Rates

Certain deficiencies in the existing tariff structure have been noted earlier and discussed in section 1.3. These deficiencies have negatively impacted our operations over the years and require resolution by PURC.

The revenue expected to be generated from GHAPOHA (Ocean Going Vessel) was not achieved as a result of disagreement between volumes provided by GHAPOHA to GWCL for billing. As a result of this we propose that one special tariff for all ports and harbours authority nationwide to address the issue.

5.18 Water Sold to Independent Water Producers

GWCL has agreed to sell bulk treated water to CWSA saline belt communities in the Central Region. A provisional tariff of GHS2.5/m³ has been agreed between the two parties. The

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tariff shall be subjected to review in line with PURC tariff adjustment guidelines. The provisional water sale begun in March, 2020.

The bulk water is being sourced from the following GWCL systems: Brimsu, Baifikrom, Essakyir and Kwanyaku systems, and currently serves the following under listed communities:

No.	Name of Community	Name of Political District	Source of water supply
1	Tsetsi	AburaAsebu Kwamankese District	Brimsu
2	Essakyir	Ekumfi District	Essakyir
3	Obrachere	Awutu Senya District	Kwanyaku
4	Bawjiase	Awutu Senya District	Kwanyaku
5	Baifikrom	Mfantseman Municipal	Baifikrom
6	Kyiren Nkwanta	Gomoa West District	Kwanyaku
7	Agona Nyakrom	Agona West District	Kwanyaku
8	Anomabo	Mfantseman Municipal	Baifikrom
9	Edzibol	Mfantseman Municipal	Baifikrom
10	Botoku	Awutu Senya District	Kwanyaku

Nearly 150,000 people within the project area are currently benefiting from this arrangement at a per capita consumption of 20 l/p/d.

There are plans to replicate similar arrangement at Supom Dunkwa in the Western Region.

5.19 Human Resource-Skilled Manpower

Job Satisfaction

Due to the limited number of vacancies, the company does not regularly organize promotion interviews. This creates a situation where staff will be in a position for more than ten (10) years in some instances, resulting in low job satisfaction with its corresponding consequences.

Training

The company's limited financial resources make it difficult to implement its training program within any particular year. This makes it difficult for the company to equip staff with current skills needed to solve the dynamic challenges of the work.

5.20 Production Infrastructure Constraints

Water Supply infrastructure is expected to be developed by government but this is not forth coming. In addition, the cost of maintaining the existing infrastructure is high and the current tariff is not adequate to contain it.

5.21 Destruction of pipelines by Public Agencies

GWCL has observed the rising incidence of destruction of pipe mains by Public agencies (i.e. Road agencies, Power agencies, Telcos etc.) during the execution of projects that affects the supply of water to supply areas. This issue is common in some areas in the Ashanti Region such as Aboabogya (North A District), Ayensua koko (Offinso District), Kwamang (Kumawu District) etc.

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GWCL is closely collaborating with the Public Agencies during the planning and implementation stages of projects to avoid the destruction of distribution and transmission pipelines.

5.22 Aged and structurally weak pipelines

Supply in some areas are affected by bottlenecks caused by encrustation of aged distribution pipelines that limits their hydraulic performance. Additionally, structurally weak transmission pipelines which result in frequent bursts and leakages affects the supply of water in the distribution network. The weak and aged pipelines are gradually being replace with HDPE and PVC pipes for an improved supply regime to the affected supply areas.

5.23 Illegal Activities

GWCL is still engulfed with the challenge of illegal activities in the distribution network such as meter by-passes, illegal connections, tampering of meters by customers, installation of in-line suction pumps by customers etc. Illegal connections and meter tampering forms part of apparent losses which contribute to the high NRW whiles the connection of in-line suction pumps by customers distorts the regular flow and pressure conditions in the network and deprives some customers of the desired level of service.

The issue of illegal connections became prevalent in the era of the free water policy when it was detected that a lot of people had connected to GWCL water supply system without recourse to the company. These connections are proactively being pursued at the District level to correct the anomalies.

6. Strategies to Address Key Challenges

The strategies to address the key challenges noted above have been presented in the preceding sections. In addition, the table below outlines the strategies to address key challenges:

No.	Key Challenges	Measures to Address Challenges
1	Electricity Supply	Liaise with ECG to provide the company with dedicated lines to GWCL water treatment plants.
2	Energy Consumption (Production Plants Electricity Usage)	1) Conduct energy audits in accordance to ISO 50002 standards 2) Procure automatic voltage regulators (AVRs) for power supply quality 3) Continue with the installation of capacitor banks for power factor correction. 4) Installation of surge protection devices especially at major headworks to protect GWCL electromechanical equipment from damage due to abnormal voltages.
3	Availability of Chemicals and Laboratory Reagents	1) Continue with the Installation of efficient laboratory and dosing equipment 2) Use alternative and more efficient chemicals where applicable
4	Breakdown of Production Facility	Allocate sufficient fund to carry out repair, replace and rehabilitate aged equipment.
5	Metering and Accounting	Production Metering

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		<p>(a) Prioritization of Meter installations to be done and ranked by system</p> <p>(b) Detailed assessment of each site to be conducted to design installation for each site</p> <p>(c) Fabrication of relevant fixtures and appurtenances for installation to be completed per ranking system</p> <p>(d) Meters to be installed in the first ranked systems.</p> <p>Upgrade of MeterShops</p> <p>(a) 2 No. meter laboratories running, each with a test bench and some limited facilities to refurbish mechanical meters</p> <p>(b) Upgrade of one-meter shop to have a second semi-automated test bench</p> <p>Behaviour Change and Capacity Building</p> <p>a) Develop training materials and content for initial introductory training on Non-Revenue Water</p> <p>b) Draw a training plan and commence implementation of same within the GAMA Regions.</p> <p>Asset Inventory and Mapping</p> <p>GWCL has invested in the setup of GIS units under its Technology and Innovation Department to build a database of Assets (Pipelines, Valves, Pumps, Treatment Plants, etc.). Mapping of these assets is currently ongoing in the regions.</p>
6	Illegal Mining	<p>1) GWCL collaborating with Water Resources Commissions (WRC) and Environmental Protection Agency (EPA) to find a lasting solution</p> <p>2) Liaise with security agencies to check illegal small scale mining operations.</p>
7	Organizational Reform and Restructuring	Reward and Sanction mechanisms would be implemented to motivate all staff to give off their best to put the company on sound financial footing.
8	Resolution of Court Cases	1) Government should hasten the payment of compensation.
9	Government and Public Sector Debts	GWCL needs support from government in applying sanctions
10	Surcharge and Subsidies	Funds should be committed by Sector ministry
11	Government Grants	<p>1) Full cost reflective tariff will be approved by PURC</p> <p>2) Continue to liaise with government to make necessary funding available to carry out the needed investment.</p>
12	Access to Finance and Repayment of Financing Costs	Full cost reflective tariff will be approved by PURC
13	Tariff Structure and Rates	Service charge will be proposed
14	Human Resource-Skilled Manpower	Provide attractive conditions of service for staff to retain staff.
15	Production Infrastructure Constraints	Government should help in expansion in water supply infrastructure

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16	Destruction of pipelines by Public Agencies	Close collaboration with Public Agencies during the planning and implementation stages of projects
17	Aged and Structurally weak pipelines	Gradual replacement of worse affected distribution pipelines with HDPE, PVC etc.
18	Illegal Connections	Establishment of Loss Control Teams in the Districts to proactively pursue illegal connections and consumer irregularities.

7. GWCL WATER PRODUCTION SYSTEM RELATED DATA

7.1 Projected Water Production Data

Table-1 GWCL Water Production Systems Data 2021-2027

Parameter	Unit	2021	2022	2023	2024	2025	2026	2027
A. Projected Raw Water Abstraction Capacity	M ³ /Day	1,041,885	1,046,810	1,062,221	1,084,762	1,420,097	2,208,648	2,208,648
B. Gross Production Capacity	M ³ /Day	982,910	996,962	1,011,639	1,033,107	1,352,473	2,103,474	2,103,474
B1. Conventional Systems	M ³ /Day							
B2. Unconventional Systems	M ³ /Day							
C. Authorised Water Usage @ Production Site	M ³ /Day	49,894	42,371	43,292	44,211	57,878	90,017	90,017
D. Average Net Effective Production Capacity	M ³ /Day	933,764	947,114	961,057	981,452	1,284,849	1,998,300	1,998,300
D1. Conventional Systems	M ³ /Day							
D2. Unconventional	M ³ /Day							
E. Water Available for Transmission	M ³ /Day	881,711	899,345	917,332	935,678	1,225,739	1,912,152	1,912,152
F. Target Availability of Production Plants	%	95	95	95	95	95	95	95

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7.2 Capital Expenditure

Table-2 Summary of Water Related Capital Investment Plan (Million GHS) 2021-2027

Item	2021	2022	2023	2024	2025	2026	2027
Capital Cost	18,518	18,827	19,410	20,079	20,854	21,755	22,645
Initial Spares	213	256	286	329	368	412	462
Additional Capitalisation							
Renovation & Modernisation (R&M)							
Rehabilitation & Resettlement (R & R)							

7.3 Capital Expenditure Financing Plan

Table-3 Summary of Water Production Related Capital Expenditure Financing Plan (Million GHS) 2021-2027

Item	2021	2022	2023	2024	2025	2026	2027
Accumulated Depreciation	9,036.30	9,978.82	11,034.44	12,248.41	13,608.06	15,130.86	16,246.533
Retained Earnings							
Commercial Borrowings:							
Domestic	57.81						
Foreign	267.10	296.73	338.21	376.38	419.12	469.42	525.75
Additional Equity Contribution By Shareholder(s)							
Grants:							
Domestic							
Foreign							
Tariff Revenue (Revenue from Projected Capacity Charge)							

8. Operation and Maintenance Costs

Table-4 Water Related Operation and Maintenance Costs (Million GHS) 2021-2027

Item	2021	2022	2023	2024	2025	2026	2027
Fixed O & M Costs							
Production	1,082.56	1,273.26	1,447.91	1,686.11	1,922.59	2,195.99	2,512.86
Transmission	79.07	91.83	104.32	121.38	138.24	157.69	177.54
Distribution	582.87	667.96	794.53	942.11	1,097.74	1,282.33	1,501.85
Variable O & M Costs							
Production	391.81	463.87	519.53	597.46	689.40	833.53	933.55

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Transmission	37.91	46.58	52.17	56.00	70.55	89.21	99.92
Distribution	2.69	3.29	3.68	4.23	4.96	6.24	6.98

9. Administration and General Costs

Table-5 Water Related Administration and General Costs (Million GHS) 2021-2027

Item	2021	2022	2023	2024	2025	2026	2027
Fixed O & M Costs							
Production	162.96	196.70	220.30	256.56	286.69	321.09	359.62
Transmission	8.35	9.73	10.89	12.53	14.03	15.71	17.60
Distribution	61.17	78.12	86.90	99.93	111.93	125.36	140.40
Variable O & M Costs							
Production							
Transmission							
Distribution							

10. Human Resource Costs- Employee Costs

Table-6 Water Production Related Human Resource Costs (Million GHS) 2021-2027

Item	2021	2022	2023	2024	2025	2026	2027
Fixed O & M Costs							
Production	160.63	196.92	250.43	319.12	410.64	524.16	669.53
Transmission	3.88	4.74	6.00	7.64	9.72	12.38	15.76
Distribution	252.11	304.33	380.00	478.31	600.54	756.08	954.25
Variable O & M Costs							
Production							
Transmission							
Distribution							

11. Public Education

Table-7 Summary of Public Education Costs (Million GHS) 2021-2027

Item	2021	2022	2023	2024	2025	2026	2027
Stakeholder Communication & Sensitisation (Pubic Education)	2.34	2.62	2.94	3.38	3.78	4.24	4.75

12. Financing and Interest Costs

Table-8 Water Production Related Financing and Interest Costs (Million GHS) 2021-2027

Item	2021	2022	2023	2024	2025	2026	2027
Interest on Foreign Loans	3,855.27	4,048.03	4,250.43	4,462.95	4,686.10	4,920.41	5,166.43
Interest on Domestic Loans	10.32						
Interest on Working Capital Loan							

13. Return on Equity

Table-9 Water Production Related Equity Financing Costs (%) 2021-2027

Item	2021	2022	2023	2024	2025	2026	2027
Rate of Return	8.0	8.0	8.0	8.0	8.0	8.0	8.0

14. Depreciation

Table-10 Depreciation (Million GHS) 2021-2027

Item	2021	2022	2023	2024	2025	2026	2027
Depreciation of Production Assets	589.08	659.77	738.94	849.78	951.75	1,065.96	1,193.9
Depreciation of Transmission Assets	42.08	47.13	52.78	60.70	67.98	76.14	85.3
Depreciation of Distribution Assets	210.38	235.63	263.91	303.49	339.91	380.70	426.4

15. Projected Water Production, Transmission and Distribution Revenue Requirement

With the guidance of officials of PURC, we have computed our revenue requirements to support our operations for the period 2019 to 2026. These are detailed in the accompanying spreadsheets. No increase in electricity tariffs has been included in the proposal.

The increase in tariff is mainly due to exchange rate depreciation, paradigm shift in the economic policies of the Government, the need for adequate funds to offset required investments in general. In addition, we have considered a reasonable return of 8% on the regulatory assets.

Currently, Government requires GWCL to meet the exchange rate depreciations, various loans and their accompanying interest's repayments through tariffing which was previously not the case.

**Table-11 Summary of Water Production Revenue Requirement
(Million GHS) 2021-2027**

Item	2021	2022	2023	2024	2025	2026	2027
A. Capital Recovery Component (CRC)							
B. Fixed O & M Component (FOMC)							
C. Revenue from Water Charge							

16. Proposed Tariff and Rates Structure

Proposed Revenue Requirements

Based on the enumerated issues and discussions made, we have computed our revenue requirements to support our operations for the period 2019 to 2027 which are shown in the tables below. The method and assumptions are also discussed.

Cash Operating Expenses

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THE COST BUILDUP	2021					
	Production	Transmission	Distribution	Commercial	General Admin	Total
	GHC	GHC	GHC	GHC	GHC	GHC
Personnel	57,954,888.55	4,741,085.02	49,786,526.50	89,559,418.58	86,501,766.58	288,543,685.23
Propose Salary						
Long Service Award Provision						
Personnel Cost	57,954,888.55	4,741,085.02	49,786,526.50	89,559,418.58	86,501,766.58	288,543,685.23
Chemicals	39,645,093.40	6,294,942.41	577,108.76	-	-	46,517,144.58
Electricity Consumption	225,914,297.39	25,373,940.76	761,609.64	276,044.62	3,240,500.99	255,566,393.39
VAT/NHIS	47,921,214.59	5,382,351.07	161,553.56	58,554.92	687,379.00	54,211,053.14
Fuel	2,762,784.12	159,378.08	4,875,747.11	2,111,305.44	5,888,802.93	15,798,017.68
Materials	12,362,089.20	-	6,629,965.64	94,681.27	6,782,523.54	25,869,259.65
Reagents	827,621.83	52,070.17	-	-	90,766.81	970,458.81
Hiring of Equipment	111,827.01	47,072.09	422,377.40	-	555,068.83	1,136,345.33
Overheads	8,151,558.55	467,912.05	8,659,725.28	20,727,631.00	88,560,688.17	126,567,515.05
Bad Debts	-	-	-	-	-	-
R & M	134,344,752.74	405,258.26	32,642,120.27	2,902,639.72	10,996,890.34	181,291,661.33
Financial Cost					3,529,413.06	3,529,413.06
Exchange Loss					1,049,331,904.77	1,049,331,904.77
Levies					18,767,545.92	18,767,545.92
Crop and Land Compensation			-		1,502,380.07	1,502,380.07
Pipeline right of way & Vegetation Management						
Contract Service						
Capital Maintenance	101,745,410.28	14,535,058.61	72,675,293.05	58,140,234.44	43,605,175.83	290,701,172.22
54,441,484.28	631,741,537.67	57,459,068.53	177,192,027.21	173,870,509.99	1,320,040,806.82	2,360,303,950.22
ABSORPTION						
COMMERCIAL						
Distribution - 100%			173,870,509.99			
GENERAL ADMINISTRATION						
Production - 70%	924,028,564.78					
Transmission - 5%		66,002,040.34				
Distribution - 25%			330,010,201.71			
TOTAL	1,555,770,102.44	123,461,108.87	681,072,738.91			2,360,303,950.22

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Projected Costs and Revenue Requirement

Item Description	GWCL PROPOSED REVENUE REQUIREMENT								
				PROJECTIONS					
	2019	2020 Base	2021	2022	2023	2024	2025	2026	2027
	Ghc	Ghc'000	Ghc'000	Ghc'000	Ghc'000	Ghc'000	Ghc'000	Ghc'000	Ghc'000
Recurrent Expenditure:									
Personnel Cost	255,423,945.00	292,830,433.35	273,390,204.64	328,068,245.57	410,085,306.96	512,606,633.70	640,758,292.13	800,947,865.16	1,001,184,831.45
Chemicals	43,098,521.00	45,619,347.75	44,074,198.56	70,518,717.70	78,980,963.82	90,828,108.39	118,984,821.99	185,616,322.31	207,890,280.99
Electricity Consumption	246,102,233.02	308,041,626.93	242,144,784.88	271,202,159.06	303,746,418.15	275,212,663.72	277,541,386.26	340,018,894.96	298,076,061.60
VAT/NHIS	52,203,503.98	53,907,284.71	51,364,045.28	57,527,730.71	64,431,058.40	74,095,717.16	82,987,203.21	92,945,667.60	104,099,147.71
Fuel	14,108,493.00	14,746,074.50	14,968,351.44	26,194,615.02	29,337,968.82	32,858,525.08	36,801,548.09	41,217,733.86	46,163,861.93
Materials	13,112,728.00	13,966,526.92	24,510,680.88	29,412,817.06	32,942,355.10	37,883,708.37	42,429,753.37	47,521,323.78	53,223,882.63
Reagents	782,785.00	2,055,311.03	919,493.12	1,103,391.74	1,235,798.75	1,421,168.57	1,591,708.79	1,782,713.85	1,996,639.51
Hiring of Equipment	983,305.00	4,542,176.59	1,076,667.76	1,292,001.31	1,447,041.47	1,664,097.69	1,863,789.41	2,087,444.14	2,337,937.44
Overheads	113,459,132.00	109,957,975.78	119,920,554.88	143,904,665.86	161,173,225.76	185,349,209.62	207,591,114.78	232,502,048.55	260,402,294.38
Bad Debts									
R & M	172,679,134.00	202,470,951.98	171,770,747.12	206,124,896.54	230,859,884.13	265,488,866.75	297,347,530.76	333,029,234.45	372,942,742.58
Financial Cost	3,820,581.00	2,089,991.60	3,344,058.48	3,745,345.50	4,194,786.96	4,824,005.00	5,402,885.60	6,051,231.87	6,777,379.70
Exchange Loss	1,751,080,444.00	316,511,810.71	994,224,025.20	1,441,624,836.54	1,513,706,078.37	1,589,391,382.29	1,668,860,951.40	1,752,303,998.97	1,839,919,198.92
Levies	18,476,428.00	12,137,081.00	17,781,928.64	19,915,760.08	22,305,651.29	25,651,498.98	28,729,678.86	32,177,240.32	36,038,509.16
Crop and Land Compensation	1,427,393.13	3,144,989.11	1,423,479.41	1,594,296.93	1,785,612.57	2,053,454.45	2,299,868.99	2,575,853.26	2,884,955.66
Pipeline right of way & Vegetation Management	-	-	1,227,744.00	1,375,073.28	466,542.72	2,324,070.00	14,063,060.03	6,465,642.40	6,788,924.52
Contract Service	-	-	2,728,599.30	3,056,031.22	6,821,498.25	17,493,449.57	161,244,630.17	108,232,185.72	113,643,795.00
Capital Maintenance	159,750,872.00	80,020,000.57	275,434,386.64	308,486,513.04	591,843,135.70	679,194,304.31	784,360,892.09	911,214,425.67	913,192,743.84
New Service Connections & Replacement Meters			120,000,000.00	160,000,000.00	200,000,000.00	200,000,000.00	280,000,000.00	320,000,000.00	360,000,000.00
Cash Operating Expenses	2,846,509,498.13	1,462,041,582.53	2,360,303,950.22	3,075,147,097.15	3,655,363,327.21	4,038,340,863.64	4,652,859,115.92	5,216,689,826.87	5,627,613,187.00
Capital Recovery Cost									
Return on Assets (Cost of Equity)	374,674,636.46	374,674,636.46	374,674,636.46						
Interest on Loans (Cost of Debt)	70,613,853.00	87,580,564.78	53,747,528.24	100,912,988.88	90,574,107.83	80,235,616.72	69,897,125.62	59,558,634.63	49,220,143.64
Depreciation	790,219,573.00	766,292,285.05	841,537,856.50	841,537,856.50	841,537,856.50	841,537,856.50	841,537,856.50	841,537,856.50	841,537,856.50
Sub Total	1,235,508,062.46	1,228,547,486.29	1,269,960,021.20	942,450,455.38	932,111,964.33	921,773,473.22	911,434,982.12	901,096,491.13	890,758,000.14
Loans									
Loan Repayment (Principal)	29,298,871.00	476,162,000.38	442,120,348.69	489,656,297.02	479,317,737.51	468,979,178.05	458,640,618.68	448,302,059.29	446,957,153.12
Sub Total	29,298,871.00	476,162,000.38	442,120,348.69	489,656,297.02	479,317,737.51	468,979,178.05	458,640,618.68	448,302,059.29	446,957,153.12
GWCL Grand Total	4,111,316,431.58	3,166,751,069.20	4,072,384,320.11	4,507,253,849.55	5,066,793,029.05	5,429,093,514.92	6,022,934,716.72	6,566,088,377.29	6,965,328,340.25
DESALINATION									
Capacity Charge	96,664,436.00	96,664,436.00	102,286,800.00	144,906,300.00	152,151,615.00	159,759,195.75	167,747,155.54	176,134,513.31	184,941,369.16
Water Charge	5,052,424.00	5,052,424.00	9,467,280.00	13,254,192.00	13,916,901.60	14,612,746.68	15,343,384.01	16,110,533.21	16,916,080.88
Electricity Cost	25,571,612.00	35,086,674.48	42,921,886.40	45,067,980.72	47,321,379.76	49,687,448.74	52,171,821.18	54,780,412.24	57,519,432.85
Distribution & Commercial Charges									
Desalination Total Cost	127,288,472.00	136,803,534.48	154,675,966.40	203,228,472.72	213,389,896.36	224,059,391.17	235,262,360.73	247,025,478.77	259,376,882.89
GWCL OPEX	2,846,509,498.13	1,462,041,582.53	2,360,303,950.22	3,075,147,097.15	3,655,363,327.21	4,038,340,863.64	4,652,859,115.92	5,216,689,826.87	5,627,613,187.00
GWCL OPEX & DEPRECIATION	3,636,729,071.13	2,228,333,867.58	3,201,841,806.72	3,916,684,953.65	4,496,901,183.71	4,879,878,720.14	5,494,396,972.42	6,058,227,683.37	6,489,151,043.50
GWCL OPEX & CRC	4,082,017,560.58	2,690,589,068.82	3,630,263,971.42	4,017,597,552.53	4,587,475,291.54	4,960,114,336.86	5,564,294,098.04	6,117,786,318.00	6,518,371,187.14
GWCL GRAND TOTAL	4,111,316,431.58	3,166,751,069.20	4,072,384,320.11	4,507,253,849.55	5,066,793,029.05	5,429,093,514.92	6,022,934,716.72	6,566,088,377.29	6,965,328,340.25
DESAL OPEX	127,288,472.00	136,803,534.48	154,675,966.40	203,228,472.72	213,389,896.36	224,059,391.17	235,262,360.73	247,025,478.77	259,376,882.89
OPEX Desal and OPEX GWCL	2,973,797,970.13	1,598,845,117.01	2,514,979,917.12	3,278,375,570.12	3,868,753,224.12	4,262,400,254.82	4,888,121,476.65	5,463,715,305.64	5,886,990,069.89
OPEX Desal, OPEX GWCL & DEPRECIATION	3,764,017,543.13	2,365,137,402.06	3,356,517,773.12	4,119,913,426.12	4,710,291,080.12	5,103,938,111.32	5,729,659,333.15	6,305,253,162.14	6,728,527,926.39
OPEX Desal, OPEX GWCL & CRC	4,209,306,032.58	2,827,392,603.30	3,784,939,938.12	4,220,826,025.12	4,800,865,188.12	5,184,173,728.04	5,799,556,458.77	6,364,811,796.77	6,777,748,070.03
GWCL & DESAL GRAND TOTAL	4,238,604,903.58	3,303,554,603.68	4,227,060,287.12	4,710,482,322.12	5,280,182,925.12	5,653,152,906.09	6,258,197,077.45	6,813,113,856.06	7,224,705,223.14
Total Estimated Revenue Requirement	4,238,604,903.58	3,303,554,603.68	4,227,060,287.12	4,710,482,322.12	5,280,182,925.12	5,653,152,906.09	6,258,197,077.45	6,813,113,856.06	7,224,705,223.14
				4,119,913,426.12					
Cost/ m³									
GWCL OPEX	19.75	7.65	14.33	19.38	22.08	23.44	20.26	14.34	15.19
GWCL OPEX & DEPRECIATION	25.23	11.66	19.43	24.69	27.16	28.33	23.92	16.65	17.46
GWCL OPEX & CRC	28.32	14.08	22.03	25.33	27.71	28.79	24.22	16.82	17.60
GWCL GRAND TOTAL	28.52	16.57	24.72	28.41	30.60	31.51	26.22	18.05	18.80
DESAL OPEX	33.15	19.68	19.14	24.12	24.85	25.61	26.40	27.30	28.59
OPEX Desal and OPEX GWCL	20.10	8.07	14.55	19.62	22.21	23.55	20.49	14.66	15.51
OPEX Desal, OPEX GWCL & DEPRECIATION	25.44	11.94	19.42	24.66	27.05	28.20	24.01	16.91	17.73
OPEX Desal, OPEX GWCL & CRC	28.44	14.27	21.90	25.27	27.57	28.64	24.31	17.07	17.86
GWCL & DESAL GRAND TOTAL	28.64	16.68	24.46	28.20	30.32	31.23	26.23	18.28	19.04

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PROPOSED TARIFF STRUCTURE

	Categories	Existing Tariff	Proposed Tariff	Expected Sales	Billing	Expected Revenue	Customers
		GHp	GHp	m3	GHs	GHs	No.
	Residential						
(a)	0- 5	329.2121	1,149.7211	5,496,246	18,094,307.79	63,191,501.13	168,610
(b)	above 5	560.2083	2,483.9544	103,539,309	580,035,802.27	2,571,869,253.91	434,453
(c)	Bulk Supply		1,149.7211	1,070,032	-	12,302,378.69	10
(d)	Non Residential	923.039	3,492.7398	1,532,436	14,144,981.93	53,524,002.37	16,907
(e)	Commercial	923.039	4,122.3598	22,303,164	205,866,897.61	919,416,651.67	48,940
(f)	Industrial	1111.8338	5,013.9975	8,443,568	93,878,445.88	423,360,299.29	300
(g)	Public Distribution/Gov't Depts.	718.6628	3,186.5391	19,391,283	139,357,939.32	617,910,822.12	5,842
(h)	Public Standpipe	369.4489	1,638.1304	4,918,822	18,172,533.45	80,576,715.90	9,596
(i)	Port & Harbour		60.0000	364,957	-	218,974.01	30
	Total			167,059,816	1,069,550,908	4,742,370,599	684,688

Proposed Meter Maintenance Fee

GWCL wishes to propose an increase in service charge for all customers. Currently customers pay for meters only once, the maintenance and replacement of such meters would be borne by GWCL.

GWCL would be able to provide a subsidy towards new service connection fees if the proposed increase is approved.

Our proposal for each customer category is tabulated below:

Category	Rate/ Month (GHS)	Inactive Customers	Active Customers	Amount/ Month (GHC)
Domestic	10	132,059	603,072	6,030,720.00
Premises without Connection(Public stand pipes)	10	2,546	9,596	95,960.00
Commercial	10	35,618	64,898	648,980.00
Industrial	10	1,121	300	3,000.00
Public/ Gov't Dept	10	2,927	5,842	58,420.00
Sachet Water Producers	10	606	972	9,720.00
Special Commercial (Bottled Water Producers)	10	10	8	80.00
Total		174,887	684,688	6,846,880.00

APPENDICES

A: The Low Income Customer Support Department (LICSD)

LICSD has been working closely with development partners, non-governmental organisations, academia, the Public Utilities Regulatory Commission communities and GWCL Departments, regions and districts to assure Low Income Urban Communities (LIUCs) are benefitting from investments through addressing barriers preventing LIUCs to connect to GWCL safe, affordable and reliable services.

Partnerships for financing and capacity building with the Dutch water sector, the World Bank, UNICEF, UN Habitat, Water, Sanitation for the Urban Poor (WSUP), the Public Utilities Regulatory Commission (PURC), just to mention a few, have resulted in innovative WASH projects in several poor and underserved communities and schools in Ghana. Lessons are being learned from past and on-going projects through active involvement in implementation of interventions which enables the unit to make a great impact within GWCL.

A brief highlight of LICSU's achievements and results are presented below.

Project Name	Innovations	Results
UNICEF Equitable water supply services in 6 low income, high population density urban and peri-urban areas	Piloting of recommendations from urban study undertaken in 2020.	<ul style="list-style-type: none"> • Work in progress • Distribution improvements • Water safety planning • Water governance • Community engagement
World Bank (IDA) Greater Accra Metropolitan Area Project	<ul style="list-style-type: none"> • Subsidised connections • Demand creation for water connection • Customer profile data collection • Profiling of standpipes/vendors • Customer education • Meetings with community leaders • Formation of water user associations • Follow-up on defaulted customers 	<ul style="list-style-type: none"> • > 12,000 households connected (the project contributed more than 30% of new connections in GWCL in 2019 alone) • Development of knowledge management products • > 26 LIUCs engaged on water issues • > 250,000 LIUC residents gained improved access to water services • Consultative process has deepened and improved relationship between LIUCs and GWCL
WaterWorX Water Operator Partnership between GWCL and the Dutch Water Sector (VEI b.v.) to support GWCL to deliver sustained, world class services.	Long-term peer-to-peer partnership to exchange knowledge and build capacity in support of achieving operational excellence and meeting the SDG 6 targets.	<ul style="list-style-type: none"> • NRW reduction exercises • Distribution improvements • Operational and financial resilience • Capacity building
Water for Life		The project has improved on water supply to more than 9,000

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Water supply to the Peri-urban Poor at Acherensua in the Brong-Ahafo Region		<p>low income consumers through the following activities:</p> <ul style="list-style-type: none"> • Construction of 50m³ high level storage tank • Rehabilitation of treatment plant • Extension of 4km 100mm distribution network • Construction of 20 standpipes
WSUP Water Supply to the poor at Fiapre in Sunyani	<ul style="list-style-type: none"> • Community involvement is a major component • Community training and Sensitisation in water management, sanitation and hygiene issues 	<ul style="list-style-type: none"> • Drilling and Mechanisation of 2 no. boreholes: • Provision of 3km distribution network • Construction of 5 No. Water Kiosks, with metered standpipes for monitoring of water sales and non-revenue water.
Football for Water / VEI b.v. Water and Sanitation for 32 schools in the Northern, Central and Greater Accra Regions	Setting-up WASH infrastructure for 32 schools in the Northern, Central and Greater Accra Region in Ghana including life skills training for boys and girls	<ul style="list-style-type: none"> • Provision of WASH facilities and SHEP training of pupils and teachers. • Training of World Coaches as role models to teach pupils life skills • Improved on WASH to more than 2,800 pupils and teachers in the Sakasaka Cluster of schools, 4,021 in the Central Region, more than 5,200 in the Gbawe Cluster of schools and 5,000 in the Ashaiman Cluster of schools all in the Greater Accra Region.
WSUP This project improved access to water supply to selected LIUCs in Kumasi by extending the water network.	<p>Adoption of effective, sustainable and scalable models of pro-poor urban water services by the service provider and the local government.</p> <p>Connection to GWCL's existing network at the edge of Adukrom and Akorem.</p>	<ul style="list-style-type: none"> • Construction of 80m transmission main (incl. a bulk flow meter) and a 250m³ high level concrete water tank. • Provision of 12.8km distribution network • Construction of 640 No. metered house connections and 39 No metered standpipes for monitoring of water sales and non-revenue water.
W4L Water Supply to the Urban Poor at Acherensua	<ul style="list-style-type: none"> • Rehabilitation of Treatment Plant • Additional distribution network 	<ul style="list-style-type: none"> • 3,000 people benefitted directly. • Additionally, 8,800 people that were already connected to the system enjoyed more reliable water supply

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	<ul style="list-style-type: none"> • Construction of 10 standpipes • Community Water and Sanitation Training 	
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Improving Access to Water Supply

- World Bank GAMA Sanitation and Water Project: connected 10,000 households directly benefitting 70,994 people and a multiple of that indirectly.
- Water for Life: laid 8.82 km distribution network has been laid in Okatabanman, a community in the Adenta District (Accra East Region) expecting to benefit 16,800 people and secured funding for two similar projects with a total of 25,000 beneficiaries.
- WaterWorX program: champion of the long-term partnership agreement between GWCL and the Dutch water sector focused on extending access to water supply in LIUCs, reducing non-revenue water (NRW) and improving the reliability of water supply in three (3) districts (i.e. Adenta, Amasaman and Santeo).

Capacity Building & Training

- Formed and trained Water User Associations (WUAs) in 14 LIUCs, including Adjeikojo, Zenu, Abenwoha and Wiaboman.
- Educated 17,000 households on water management, bill calculation and payment, mobile money payment and meter reading
- Gathered and tracking customer satisfaction information regarding their perceived water service delivery for over 1,000 customers in 10 LIUCs.

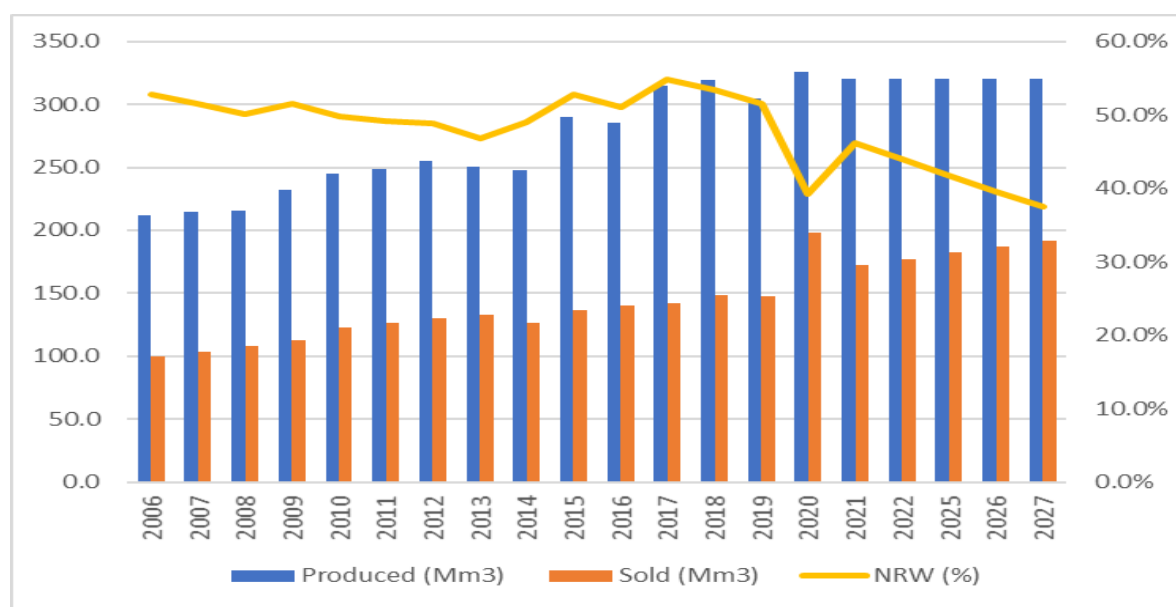
Knowledge and Capacity Development

- Organised benchmarking visit to 3 leading Kenyan utilities (in Nairobi City, Kisumu and Nakuru) for key LICSU and regional staff (commercial, communication ICT and HR) to appreciate best African practices in low income water service delivery.
- Arranged for 4 regional staff to attend the 1st IWA Conference of Intermittent Supply and participate in WaterWorX Community of Practice Workshop on NRW held in Uganda.
- Produced an impressive number of field study and briefing notes, which document evidence on pro-poor urban WASH in GWCL.

B. WATER LOSS REDUCTION MANAGEMENT

The highest non-revenue water recorded since 2006 was in 2017, at approximately 55%, non-revenue water for 2021 was 46.2%. The trend shows that the volumes of water sold only increases marginally from year to year, it is not sensitive to increases in water production. The year 2020 was an extraordinary year, the NRW estimate for the year deviated from the normal expected values based on the empirical data. It was therefore adjusted (interpolated) to 48.9% as expected and used for the analysis.

The projection of expected non-revenue water levels for the next three years with 2021 as a point of departure. It is assumed that production will remain constant for the next three years and NRW will reduce at a rate equal to the average reduction experienced in the last four years. This translates into an average reduction of 1.8% per year, projecting that expected non-revenue water for the year 2027 will be approximately 37.5%. To achieve this, sales will have to increase to 200.6 Mm³ in the year 2027 from the 172.7 Mm³ recorded in 2021. The desired outcome if achieved could reduce GWCL's NRW to just above 37% in three years. With due consideration to all the current interventions.



Management launched a five-year non-revenue water reduction plan in January 2020 which consolidated existing efforts to reduce non-revenue water and prescribed strategies for reducing non-revenue water. The plan is summarised below

Short term Strategies

Planning Horizon: Short-term

Planned Duration: 18 months (2020-2021)

Planning Philosophy: Knowledge gathering, capacity building and setting the stage

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Short-term planning horizon for NRW

Component	Description/Activity	Status	Projected Completion	Remarks
(1) Production Metering	<ul style="list-style-type: none"> A total of 426 meters: 409 Magnetic Meters, and 17 Ultrasonic Clamp-on Meters were procured and delivered on 17 March 2021 for installation on all 90 water systems. 	<ul style="list-style-type: none"> Installation commenced in August 2021 and as at the end of March 2022, 141 No. meters had been installed, out of the number installed 33 have been commissioned as at March ending 2022. 	June 2022	<ul style="list-style-type: none"> Meters have been installed in three regions: ATMA Production, Central Region and Ashanti Production
(2) Inter-regional Metering	<ul style="list-style-type: none"> Metering of trunk mains connecting two or more regions has been completed for ATMA, and a SCADA system (including a Control Room) established for it. 	<ul style="list-style-type: none"> 21 No. magnetic meters and 21 No. pressure loggers have been installed to monitor flow and pressure between Accra East-Accra West and Accra East-Tema 	Completed	
(3) Upgrade Meter Laboratories	<ul style="list-style-type: none"> There are two meter test laboratories for testing and refurbishing domestic meters: Accra Metershop and Kumasi Metershop. 	<ul style="list-style-type: none"> The rehabilitation and upgrade of the Accra Metershop was completed in June 2021. Assessment for Kumasi Metershop has been completed, and rehabilitation expected in 2022. Procurement of contractor will 	Completed	<ul style="list-style-type: none"> The works included rehabilitation of existing Meter and Instrumentation building, creation of storage for same, installation of 1 number modern semi-automated test bench able to

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Component	Description/Activity	Status	Projected Completion	Remarks
	<ul style="list-style-type: none"> Architectural and Structural Designs have been completed for the construction of a third Metershop in Tamale, 	commence in Q3 of 2022	December 2022	accurately test smart ultrasonic meters.
(4)Improve Customer Metering	<ul style="list-style-type: none"> Categorised into 3 distinct sub-activities: tackling poor industrial and bulk customer metering, achieving 100% effective customer metering and introduction of Automatic Meter Reading (AMR). To achieve 100% metering, 150,000 number customer meters were procured for all regions replace faulty customer meters and customers without meters, Two smart meter projects have been initiated to introduce Automatic Meter Reading; One makes use of Drive-by technology and the other makes use of a Fixed network. <ul style="list-style-type: none"> 40,000 smart meters have been installed in the three ATMA regions for the drive- 	<ul style="list-style-type: none"> 226 number magnetic meters were procured for industrial metering in 2021, installation commenced in August 2021. As at March 2022, 72 meters had been installed and configured. 83,000 customer meters have been installed as at December 2021. Roll out of drive-by meter reading is expected to commence by the 3rd quarter of 2022. 2,700 smart meters have been installed 	December 2022	

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Component	Description/Activity	Status	Projected Completion	Remarks
	<p>by project, drive-by tests completed.</p> <ul style="list-style-type: none"> 20,000 meters will be installed in the Northeast district of the Accra East region by December 2022 and configured to the fixed network 			
(5)Integrate NRW reduction into Regional Operational structure	<ul style="list-style-type: none"> Appointment of non-revenue water officers for the regions 	<ul style="list-style-type: none"> Completed for 8 regions: Accra East, Accra West, Tema, Eastern, Central, Western, Ashanti North, Ashanti South, Volta, Northern. 	Completed	<ul style="list-style-type: none"> Appointed officers were trained on cutting-edge industry tools for reducing non-revenue water. As at December 2021, all regions had developed a non-revenue water strategic plan for implementation beginning 2022.
(6)Behavioral Change, training and Capacity Building	<ul style="list-style-type: none"> Training needs assessment-online survey was conducted to understand NRW at the regional/district levels in first quarter of 2021. 	The campaign was conducted between January and May 2021.	<p>Completed</p> <p>Ongoing</p>	<ul style="list-style-type: none"> Based on the report of this survey, a change campaign was initiated in all districts in GAMA led by the

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Component	Description/Activity	Status	Projected Completion	Remarks
	<ul style="list-style-type: none"> • Introductory training on non-revenue water production was provided to all district management staff in the 8 regions that have non-revenue water officers. • Selected Engineers (T&I and Operations) were given training in Hydraulic Network Modelling in 2021, and 15 no. Synergi water licenses procured for all regions and Head Office. 		December 2022	Managing Director.
(7) Inventory of water supply Assets (Pipe Network)	<ul style="list-style-type: none"> • This is the continuous mapping and digitizing of GWCL spatial assets comprising pipe network, distribution appurtenances, etc. • The GIS software used for mapping and digitizing was upgraded in 2021 to allow for the development of (web and mobile) services on the GIS. • The establishment of a Continuously Operating Reference Stations (CORS) completed • 	<ul style="list-style-type: none"> • As at December 2021, 8,519 kilometres of pipelines had been mapped and digitized countrywide. 	Recurrent Activity	
(8) Provide Basic tools at the regional level (Loggers, Flow meters, etc.)	<ul style="list-style-type: none"> • All regions (including ATMA and Ashanti Production) have been provided with: <ul style="list-style-type: none"> ◦ portable flow meters (2 No.) ◦ digital pressure loggers (10 No.) ◦ thickness loggers (10 No.) and 	<ul style="list-style-type: none"> • GIS offices in all regions have been renovated and furnished with computers, plotters, scanners, etc.). At least 2 No. GNSS devices were 	Completed	

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Component	Description/Activity	Status	Projected Completion	Remarks
	<ul style="list-style-type: none"> metal detectors (1 No.). The measuring tools are to aid the regions to conduct basic measurements on their distribution systems to have a better understanding of the systems to reduce the losses. 	provided per region. 2 No. new offices have been constructed for Accra West and Eastern regions		
(9) Demonstration Projects	<ul style="list-style-type: none"> Leakage Detection activities (in 6 DMAs) Water loss reduction in Santeo and Amasaman districts through creation of DMAs. 	<ul style="list-style-type: none"> 6 DMAs in Kaneshie District completed and helped save at least GHS 5 million under the Nationwide Network Management Project 91 number unreported/undiscovered leakages were discovered in April 2022 under the Strategic Sector Cooperation Project being implemented in the Tema Region. NRW level reduced in Santeo and Amasaman from 72% to 19% and 56% to 23% respectively under the WaterWorX Project 		

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Component	Description/Activity	Status	Projected Completion	Remarks
		<ul style="list-style-type: none"> • All leakages have been resolved. 		

General Comment:

These activities were gravely affected by the COVID-19 pandemic, as most of them bordered on procurement, especially devices that were imported.

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Medium term Strategies

Planning Horizon: Medium-term

Planned Duration: 24 months (2021-2023)

Planning Philosophy: Defined structure, improved monitoring and management, retooling, change management

Medium-term planning horizon for NRW

Activity	Activities	Status	Projecte d Completi on	Remarks
(1) Consumer Metering (Smart and Prepaid Introduced)	<ul style="list-style-type: none"> • Introduction of Prepaid meters is being piloted in the Accra East district of the Accra East region 	<ul style="list-style-type: none"> • 820 prepaid meters had been installed in the pilot area as at the end of December 2021. 	December 2022	<ul style="list-style-type: none"> • Commenced under the Short-term planning horizon. • Full configuration of the system will be completed in 2022
(2) Network Zoning and DMA design and Implementation	<ul style="list-style-type: none"> • Planned. 	<ul style="list-style-type: none"> • Guideline document for zoning networks and designing DMAs drafted. 	2022	
(3) Active Leakage Search (Night Flow, Step testing, etc.)	<ul style="list-style-type: none"> • Planned. • To introduce a Rapid Response Team and an Active Search Team in all regions 		2023 Recurrent	
(4) Continuous Capacity	<ul style="list-style-type: none"> • Planned 		Recurrent	

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Building (Training, retooling, etc.)				
(5) Asset Managemen t Software (digitized leakage reporting, etc.)	• Planned		2023	
(6) Aggressive Public Education and Perception Managemen t	• Planned		2023	
(7) Metering of Transmissio n Mains (Terminal points)	• Planned.	• Implementat ion has commenced in ATMA production under the production metering activity	2023	
(8) Walk and Cycle Analysis	• Planned		2024	

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Long term Strategies

Planning Horizon: Long-term

Planned Duration: 24 months (2023-2024)

Planning Philosophy: Asset Management, Full Technology Deployment

Long-term planning horizon for NRW

Activity	Activities	Status	Projected Completion	Remarks
(1) Metering of Distribution Zones (Districts, DMAs, etc.)	Planned		2023	
(2) Active Leakage Management	Planned		2023	
(3) Risk based network analysis (from Leakage Reports)	Planned		2024	
(4) Activation of Asset Management (AM) Principles	Planned		2024	
(5) Linkage between AM, GIS, and PPD	Planned		2024	
(6) Replacement of weak pipes and redesign of bottlenecks	Status quo			Current Practice
(7) Strengthen Distribution network	Status quo			Current Practice
(8) Implementation of Full SCADA for Booster operations	Planned		2024	