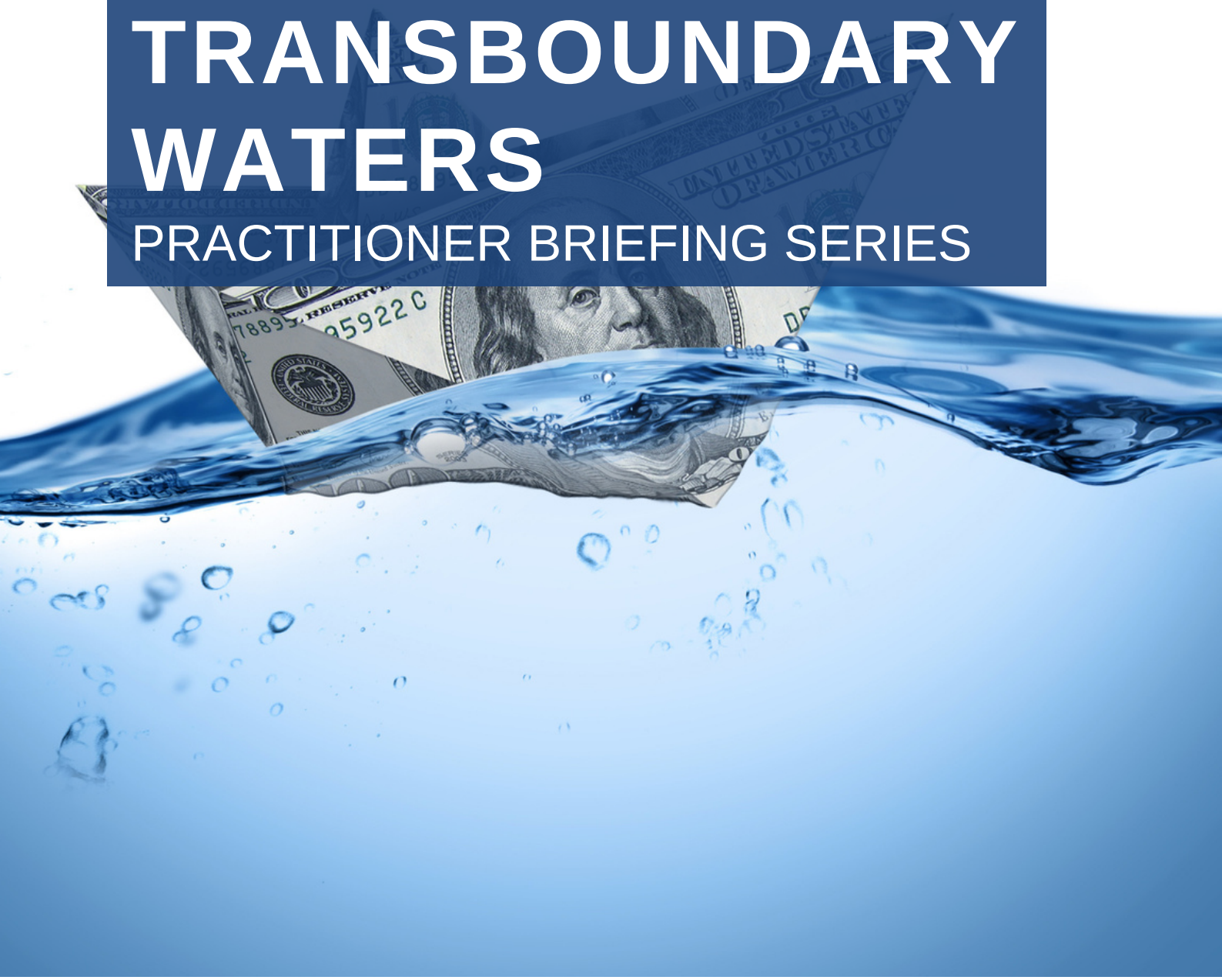
MEDRC

TRANSBOUNDARY WATERS

PRACTITIONER BRIEFING SERIES



Water Finance

Water Finance

"Show me your budget and I'll tell you what you value" *– 46th President of the United States*

Introduction

This summer record levels of drought were recorded across the globe, in the American West, Europe, and China, bringing into stark relief concerns on the true value of water—whether for growing crops, generating electricity, or navigating key waterways. The Nexus of water, energy, and food means a cascading of problems when rivers and wells start to run dry. The real choices between water for power, or water for food brings into question, how it got to this point?

Source: The Guardian

The chronic undervaluing of water resources at various levels from the public to governments has created misaligned incentives and inefficient systems that are ill-equipped to deal with the severe and prolonged drought conditions that will become more common with climate change. Drought management preparedness and responses are increasingly vital, but the legal underpinnings of user's water rights, a water utility's mandate, and public policy priorities affecting water costing can often prevent vital actions from being taken.

The value of water and the cost of water have long been misaligned due to a variety of factors, including assumptions of abundance, prevailing public attitudes that a naturally occurring resource should be free (or very cheap), and the political motivations of governments in allocating a vital resource. Across the globe however, some of the most water insecure regions on earth still cost their water far below the O&M (operations & maintenance) costs necessary to provide it. Not only does its price fail to signal water's intrinsic value, it is set below a level of even financial sustainability—to recover costs incurred to provide it.

Shared Costs:

Water is a primary driver of climate change, yet its financing has long been neglected and its price undervalued. Water finance is unique both politically and economically, and should be more thoughtfully addressed.

Water utilities from developed and developing countries both struggle with this dilemma. Low collection rates and low ability to pay are often further complications for utilities in a developing country context, but most all suffer from overly low tariff rates, lack of predicable financing, and political interference, ranging from plain inefficiency to outright corruption.

These factors may lead to a negative performance spiral, making the utility less viable and unworthy of financial resources, harming cash flows for maintenance and lowering infrastructure quality over time, leading to negative outcomes for society and the overall sector. Degraded infrastructure increases non-revenue water, leads to lower water quality, and makes funding such nonviable entities unattractive. Reversing this cycle however can lead to long-term improvements and eventually sustainability, as well as financial security and independence. Each of those are different levels a water utility should seek to reach, and are necessary to achieve water security overall.

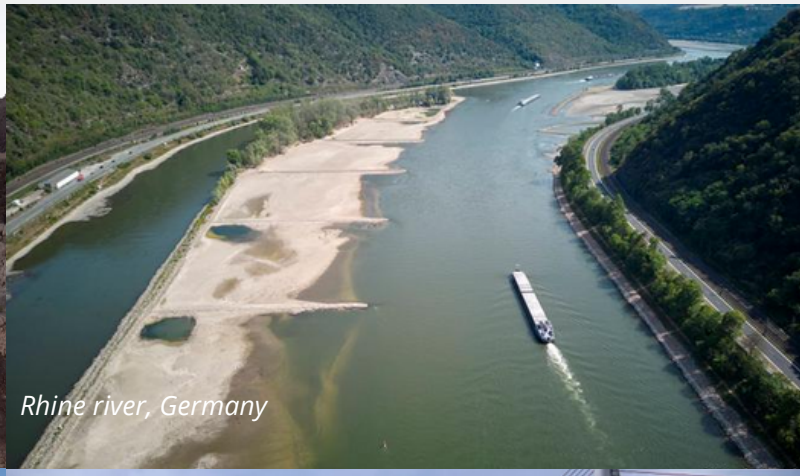
"Water security is climate security," and the impacts of climate change will be felt most directly by changes to the water cycle—more rain in shorter intervals, more drought for longer periods, and more violent storms and coastal impacts with rising sea levels. It is therefore imperative to get the cost of water right, and to secure financing of the water sector for resilience.

Without a rapid increase in financial resources to address water security in comprehensive ways, we will fall well short of meeting SDG 6, and may likely slide backwards into increasing water insecurity that threatens food supplies, energy production, navigation, as well as numerous consumer products. Each year of falling short only adds to the total.

Practical Summary

- The cost of water does not and often cannot reflect its true value, due to the unique characteristics of water as a public good with no substitutes. This value or cost also changes from abundance to scarcity conditions.
- Water Finance is both economics and politics. Policy considerations and public expectations can lead to the chronic undervaluing of water resources and a lack of financing available for water infrastructure.
- Water utilities are often underfunded and unsustainable due to their financial structure, overextension, and poor governance, particularly in developing country contexts.
- Moving from a vicious to a virtuous cycle is critical for water utilities, and for achieving the SDGs by closing the Water Finance Gap.
- Blended finance can help to encourage local capital markets and bring in private sector participation in ways tailored to the local context. However, a blended shortfall is still a shortfall.
- Closing the gap to reach UN SDG #6 requires *trillions* in new investments to both catch up and keep pace.
- Water security is key to climate security, and the water finance gap is key to the climate finance gap, which has favored Energy and mitigation efforts to water adaptation projects.


Lake Mead, USA


Rhine river, Germany


Loire river, France


Jialing river, China

1983

2000

2022

Lake Mead's water level over 40 years from 1983-2022. Most of this loss has occurred since 2000.

Lake Mead and Hoover Dam are a stark warning of the cascading effects of drought and poor water management, affecting drinking water supplies, power generation, and food supplies all at once.

What do we Value – *Water Rates around the World*

Budgets are political documents. They set spending priorities and allocate scarce resources for the benefit of the people; they say what governments will do and will not do. In this respect, spending on water infrastructure has been highly undervalued in most contexts. A very small portion of government budgets are actually allocated to the financing of water infrastructure. Decades of underspending now needs to be caught up, whereby even steady annual increases in spending would be insufficient. Private sector financing is one means of closing this 'gap'.

From 1977 to 2017, the US government's share of capital spending in the water sector went from 63%, to 9% of total spending [1]. In 2001, per the OECD, developing country governments were spending between 1-3% of their government budgets on water and sanitation [2]. Per recent World Bank reports, little has changed in this regard [3]. In some country contexts, international aid flows are almost entirely responsible for the financing of water infrastructure, and the utility or water service provider, is dependent on government transfers, donors, or bailouts to make ends meet.

In general, water utilities are funded by 3 primary means, known as the 3 T's — tariffs, taxes, and transfers. Tariffs are the direct water rate payments that users make for their water services. The more a water utility can be financed for all its operations and future investments based on these tariffs, the more financially secure and independent they will be. Taxes refers to the public's contributions made to governments that are then provided to utilities on a regular basis, while Transfers are those made by external entities, such as international donors, or a one-off payment by governments, often for a specific project or expansion.

As may be clear already, the most reliable of these T's is Tariffs, as the utility collects this revenue directly from its customers. In some cases, laws may prevent a water utility from cutting off nonpaying connections, and a low ability or willingness to pay makes setting the 'correct' tariff rate difficult to achieve. If a utility is unable to collect tariffs, it is likely already unviable. The second T of Taxes can be reliable, if the government is reliable as well, which is not often the case for many developing contexts. Transfers should only be relied upon for specific projects or upgrades with large capital outlays to cover these costs. For an unhealthy utility, transfers and taxes form the primary financing base, with tariffs playing the smallest role. The reverse is most desirable, where the utility is self-sufficient by collecting its tariffs, and can also obtain the long-term financing it requires via capital markets as a reliable source of cash flows to invest in enhancement or expansions.

Setting the right tariff therefore is critical and can be considered an art, as much as a science or financial calculation. From block tariffs that rise or fall with usage, to flat rates with separate fees for wastewater or storm water, there are many ways to charge the end-user for their water usage based on policy goals and financial stability considerations. There is no one size fits all rate, or even approach to finding this rate. The individual market and the needs of its customer basis are primary factors, which is then further shaped by policy goals, and the regulatory environment. The capacity of the utility to administer this rate is another factor.

For example, a very low entry rate to assist low-income populations, which rises with usage to discourage waste in major segments, and then decreases again for water intensive industries. Rates that vary by industry or connection type, and limiting pipeline sizes are other means to control usage. Some approaches require administration and monitoring, while the other does not.

The most common form of water tariff is an 'increasing block structure', followed by uniform volumetric charges, which could be metered or unmetered. Metered charges are volumetric, charging for usage, while fixed charges are independent of usage. A single or two-part tariff can be used, with a base charge flat fee, and/or a volumetric rate for usage, which can be variable in block segments based on the market's needs, the prevailing water stress levels, and a customer's ability and willingness to pay.

It may surprise that even in the most highly water stressed regions of the world, we do not find the highest water tariff rates to account for this greater water security risk. In fact, some of the most water stressed nations, have some of the lowest tariff rates, with little consideration for customer variance or price signaling for conservation. Following is a list of WRI's national water stress rankings, and the combined average tariff rate per cubic meter from Global Water Intelligence's 2020 tariff survey report [4].

Most Water Stressed Countries

Water Tariff Rates

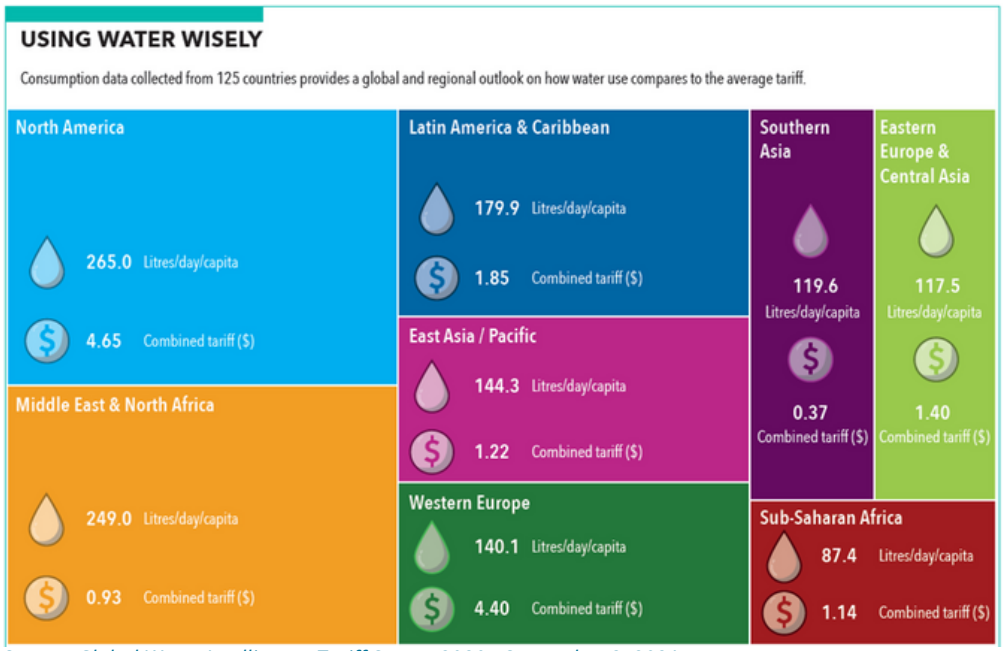
Qatar – $1.51
Israel – $2.47
Lebanon – $0.21
Iran – $0.22
Jordan – $0.75
Libya – $
Kuwait – $0.58
Saudi Arabia – $0.13
UAE – $1.76
Bahrain – $1.21
India – $0.12
Pakistan – $0.08
Oman – $1.89

Among different countries in MENA, we see a wide variety of tariff rates employed despite common high levels of water stress, in which some are heavily subsidized by other natural resource profits, while others are very low even without such offsets. The financing resources of the countries are different, and cost-of-service provision can be marginally the same, but the political priorities of each are very different. Politics often drives tariff rates more than economic or financial considerations.

Some countries in the Gulf region in particular also charge different water rates for Nationals vs. Foreign Nationals, to subsidize their citizens' usage and keep a low tariff rate. However in practice, due to property ownership characteristics this can be mostly ineffective as most end users that are foreign nationals have a water meter or account that is in a national's name, with a lack of administrative capacity to check this. A heavy reliance on taxes and transfers to fund the water sector creates a vulnerability to long-term sustainability and operational efficiency.

From the chart below we can see both the per capita usage by region, as well as the combined average tariff rate, which shows higher rates and lower usage in Western Europe, with similar usage at nearly ¼ the rate for Eastern Europe and Central Asia. For Latin American, Eastern Europe, and East Asia, the water tariff ranges from $1.22 to $1.85 USD per cubic meter, or $1.49 on average, with consumption from 118 to 180 liter per capita per day, an average consumption of 147 liters. While for Western Europe's 140 liters, the rate is $4.40.

MENA and South Asia contain the most water scarce countries listed above yet have a combined tariff rate of only $0.93 and $0.37 per cubic meter, with 249 liters and 120 liters of consumption respectively. Consumption for MENA is similar to that of North American rates, but prices at only 20% of the same rate is untenable for sustainability. Coupled with this is the very high use of non-renewable groundwater resources to grow food [5].

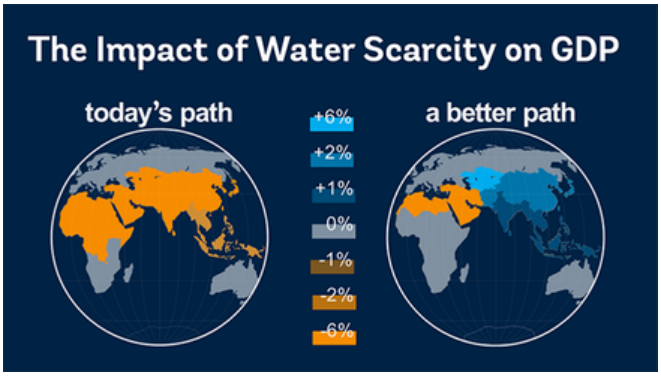


Source: Global Water Intelligence Tariff Survey 2020 - September 3, 2021

Many are raising rates in recent years, but the process is difficult and riddled with politics, as water is a factor price input on all other economic activities. In areas where many people do not have the ability to pay, simply increasing rates will not cure their financials.

In fact, for many water utilities in developing nations, their first issue is not the tariff rate, but very high levels of ***non-revenue water***—water losses from system leakages or nonpayment for service that greatly skews their financial picture. Doubling or tripling rates matters little if 40-50% of its potential revenues are continually lost. Addressing these losses alone can solve many of the financing problems for some utilities, including losses from government entities or military connections. It is important to note raising tariff rates without addressing nonpayment and leakages only serves to punish paying customers for others nonpayment, or for system inefficiencies.

Furthermore, increasing the scope of a failing water utility's remit to cover a larger area is also likely to meet with mixed results, as the increase in size will not offset their additional costs, and non-revenue water rates will continue to grow. Sustainable expansion is necessary to meet the SDGs, and this can only be reached by closing the water finance gap not being met by the traditional 3T's.



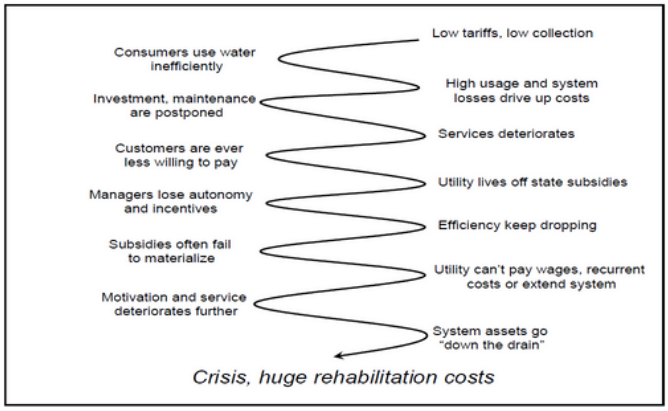
Source: World Bank – High & Dry: Climate Change, Water, and the Economy

The Water Finance Gap

Choosing the *right* tariff rate is a balance of political, economic, and financial considerations, which can vary greatly by country or market context. Still, the total financing provided for water services from the 3T's of tariffs, taxes, and transfers is often enough. For many water service providers, the unique challenges of providing a typically undervalued Public Good, with assets that are literally buried and inaccessible, and with high and long-term capital investment costs, results in a chronic persistent shortfall of funding, known as the utility financing gap. This financing gap prevents the utility from being financial sustainable and contributes towards a downward spiral of performance, as shown below [6].

Due to issues of ability to pay, political interference, and social and economic policy considerations, most countries or utilities cannot simply raise tariffs or taxes to close their water financing gap. Therefore, external sources beyond the government and end consumer are considered, namely commercial financing—and mostly debt. For many in developing countries, this option may be underdeveloped and not a viable option, and transfers from donors instead fill this void. However, this can also be unreliable, or garner a dependency long-term that prevents a utility from moving up the financial sustainability ladder.

Figure 1 The Vicious Spiral of Performance Decline of Utilities



Source: New Designs for Water and Sanitation Transactions: Making Private Sector Participation Work for the Poor, WSP/PPIAF, 2002.

Tapping into commercial finance can be done in a few ways, often via PPP or public-private-partnership arrangement, which may take on aspects of water service delivery, from an entire desalination plant, to billing, metering, and collections. In a developing context, the use of private kiosks and vendors can help to increase collections and decrease non-revenue water, and to encourage greater efficiency. However, the risk of creating resource barons for water or electricity has been an issue in some places.

A blend of financial resources, meaning a mix of concessional and non-concessional financing, can offer the benefits of private sector participation in areas that make sense for the local context without fostering dependency, and can help to kickstart local capital markets. It is a transitional tool that aims to support commercial finance markets long-term and hopefully close the finance gap and fill this void.

'Blending' finance is about using typical development finance tools to mobilize or crowd-in other financial sources that might otherwise be unavailable—namely,

commercial finance resources. Ideally, a utility will move up the sustainability ladder and be able to cover all costs with its tariff rate and use commercial capital markets to finance its larger investments, being self-sufficient and *creditworthy*. This would be closing the water finance gap at the utility level, but it requires a market to do so. Donors can focus their efforts on creating this environment while aiming to reach the SDG goals. The local utility's finance gap is the starting point of the global water finance gap.

In recent years, tariffs have generally been rising to try and close the financing gap that they have long faced, but even more recently this has been necessary just to keep up with inflation. In this respect there is a push-pull on tariff rates as part of a utility's unique mandate —1) raise rates to meet costs and to keep up with inflation experienced by the utility, and 2) lower or maintain rates to provide a beneficial cost-of-living adjustment to customers who also dealing with rising costs. Tariff rates typically are raised above inflation to ensure they are increasing in real terms, but the past year's steep global inflation has meant that while consumer's bills are higher, the utility may actually be the same or worse off in real-cost terms [7].

Furthermore, as energy rates spike due to ongoing global conflicts, rising water bills become more difficult for consumers to pay. From the provider's view, users' bills have gone down in real teams, but for the end consumer, which has likely not had an inflation-matching increase in their income, their bills are simply higher. Water utilities can be an easy political target to provide some relief to rising fuel and food prices, which will also make them less sustainable in the medium to long-term.

Short-term relief and long-term needs are often at odds with each other, as the need for investing in climate resilience increases pressure to raise rates. The U.S. Environmental Protection Agency (EPA) has required some cities to raise their rates to fund their climate resilient infrastructure investments, tying rate increases to increased federal spending availability.

History is impacting the future; carbon and climate change, and tariff rates set too low for too long. The pressure to raise rates for long-term viability, future investment, or to just keep ahead of inflation, means drastic increases in water bills that many may not be able to afford. It is all the more important to increase the blend of financing available for water investments to mitigate steep tariff increases on end consumers.

In global terms, the water finance gap represents that vast underspending on water resources development, protection, and infrastructure, to meet the 2030 Sustainable Development Goals (SDGs).

UN SDG 6 – *Ensure access to water and sanitation for all*

- Target 6.1 Safe and affordable drinking water
- Target 6.2 Provide access to sanitation and hygiene
- Target 6.3 Improve water quality, wastewater treatment and safe reuse
- Target 6.4 Increase water use efficiency and ensure freshwater supplies
- Target 6.5 Implement integrated water resources management
- Target 6.6 Protect and restore water-related ecosystems

Meeting the UN SDG on Water (#6), specifically targets of 6.1 and 6.2, requires increased funding on the order of trillions of dollars in the next 25 years. Estimates to achieve SDG 6 range from spending of an additional $100 billion per year from 2015-2030, or $1.7 trillion to $6.7 trillion by 2030, and up to $22.6 trillion by 2050 per the OECD.

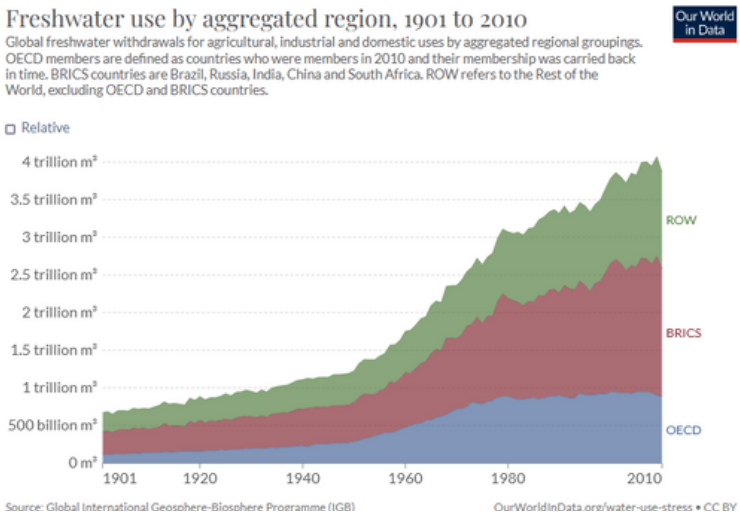
Decades of under investment have created a large gap to close, and while trying to move forward, ever-older systems need to be replaced as well. The U.S. is currently trying to replace aging led pipe systems throughout the country in the next 10 years. Massive investments are required to catch-up, as well as to keep pace.

UN SDG 6 Progress Reports
SDG Tracker – Water and Sanitation

More than $10 billion per year will be spent over 5 years to re-invest in aging water infrastructure, where water loss rates have increased to 60% in some areas, with systems that are over 100 years old [8]. This is a familiar issue for many developed water sectors around the world and presents its own expensive challenges to replace their aging systems, which have not been budgeted for either. As the 2021 World Water Development Report focused on, to value water effectively the economic, social, ecological, and financial considerations of water resources and its infrastructure must be recognized, and quantified.

Water is a finite resource governed by the water cycle, but freshwater use has been rising rapidly both with population growth and with economic development. In the OECD region, water usage has mostly been flat

since 1980 at about 500 billion m3, while total usage globally has risen from 1.5 trillion m3, to over 4 trillion m3 today. As the world develops, per capita usage is rising alongside population levels.



This level of growth is unsustainable, and greater focus on water re-use and desalination is required to increase freshwater resources and to more efficiently use the resources that we have. Just meeting the SDGs globally requires a massive increase in investment and urgency to develop the water infrastructure necessary to meet each target, and cooperate on shared water resources in meaningful ways. This is true without climate change.

A changing climate means a changing water cycle, and the investments to be made must be done thoughtfully and with a focus on resilience to avoid being made ineffective.

Water Finance is Climate Finance

The effects of climate change are felt most acutely by changes in the water cycle—droughts, flooding, surface water changes, sea level rise, and more powerful storms. It is said that climate change is water change, and therefore climate finance must also be water finance. Adapting to climate change and developing resiliency must mean addressing water challenges and building resilient water infrastructure. However, this has not been the case for where the money has flowed thus far.

As we have previously touched on in our Climate Finance issue, most investment grade bonds in the climate finance sector have gone to Transport projects, with Energy as a distant second, followed by 'multi-sector', and then Water. In the realm of infrastructure finance, building bridges has always been more attractive than wastewater treatment plants, particularly for politically driven ribbon cutting ceremonies.

The focus on climate *mitigation* has been a major reason for this, as dealing with transport emissions and greening the electrical grid are major areas to clean up our carbon emissions. However, with each passing year adaptation takes more of center stage while mitigation efforts remain too little and too late. While the climate finance industry has seen significant growth, and color-coded bonds are becoming more mainstream to signal their virtuous intent beyond their below-market interest rate, this has not kept pace with the promises made [9].

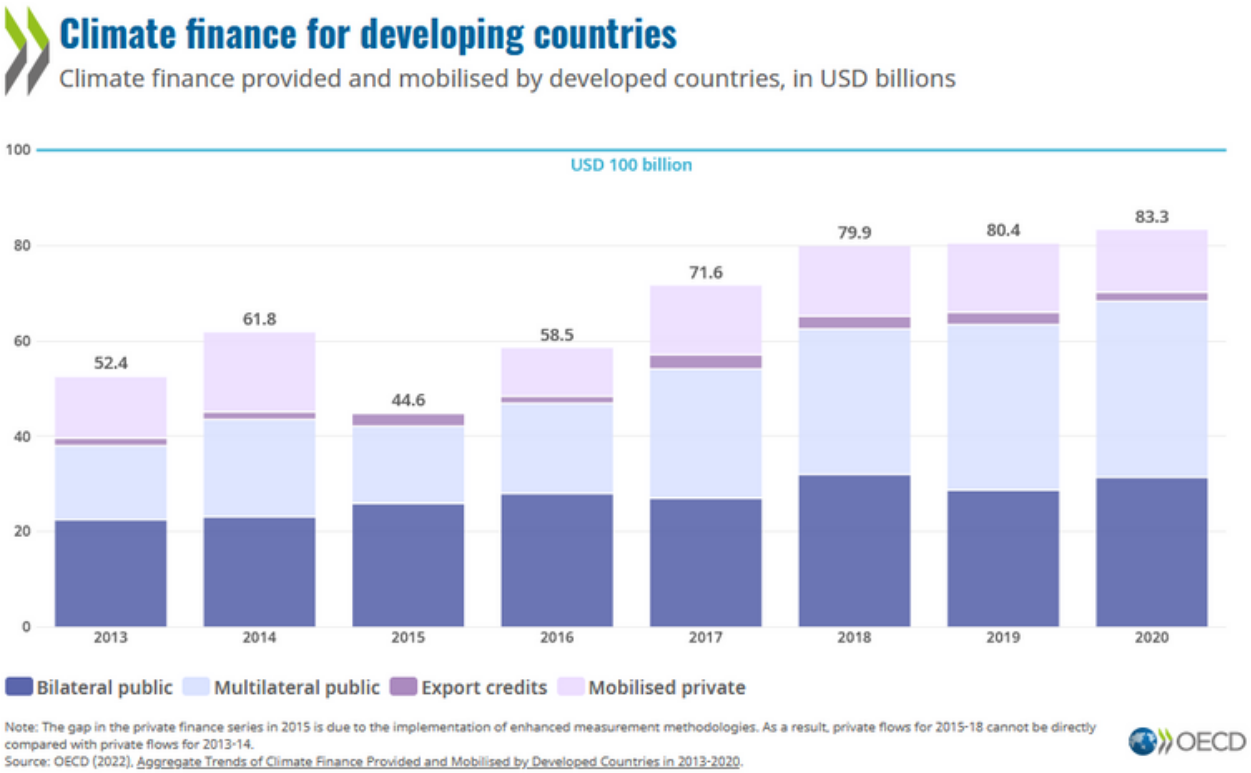
Green bonds, blue bonds, or brown bonds can help to track financial flows, but unaccounted for costs and continuing subsidies for business-as-usual approaches remain unaddressed by such a rainbow of debt [10].

The over-promise and under-delivery from green washing of activities is a serious problem. Carbon offsets and credit systems make dubious claims about undoing the climate impact of activities that may work well for ESG marketing, but do little, or even nothing, to address actual rising carbon emission levels [11].

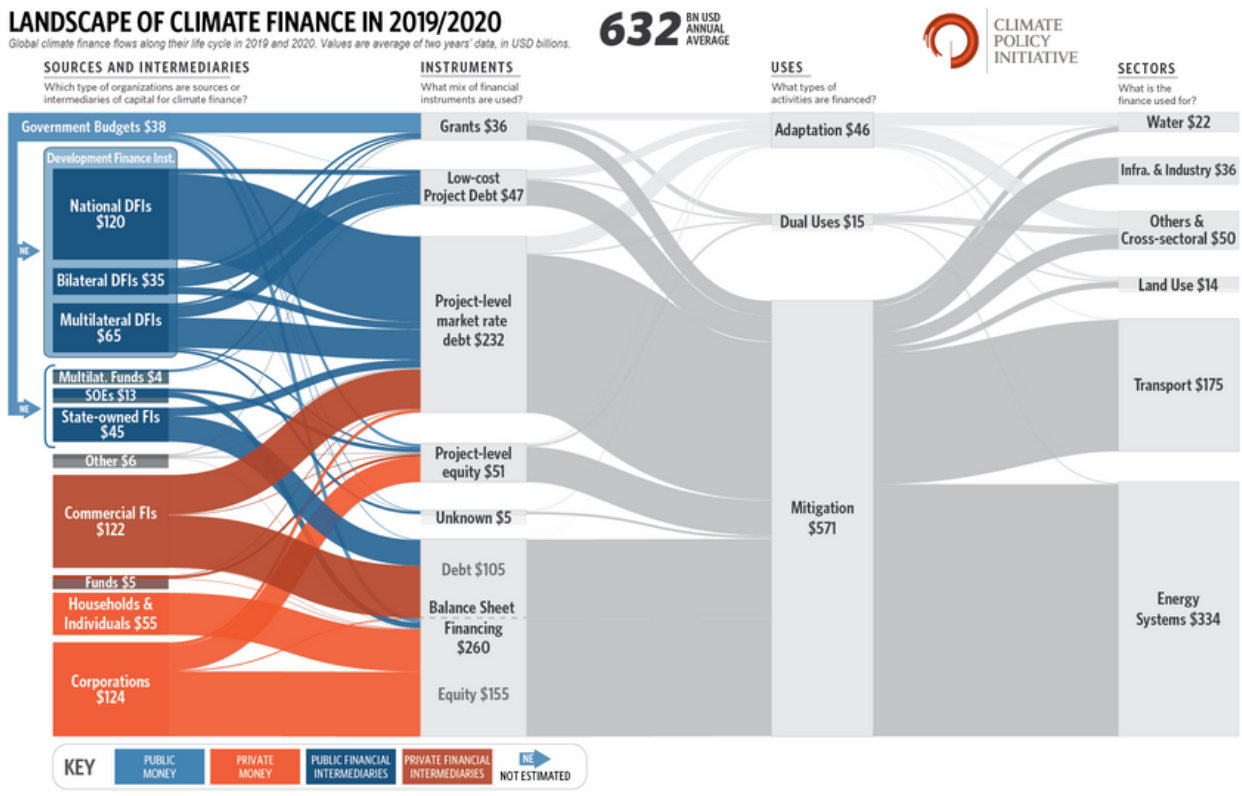
Promises on water finance are continuing to fall short as well. In 2009 pledges of $100 billion USD per year in investment *by* 2020 (meaning, *from*) kicked the can over a decade down the road, and still this benchmark has not been hit to date. Each year's underspend is not being added to future totals either.

"At the 15th Conference of Parties (COP15) of the UNFCCC in Copenhagen in 2009, developed countries committed to a collective goal of mobilising USD 100 billion per year by 2020 for climate action in developing countries, in the context of meaningful mitigation actions and transparency on implementation. The goal was formalised at COP16 in Cancun, and at COP21 in Paris, it was reiterated and extended to 2025" [12].

The finance that has flowed has mostly been to the least developed countries (LDCs) and small island developing states (SIDS), primarily through grants. Private climate finance has focused on middle-income countries with relative stable and conducive enabling environments, meaning with low-risk profiles. This is not crowding-in the private sector, or addressing the needs of the most impacted water sectors with the greatest gaps to fill. More is needed, and urgently.



Source: OECD (2022) - Aggregate Trends of Climate Finance Provided and Mobilised by Developed Countries 2013-2020



Source: Climate Policy Initiative - Global Landscape of Climate Finance 2021

San Francisco Public Utilities Commission (SFPUC) – *Climate Bonds for Water Infrastructure*

In 2008, the city of San Francisco set an ambitious goal to reduce its citywide greenhouse gas emissions by 25% below their 1990 levels by the year 2017, then to 40% below 1990 levels by 2025, and finally become carbon neutral by 2045.

The program featured a focus on issuing Water Bonds to finance its Water System Improvement Program (WSIP), a $4.8 billion multi-year program to upgrade regional and local water infrastructure.

The first green bond was issued in 2015 and sold $1.4 billion in certified green bonds by 2018, and up to $3 billion by 2021, across its 3 areas of water, wastewater, and power.

This program has received international recognition and awards, becoming the first issuer of a green bond certified under the Water Climate Bonds Standard.

According to the SF Environment Department, their goal of more than 40% in emission reductions from 1990 levels has already been met ahead of schedule in 2019, the latest data available. During this time, the population increased by 22%, and GDP rose by 199%.

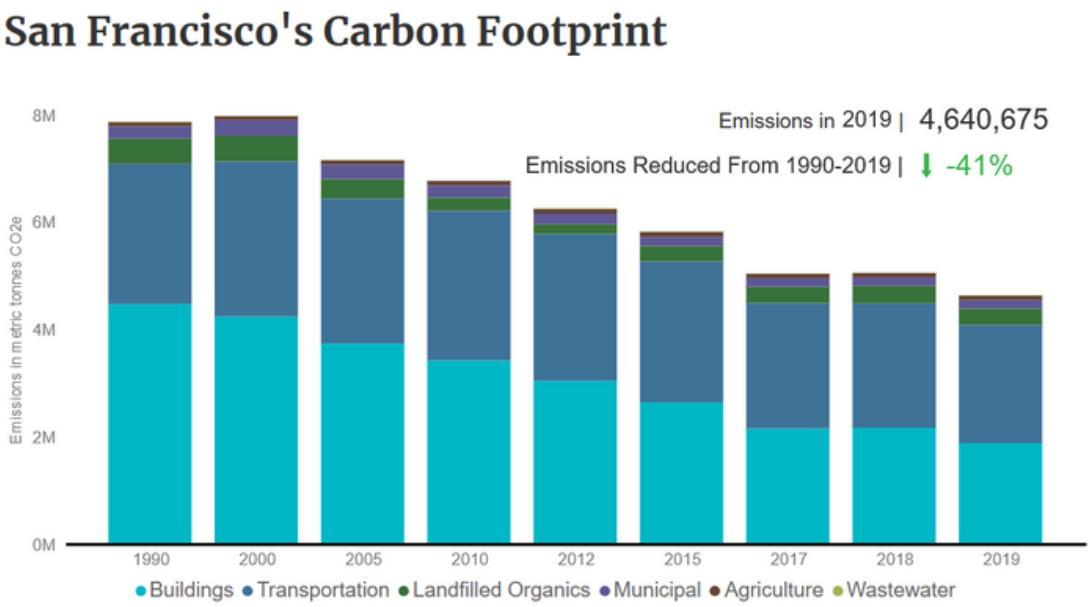
The majority of GHG emissions are from electricity generation via natural gas, and the fuel used in cars and trucks. Additional emissions come from landfill organic waste, agriculture, as well as wastewater treatment.

The majority of these reductions have been found by lowering Building emissions, which were the largest segment of emissions in 1990, and have reduced by -58%. While transport has reduced by only -16% in comparison, and agriculture by -9%.

In short, these are electrical grid emissions, and reductions have been found by cleaning up the grid they run on, which has gone from 40% Renewable to 83% Renewable since 2005, primarily via increased wind and large-scale hydroelectric power. Still, 61% of the 'non-renewable' segment of energy sources comes from nuclear power, which produces no GHGs.

Water has played a rather minimal role in this Water Climate Bond compared to energy, outside of water for power generation.

Source: City of San Francisco - https://sfgov.org/scorecards/environment/greenhouse-gas-emissions



Source: San Francisco Environment Department - https://sfenvironment.org/carbonfootprint

Conclusion

No matter how you slice or blend it, the 3T's form the backbone of water finance for utilities and for the wider water security picture nationally and globally. Without thoughtful tariff rates, and administrative systems to effectively implement them, water resource financing will continue to fall chronically short. Commercial financing can fill the gap where markets are developed, and more effort is needed to make this happen in difficult and developing contexts, with donors helping to take on and spread risk. Transboundary cooperation opportunities abound in this respect as well.

Whatever the mix however, more is needed, and can only be addressed by increased political will and renewed focus. Water finance is particularly political and subject to external distortions. It is important to get this right in order to address how climate change will be mostly felt.

From the micro to the macro level, water resources have been underfunded and appreciated, not fully accounting for its costs, and undervaluing its benefits throughout supply chains or within the water-energy-food nexus. The reasons for this are generally cultural and political, rather than economic or financial.

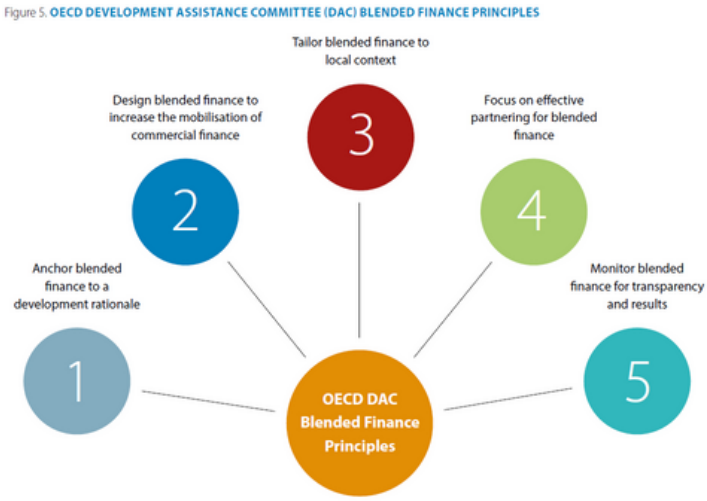
The flow of climate finance funds has tended towards the energy and transport sectors, typically the largest drivers of greenhouse gas (GHG) emissions for most cities—where the emissions come from. So this makes sense, particularly with a focus on mitigation.

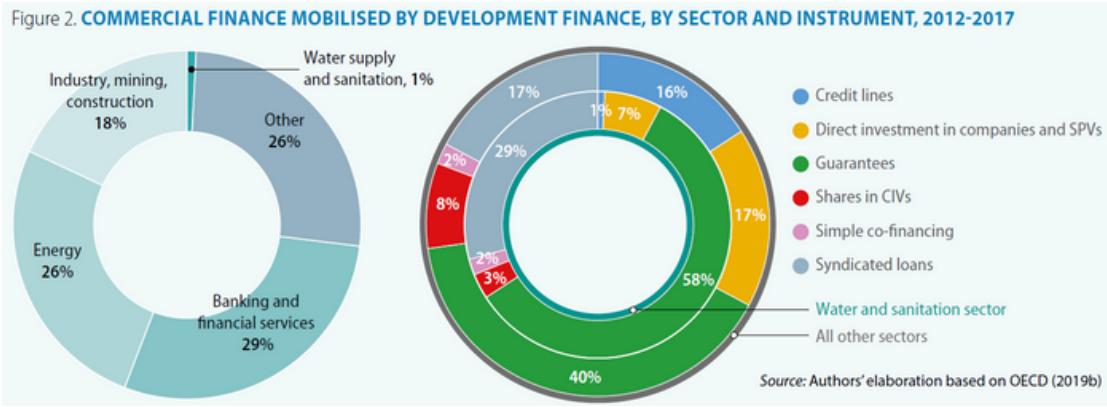
These efforts however, are mostly too small, very late, and are running alongside the continued development and subsidization of fossil fuel projects, including coal.

Over 940 new additional coal-fired power plants are slated to be built, in addition to the more than 6,500 already in operation [13]. It is the single largest source of GHG emissions at over 70%. While the SF Public Utilities Commission succeeded to reduce emissions to below 1990 levels, global coal-fired power plants have doubled. Green and blue bonds are needed, but the black bonds of business-as-usual cannot continue.

Falling short of funding every year for 15 years, while continuing to subsidize a known problem, illustrates the severe hole we are in. Blending finance is not enough. Stopping future 1Gt 'carbon bombs' and taking a pandemic-level approach to financing adaptation and mitigation are now required to reverse the tide.

There are 425 fossil fuel projects that would each create over 1 Gt of CO2 emissions globally, or 646 Gt total, exceeding a 1.5 degree C carbon budget by double. All the commercial financing markets for water utilities in the world cannot offset such projects and their eventual impacts on the water cycle [14].





Source: OECD - Making Blending Finance Work for Water & Sanitation (2019)

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Sources for Further Learning

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