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**BALTIMORE'S WATER UTILITY
CRISIS AND THE POTENTIAL OF
PRIVATIZATION**

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Johns Hopkins Institute for Applied Economics,
Global Health, and the Study of Business Enterprise



Baltimore's Water Utility Crisis and the Potential of Privatization

By Hunter Hopkins

About the Series

The *Studies in Applied Economics* series is under the general direction of Professor Steve H. Hanke, Founder and Co-Director of the Institute for Applied Economics, Global Health and the Study of Business Enterprise (hanke@jhu.edu).

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Abstract

This paper analyzes the Baltimore water utility crisis. In 2018, there were around 64 million gallons (MG) of water supplied to Baltimore City and County through the public water system managed by the Baltimore Department of Public Works (DPW). However, before it could reach consumers, over 16 of the 64 MG leaked as a result of an outdated and mismanaged utility. This paper explores how Baltimore reached the point where 25% of its water supply leaks before it reaches consumers as well as how privatization could help solve Baltimore's water crisis.

Acknowledgements

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Glossary of Terms

Revenue Water / Billed Authorized Consumption: All water consumption that is billed and authorized, it includes metered and unmetered (estimated) consumption.

Unbilled Authorized Consumption: water consumption that is unbilled but authorized, including landscaping, frost protection, flushing, and firefighting.

Real Losses: physical water loss from the distribution system, including water loss due to leaks and breaks in the transmission and distribution mains, service connections, tanks, reservoirs, and overflow of water in the reservoirs.

Apparent losses: non-revenue water that is not lost through real sources, including water loss due to customer metering inaccuracies, systematic data handling errors in the meter reading and billing procedures, unauthorized consumption/theft from the utility, and any calculation, reporting, and adjustment errors in the water billing.

Water exported: water sold by the water utility to neighboring water systems outside the utility's service area.

Contract Operations: water and wastewater public utilities that are outsourced to the private sector.

History of the Baltimore Water System

Shortly after Baltimore was incorporated in 1797, the city began to create and maintain water pumps. In the early 1800s, a stock company known as the Baltimore Water Company formed. The company used water from Jones Falls and built a reservoir to provide water to the city. In 1854, the Baltimore Water Company was sold to the city of Baltimore for \$1,350,000. Since then, as Baltimore has grown, the city government has continued to add reservoirs, dams, and filtration plants. The Lake Roland Dam and Reservoir, Johns Fall conduit, Lake Hampden, Mount Royal Reservoir, Druid Hill Reservoir, and permanent supply lines and a dam at Gunpowder Falls were all constructed in the mid to late 1800s. In 1918, new land annexed by the city increased the need and construction of an additional water treatment plant. In the first half of the 20th century, growing water demands were met with more dam construction and the Ashburn Filtration Plant. However, since then, only a few refurbishments have taken place (“History of the Water System”, *Baltimore City Department of Public Works*, n.d.). The Baltimore water utility system continues to age, without being updated as necessary. The result, as this paper will discuss, are high levels of real and apparent water losses.

A Brief Overview Baltimore’s Water Distribution System

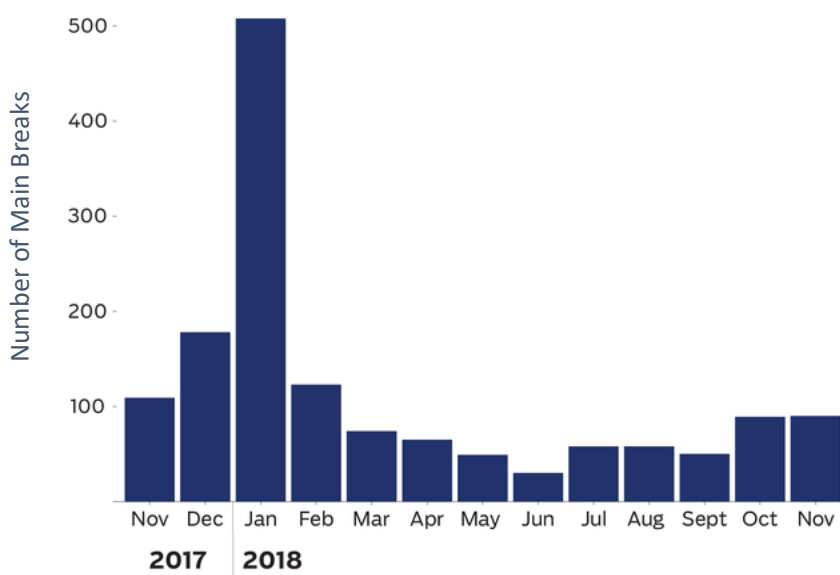
Baltimore’s distribution system, referred to as the Central System, delivers treated water to the surrounding metropolitan area. The service area is around 560 square miles and the system provides potable water to approximately 1.8 million people. The water distribution system consists of over 4,500 miles of water mains, ranging from three inches to twelve feet in diameter. The water mains connect to a series of pumping stations, reservoirs, and elevated storage tanks; together the system provides water to Baltimore City as well as parts of Baltimore County, Howard County, and Anne Arundel County (“Distribution.” *Baltimore City Department of Public Works*, n.d.).

The Current Water and Wastewater Problem in Baltimore

Open a copy of the *Baltimore Sun* on any given day, and it is likely there will be a headline along the lines of “Baltimore experiencing widespread water problems after water main break” (Jackson, 2019) or “Poe Homes’ water issues continue.” (Merton et al, 2019). These are just a couple of the many *Baltimore Sun* articles documenting Baltimore’s Water Crisis. Which leads one to wonder, just how many main breaks, sewage overflows and other miscellaneous water and wastewater problems are occurring in Baltimore?

In December 2018, the *Baltimore Sun* published an article “By the Numbers: The Toll Winter Takes on Baltimore’s infrastructure.” The author, Christine Zhang, was able to collect a comprehensive list of water main breaks in Baltimore from January 2, 2015 to November 30, 2018. The result for the three-year period showed 4234 reported water main breaks. (Zhang, 2019.) Zhang then examined the water main breaks over a one-year period in Baltimore, finding that most main breaks occur in the winter months. The same cold weather that causes household pipes to freeze and burst is also known to cause breakage for the larger, underground water mains. The results are staggering. In January 2018 there were 508 main breaks in Baltimore city and county, with as many as three dozen in one day.

Water main breaks in Baltimore city and county, Nov ‘17 – Nov ‘18

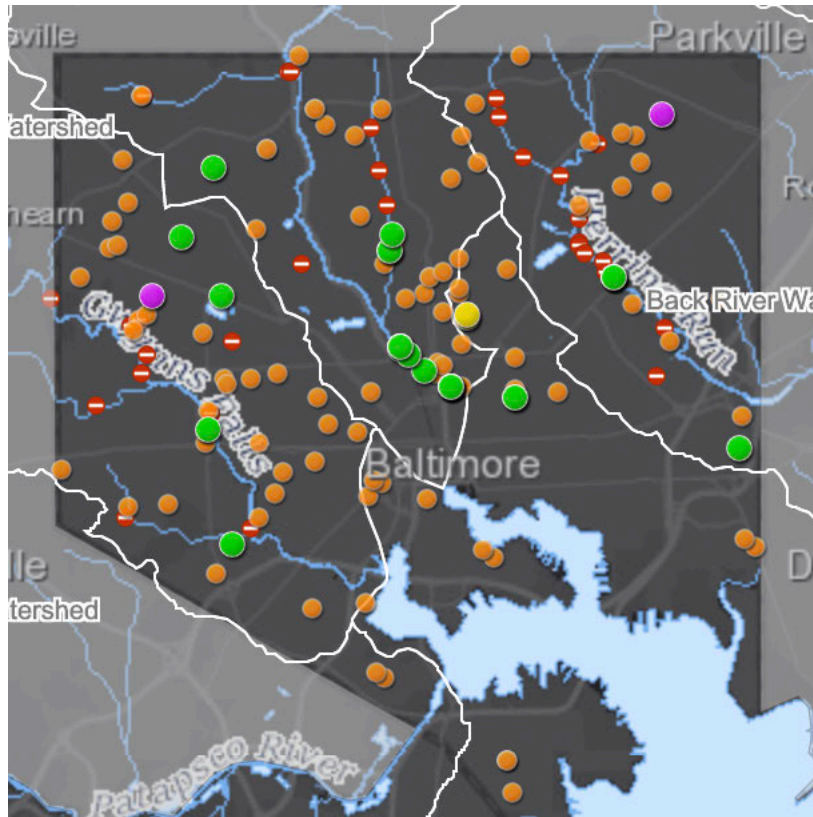


Source: Zhang, Christine. “By the Numbers: The Toll Winter Takes on Baltimore’s Infrastructure.” *Baltimore Sun*. 18 Dec 2018.

The wastewater system of Baltimore is in as bad a condition, if not worse, than the water distribution system. In addition to water main breaks, there were over 189 MG of sewage tainted water that leaked into Baltimore’s waterways in 2018. Rain and heavy snowfall tend to instigate sewage overflows.

Even the city of Baltimore has acknowledged this wastewater problem and has stated “The public is advised to avoid direct contact with the receiving waters identified as impacted by these sanitary sewer overflows (SSOs). The water in all of our streams is considered impaired and may not meet applicable standards for full body contact recreation, including swimming, regardless of the impact of a specific sewer overflow. Accordingly, the City discourages full-

body contact with all surface waters.” (“Sanitary Sewer Overflow (SSO) Public Notice.” Baltimore City Department of Public Works). The Baltimore City Department of Public Works (DPW) has created an interactive map outlining these overflows, shown below. The green dots represent SSOs over 10,000 gallons that have occurred in the last four months. The orange dots show the same but for under 10,000 gallons, and the yellow dots are for ongoing SSOs.



Source: Sanitary Sewer Overflow (SSO) Map, Baltimore DPW.
Date Accessed: 19/12/19

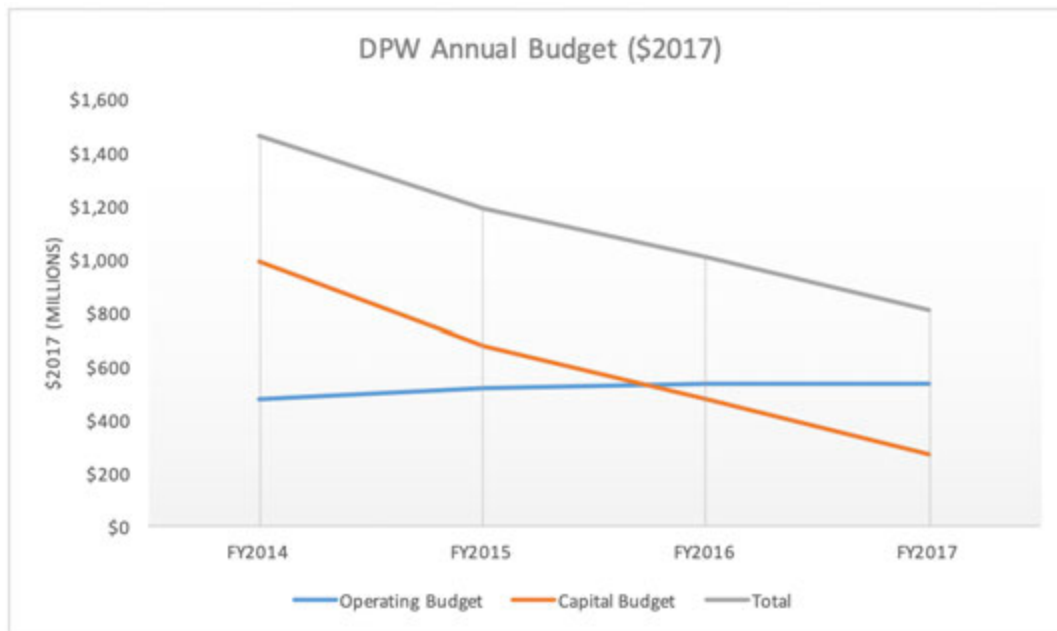
Each year, the situation seems to worsen. In 2004, there were 622 sewage backups reported in Baltimore. By 2017, the number had grown close to 5,000. This problem has escalated to the point that the city is under a \$1.6 billion federal consent decree to reduce sewage pollution and modernize the system, designed over a century ago, by 2030. This new target date is a result of the city's failure to meet the original 2016 deadline. Necessary renovations include an upgrade to the Back River Wastewater Treatment Plant, clearing a 10-mile backup of sewage underground, and replacing sewage mains amongst other projects. The result of these problems building up over time is skyrocketing sewer rates. On average, customers in 2017 paid \$30 per month for their wastewater, three times as much as they paid in 2002 (Dance & Scott, 2017).

Baltimore's Capital Budgeting Issue

Haleemah Qureshi, a Master of City Planning student at the Massachusetts Institute of Technology, wrote her thesis on "Binding Civil and Civic Infrastructure: The Need for Transparency and Accountability in Baltimore's Water Crisis." She says civil and environmental engineers have the technical expertise and knowledge to fix the United States' infrastructure, but the problem is paying for it. Baltimore is one of many U.S. cities with decades of underinvestment resulting in physical deterioration of utilities. The primary causes of underinvestment are typically considered to be physical invisibility, ease of access, and political paralysis. Physical invisibility comes from an "out of sight, out of mind" philosophy that often keeps water utility crises from the forefront until there is a burst or a leak that can no longer be ignored. Additionally, the ease of access to water systems and distributed safe water in the United States are taken for granted because they have been readily available for so long.

As a result, large swaths of Baltimore's water infrastructure remain outdated, with some of the oldest parts of the system built in 1855. Qureshi focuses her thesis on Baltimore from 2013-2017 but takes time to note that this is not a new issue. Past studies point to reduced nationwide infrastructure spending in the 70s and 80s that was not simply due to a lack of available funds, but primarily the result of budget decisions made by elected officials and voter who failed to grasp the consequences of deferring infrastructure repairs (Qureshi, 2018).

The DPW's Budget is divided into operating and capital costs. Operating costs include day to day costs of running the utilities and administrative costs, while the capital budget is for construction and acquisition of assets. The DPW's operating budget is about 20% of the city's entire budget, the largest subset (Qureshi & Haleemah N, 2018). However, the DPW annual budget has been on the decline, with funds allocated to the capital budget taking the biggest hit. In full year 2014, \$1,600 million was allocated to the capital budget, but by 2017, less than \$400 million was given to the capital budget. Given the deterioration of Baltimore's infrastructure, if the problem is going to be fixed, the capital budget needs to be moving in the opposite direction.



Source: Qureshi, Haleemah. "Binding Civil and Civic Infrastructure: The Need for Transparency and Accountability in Baltimore's Water Crisis." MIT, 2018.

This increased need for capital budgeting is one of several causes leading to heightened interest in privatization. Hanke and Walters list three main causes for increased interest in private ownership or management of utilities. The first is local budgetary pressures as a result of the 2008 recession. The second is the old age and general decay of systems. The final reason: capital spending requirements could reach \$1 trillion by 2031, primarily due to federal regulations surrounding water and wastewater treatment (Hanke & Walters, 2011).

The age of the system and legal regulations have increased the cost of running the water utilities in Baltimore. While the system was built to last 50 years, the water mains in many areas now average 75 years and require replacement. As for regulations that have increased the cost of running utilities, there is the \$1.6 billion Consent Decree that was mentioned earlier in this paper. Baltimore is one of many cities facing increased utility costs as a result of outdated facilities following the Clean Water Act. In 2002 Baltimore was given a mandate from the federal government to improve its sewage system. Before the problem could be fixed though, the source of the problem had to be determined. At that point, the city did not even have complete maps of the water distribution system and was unaware of the conditions of pipes underground. One of the main capital budget projects following the consent decree was fixing a misaligned pipe at the head of the Back River Wastewater Treatment plant, which was causing a sewage backup for 10 miles. By the end of 2016, this project had cost \$900 million, and it is just the start of necessary fixes outlined by the Consent Decree, which has been extended to 2030 (Qureshi & Haleemah N., 2018).

Starting in 2014, the DPW has been rehabilitating over 4000 miles of underground water infrastructure at a rate of 40 miles per year (Qureshi & Haleemah N., 2018). While this is a start, repairs at a rate of 1% of the system per year would take 100 years to update the system. At which point, the watermains that were renovated at the beginning will likely already be long due for an update.

Summary of Baltimore Office of Asset Management: FY 2018 Water Audit

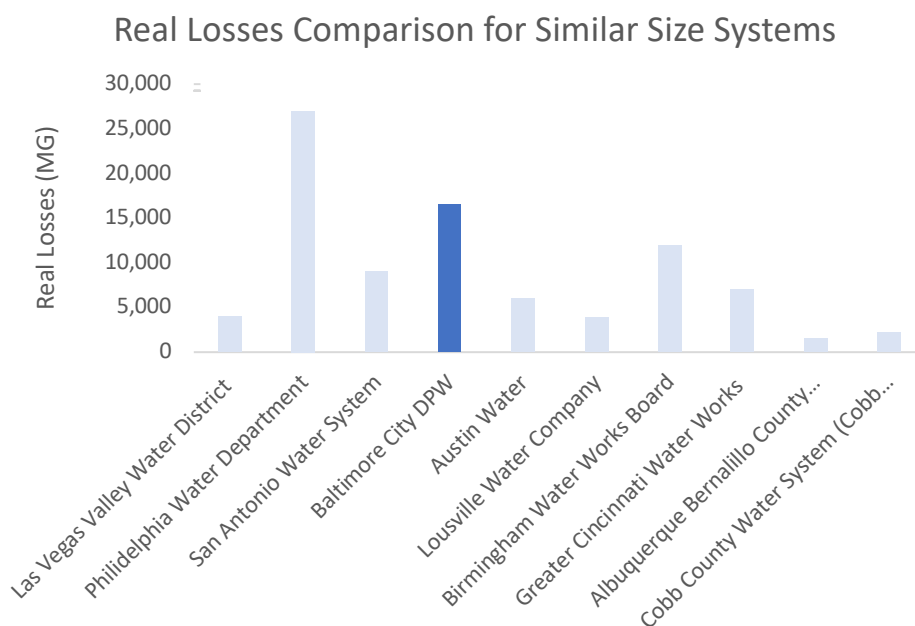
Every year, the Baltimore City DPW Office of Asset Management publishes a water audit. The most recent audit is FY 2018. Per the report, 73,016 million gallons (MG) of water were produced by Baltimore's three water treatment plants in 2018. 8,483.05 MG of this water was exported to Howard County, which pays a lump sum for its water. This leaves 64,533.01 MG of water supplied to Baltimore city and county. However, only 72.4% of this water supplied becomes revenue water. As depicted by the graphic below, water main leaks and breaks caused 16,602.02 MG of real losses. Meaning 25.7% of the total water supply of Baltimore is wasted and unbilled. The DPW places a \$3.8 million price tag on these losses (Baltimore DPW: Office of Asset Management, 2019).

Water Balance According to the FY 2018 Water Audit

Own Sources (Adjusted for known errors)	System Input	Water Exported 8,483.040	Water Supplied 64,533.012	Billed Water Exported			Revenue Water 8,483.040
				Authorized Consumption	Billed Authorized Consumption	Billed Metered Consumption (water exported is removed)	
73,016.052	73,016.052			47,553.864	46,747.201	39,152.611	46,747.201
						Billed Unmetered Consumption	
						7,594.590	
				16,979.149	Unbilled Authorized Consumption	Unbilled Metered Consumption	17,785.812
					806.663	0.000	
						Unbilled Unmetered Consumption	
				Water Losses	Apparent Losses	806.663	
						Unauthorized Consumption	
						161.333	
					Real Losses	Customer Metering Inaccuracies	
						117.910	
						Systematic Data Handling Errors	
						97.882	
						Leakage on Transmission and/or Distribution Mains	
						14,266.80	
						Leakage and Overflows at Utility's Storage Tanks	
						26.28	
						Leakage on Service Connections	
						74.9	
						Unsurfaced Leaks and Breaks	
						2,234.044	

Source: "FY 2018 Water Audit." Baltimore DPW: Office of Asset Management. September 2019.

Following these staggering numbers, it is logical to wonder if this level of water loss is normal for utility systems like Baltimore. The graph below uses data from the American Water Works Association's (AWWA) annual report to compare Baltimore's real losses in MG to similar sized systems. Baltimore's real losses are almost double that of many other systems. Excluding Philadelphia, which also appears to be experiencing a real loss crisis, every other similar sized utility system had lower real losses than Baltimore. Based on this data, it can be seen that the water loss experienced by Baltimore is a result of the mismanagement of an outdated system and is not inherent to all water utilities.



Source: "FY 2018 Water Audit." *Baltimore DPW*, September 2019.
 Prepared By: Hunter Hopkins, *The Johns Hopkins University*

Further supporting this consensus that Baltimore's real losses exceed what they should is the calculation of Unavoidable Losses in the Utility (UARL). In which, the Baltimore DPW is able to calculate the unavoidable losses specifically for the Baltimore System. According to the FY 2018 Water Audit, only 2.8 of the 16 MG of real losses are unavoidable losses. (Baltimore DPW: Office of Asset Management, 2019).

How to Have Efficient Leak Detection & Control in Baltimore

The Baltimore DPW's Water Audit divides Baltimore city and county into 10 zones. Leak detection is used to determine the amount of water lost as a result of leaks and main breaks in each zone. From this data, it is possible to compare water loss in different zones and determine the location most in need of refurbishment. However, in the water audit, it was not specified

how the area to be repaired would be chosen each year. According to the audit, “The city can greatly benefit from focusing its proactive and reactive efforts on these areas to reduce system loss.” This view is in line with the cost-benefit model that ought to be used when evaluating the allocation of capital. “The greatest level of capital replacement expenditure should be given to areas where leakage is greatest” (Hanke, 1981).

Billing Issues in Baltimore

User fees paid by Baltimore City and County residents make up the principle revenue source for water and wastewater utilities (Qureshi & Haleemah N., 2018). However, Baltimore has recently had difficulties with their billing system. In May 2019 there was a ransomware attack on Baltimore’s computer network, preventing Baltimore from issuing water bills for three months. Once the system was finally working, Baltimore mailed a combined bill for the months of May, June, and July. This naturally led to concerned, low-income customers who find it difficult to pay a \$300-400 water bill at one time (Duncan, 2019). Then, in November 2019, the wrong due dates were printed on 15,000 water bills for Baltimore county residents (Knezevich, 2019). These billing errors are separate from the issue of real losses of the water system, but they still exemplify the same story of poor management by the Baltimore DPW.

Banning Private Water Utilities in Baltimore

Baltimore, unlike almost every other city in the United States, has chosen to ban water privatization. In the 2018 election, Baltimoreans voted in favor of Ballot Question E; a charter amendment that banned any support from professional water companies. While this led many to consider Baltimore a “public water hero,” in reality banning privatization did not solve any of Baltimore’s problems (Powelson, 2020).

According to Robert Powelson, president and chief executive officer of the National Association of Water Companies, “With the passage of Ballot Question E, Baltimore has summarily taken proven solutions for its water and wastewater system off the table. Baltimore leaders have allowed activists to turn its water services into a political issue instead of working to address system deficiencies and improve services to residents” (Powelson, 2020).

Water Accountability and Equity Act in Baltimore

In January 2020, Baltimore enacted the Water Accountability and Equity Act. The new law created an Office of the Customer Advocate, meant to solve issues of unaffordable or inaccurate bills. Additionally, the act created a program to ensure Baltimore residents do not

spend more than 3% of their household income on water services. Third, the act is meant to hold public works leadership accountable by decreasing delays and overbilling. Many supporters of the act were also advocates for Baltimore's infamous law banning privatized water utilities. One such advocate, Reverend Alvin Gwynn said, "We've started to turn things from upside down to right side up, while keeping profit out of it" (Gwynn, 2020).

Unfortunately, this new act only addresses the symptoms rather than the causes of Baltimore's water problems. What Reverend Gwynn failed to mention in his article to the Baltimore Sun is the 16.6 MG of real losses due to water main leaks and breaks. At the end of the day, the cost of the water that leaks is incurred by the customer. This act may lower the bills of some customers, but it does not lower the costs of the water they are consuming, nor does it provide any concrete way of improving the quality.

Size and Scope of the U.S. Water and Wastewater Contract Operations Market

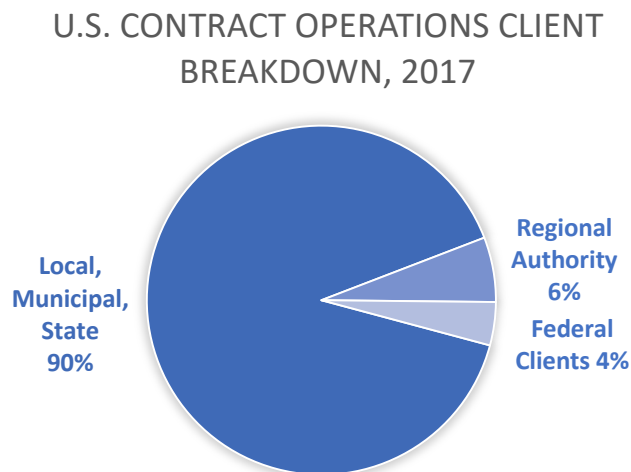
Given the outdated system, high price tag for repairs, and poor track record for maintaining the utility, it seems unlikely that Baltimore city is capable of repairing its water utilities alone. It is time to consider alternatives. One such method is privatization of the utility. There are a number of private companies with experience in the private water and wastewater management industries in the United States. A few of the largest companies operating in the United States include American States Water Company, American Water, Inframark, Jacobs, Suez, and Veolia. It should be noted this is not an exhaustive list, as there are over 50 companies active in the market, ranging from large national corporations to smaller, regional firms (National Association of Water Companies [NAWC], 2019).

The National Association of Water Companies (NAWC) represents regulated water and wastewater companies, as well as companies partnered with municipal utilities. According to the NAWC, "Contract operators bring many benefits to the municipalities with which they partner, including more efficient operations, strict environmental and safety compliance, shared risk liability and guaranteed performance metrics" (NAWC, 2019).

The current size and makeup of the contract operations market was largely unknown until NAWC partnered with Mazars USA LLP to conduct a study entitled, "U.S. Water and Wastewater Contract Operations Market Report." The report is the first to research the water and wastewater contract operations market and provide an overview of the number of various contracts throughout the United States. In 2017, the most recent data available, the water contract operations market was responsible for 761 contracts in the United States, serving over 41.1 million people and handling 6,451 million gallons of water per day (MGD) (NAWC, 2019).

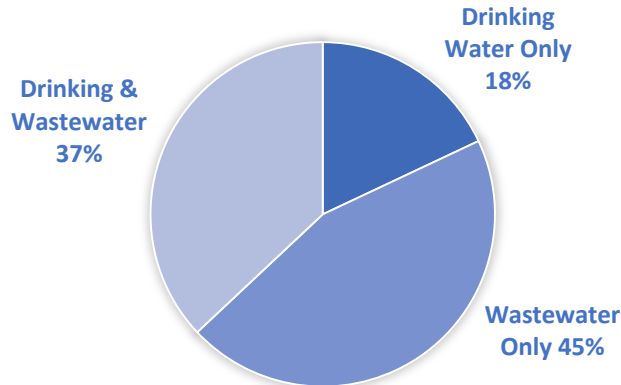
Having private utilities does not always entail full private ownership. Rather, there is a spectrum from public to private utilities. The National Association of Water Companies lists four distinct contract options for utilities: Operations & Maintenance (O&M), Concession, Design-Build-Operate (DBO), and Design-Build-Operate-Finance-Maintain (DBFOM). This myriad of contract types is not unique to the United States. Although called different names, private ownership and management has been successfully implemented in other countries as well, most notably in France. There, “affermage” refers to the privatization system where municipal funding is used, but operations are handled by the private company. “Concession” is used to describe operation contracts where the private company is entrusted with sourcing funds as well as handling operations (Hanke & Walters, 2011).

With an Operations & Maintenance contract, the public partner contracts with a private partner to provide a specific service, while the public partner retains ownership, rate setting authority and overall management, including capital program investment and delivery. This is the most common partnership in the United States, constituting 94% of utility privatization contracts. In a Concession contract, a private partner operates, maintains and makes capital investments in a publicly owned system for a specified period of time, while asset ownership remains with the public agency. For a Design-Build-Operate contract, a single private partner designs, builds and operates a facility, while the public partner finances the project. The least common contract type is Design-Build-Operate-Finance-Maintain, where a single private partner designs, builds, finances, operates, and maintains a facility (NAWC, 2019). The graphs below give an idea of the makeup of the contract operations market in the United States. As can be seen, the majority of contracts are Operations & Maintenance contracts between local, municipal, or state governments and a private water corporation.



Source: “U.S. Water and Wastewater contract Operations Market Report.” NAWC. Mazars USA LLP, 2019.
Prepared by: Hunter Hopkins, The Johns Hopkins University

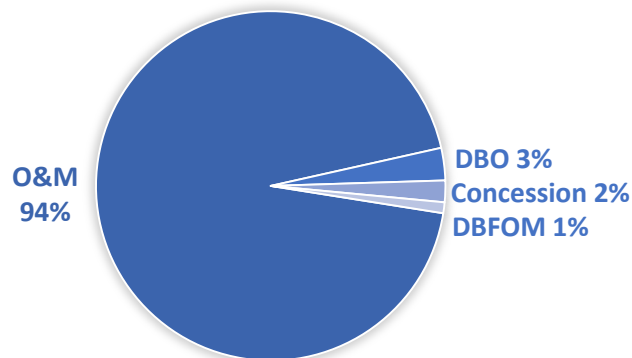
U.S. CONTRACT OPERATIONS UTILITY BREAKDOWN, 2017



Source: "U.S. Water and Wastewater contract Operations Market Report." NAWC. Mazars USA LLP, 2019.

Prepared by: Hunter Hopkins, The Johns Hopkins University

U.S. CONTRACT OPERATIONS TYPE OF CONTRACT BREAKDOWN, 2017



Source: Source: "U.S. Water and Wastewater contract Operations Market Report." NAWC. Mazars USA LLP, 2019.

Prepared by: Hunter Hopkins, The Johns Hopkins University

An Explanation of Atlanta's Failed Water Utility Privatization

In the 1990s, as economic, fiscal, regulatory, and environmental factors complicated water supply and wastewater systems, many cities considered privatization.

Water privatization was a respectable option for large municipalities in the 1990s. However, subsequent interest seems to have dwindled. The termination of Atlanta's contract with United

Water is often given as an example for the failure of private water contracts. However, “Atlanta’s experience with water privatization is not typical. Satisfaction with water and wastewater privatization has been very high, with over 90% of communities choosing to continue privatization at renewal time” (Segal, 2003).

When United Water took over operations of the Atlanta system in January 1999, they took on an outdated and uncertain system. At the time, the city was unaware that there was such a high percentage of treated water leaking between the treatment plant and meters, going unbilled. As such, many unfounded assumptions went into the contract between Atlanta and United Water. For instance, the contract assumed 1,171 water meters per year would break, when in reality the figure was 11,108. Overall, the system required a much higher level of repair than United Water had assumed in the contract. As such, United Water requested additional payment from the city. The city refused to pay, saying it was only seeing savings of \$3 million from the partnership. This ultimately led to an early termination of the planned 20-year contract. However, this case is not a reason to disregard water privatization for cities altogether. Rather, the problem was ultimately the result of poor data and a lack of record keeping by Atlanta. As a result of this bureaucratic malfeasance, a realistic baseline of needed annual repairs was unable to be estimated. A portion of the blame does go to United Water, who understood the lack of data prior to submitting their \$21 million bid for the contract (Segal, 2003).

There are several important lessons that can be learned from the Atlanta experience, which can be applied to future private water contracts. First, both sides in a concessions contract must be diligent in their research prior to entering the contract. Second, contract terms must be specific and focus on outcomes rather than inputs. Third, the standard utility contract length of three to five years is perhaps more effective than the twenty-year contract. Finally, strong communication is needed between both partners in the contract (Hanke & Walters, 2011).

Water Privatization in England and Wales

Sir Ian Byatt, the first regulator of the water and wastewater industry in England and Wales, is able to offer unique insights into the privatization of infrastructure. In 1989, England and Wales sold the ten Regional Water Authorities, thereby transferring them from the state to the private sector. When asked if privatization worked well, Sir Byatt candidly answers, “Replies should be more nuances: nothing stands still – nor should. Some things went well, and policy still needs to move on” (Byatt, 2019, P. 301).

Reflecting on his experience, Sir Byatt notes some important regulatory aspects that can facilitate successful privatization of water and wastewater utilities. One of which is that England introduced a special merger policy to preserve comparative competition. Byatt notes “there is little evidence of economies of scale in networks beyond the low level.” Thus, it was valuable to customers to prevent the ten regional monopolies from amalgamating into a single national monopoly (Byatt, 2019, p. 306).

Equally vital to successful privatization is establishing price cap regulation for private utilities. “Prices were reviewed every five years and set for five years ahead. This provided powerful incentives to reduce operating expenditure (broadly a third of total costs of supply) and allowed for a substantial increase in the quality of drinking water and wastewater” (Byatt, 2019, p. 307). In England and Wales, during the first decade of privatization: customer service improved, operating costs decreased, and output, adjusted for quality, rose almost 50%.

Examples of Water Privatization Successes

Jersey City, NJ and Boise, ID are two of many examples of successes in the water utility contract operations market. In 1996, SUEZ, one of the largest international private utility companies, and Jersey City entered the largest U.S. water service partnership of its time. The SUEZ-Jersey City Contract has been renewed several times due to high satisfaction and continued success. Since its inception, the partnership has helped save the city at least \$40 million while also allowing for needed restoration to the utility (“Building a sustainable future for Jersey City, NJ.”, *SUEZ*).

Boise, ID is another example of success with privatization. Ada County, where Boise is located, is a rapidly growing area. The population grew more than 8% between 2010 and 2014. This sort of growth can be disastrous for cities whose utilities are not prepared to accommodate the influx of users. However, SUEZ was prepared for growth and invested the capital necessary for new treatment plants and updated technology. This past success has led to a continued partnership with Boise (“Building a sustainable future for Boise, ID”, *SUEZ*).

According to Adrian Moore, an infrastructure expert, “Private Utilities simply borrow the money to build new water supply pipelines or treatment plants when they need them, and they have every incentive to build them fast and keep costs down.” However, governments suffering bureaucratic inefficiencies must go through lengthy approval processes and fight against hordes of other political priorities in order to receive funding for improvements (Park, 2018). This fundamental difference in the organizations and incentives provides a theoretical basis for the superior capability of private entities to manage utilities. Examples such as Jersey City and Boise support this theory and appear to represent the industry norm. Research speaks to the

efficiency of private partnerships. One study of U.S. systems found operating costs savings for private partnerships range from 10-40%. Additionally, 40% of publicly operated sampled facilities failed to comply with federal clean drinking water standards, but within just one year of a public-private partnership, 100% were in compliance (Hanke & Walters, "Reflections on Private Water Supply: Agency and Equity Issues", 2011).

Addressing the Natural Monopoly Problem

"An industry is usually said to be a natural monopoly if production can be conducted most efficiently by a single entity. This will generally be the case if unit costs are declining over the entire relevant range of the market demand for a product – that is, in cases where there are massive economies of scale in the production of a good" (Hanke & Walters, "Privatizing Waterworks: Learning from the French Experience", 2011). Utilities, such as the water and wastewater industries, fit this natural monopoly description well. Hanke and Roland W. Wentworth have analyzed field data that strongly supports lower costs for one utility as opposed to two utilities operating in the same space. Given that utilities are a natural monopoly, it can be difficult to produce the competition needed to best benefit the consumer.

It has often been argued that hiring a private firm to run a utility is no better than having the government run the utility, because either option will lead to monopolistic practices. However, Edwin Chadwick, an urban sanitation reformer, proposed a solution to this dilemma. Chadwick wisely recognized that "those markets most cheaply served by a monopoly need to be afflicted with monopolistic conduct so long as there is meaningful competition for the rights to the monopoly franchise" (Hanke & Walters, "Privatizing Waterworks: Learning from the French Experience", 2011, p. 32-33). This meaningful competition takes the form of many private companies bidding on the right to run a utility. However, it is important that the utility is not simply given to the bidder willing to pay the most, as that would raise the price of the utility to the present value of expected profit. The key to the bidding process, in order to best benefit the consumer, is to grant the utility to whichever bidder promises the best combination of selling price and quality to the customer.

Critics of this theory question the competitiveness of the process. Indeed, there are examples of a lack of competition leading to failures. One case is Cochabamba, Bolivia. In Cochabamba, a single bidder won a contract with an implied 15 percent return on investment. The firm promised to handle the utility's pre-existing debt while also building new facilities. The end result of this debacle was protests over 38 percent increases in water rates (Hanke & Walters, "Reflections on Private Water Supply: Agency and Equity Issues", 2011). However, as mentioned earlier in this paper, this is not the norm, and there are over 50 private utility

companies currently contracting in the United States. These companies compete for contracts and will continue to do so. The 90 percent success rate of renewed contracts speaks to the fulfillment of efficiencies promised by the majority of these utility contracts (Hanke & Walters, “Reflections on Private Water Supply: Agency and Equity Issues”, 2011).

Conclusion: Why Baltimore is a Strong Candidate for Water Privatization

As outlined in this paper, Baltimore’s water and wastewater utilities are outdated and dysfunctional as a result of years of bureaucratic malfeasance. The city failed to make necessary repairs in a timely manner, and the problem has now escalated to the point where 25% of the water supply leaks: a waste of water and a burden to taxpayers.

In 1993 the Environmental Protection Agency (EPA) published a “quiz” for municipal wastewater utilities (The National Academies Press, 2002). The EPA said, if a public utility responds ‘yes’ to most of the following questions, then it should consider using contract operations and maintenance. The list of questions included: Does your municipality experience Design problems? Excessive costs? Personnel problems? Public-images issues? Operating inefficiencies? Compliance difficulties?

Baltimore certainly answers yes to many of these questions. The misalignment of the pipe at the head of the Back River Wastewater Treatment plant, having caused a sewage backup for 10 miles, is an obvious example of design problems. Excessive costs are seen through the recent increase of water rates for Baltimore citizens. *The Baltimore Sun* has published a plethora of articles highlighting the failures of the Baltimore water system, certainly leading to public-image issues. And most grievously, the 16 MG of real losses highlight serious operating inefficiencies.

Privatization is perhaps Baltimore’s only hope of solving its water utility crisis. Familiar with Baltimore’s water woes, private utility companies, such as Veolia and SUEZ have expressed interest in managing the city’s water. However, Baltimore, with its charter amendment, is currently prohibited from privatizing its water system (Park, 2018).

This amendment represents what some call “asset hoarding in the public sector” (Hanke, 1982, p. 660). Because government officials do not have to pay rent for the assets they control, the assets tend to be viewed as free. Additionally, if a public asset is sold, the revenue often does not go to the department who made the sale. Thus, little incentive to liquidate exists. Furthermore, if the assets a government manages decrease, then employment opportunities are diminished. While this asset hoarding may allow bureaucrats to keep their jobs, it is not in

the best interest of citizens. In order to privatize the Baltimore water utility, the charter amendment needs to be revoked. Overall, "The privatization of waterworks and the proper use of competitive franchising can and should generate substantial benefits for consumers and reduce resource waste by society as a whole" (Hanke & Walters, "Privatizing Waterworks: Learning from the French Experience", 2011, p. 35).

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