Wastewater Zero

A call to action for business to raise ambition for SDG 6.3

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Foreword

Wastewater management is gaining increasing importance as a critical element, not only of SDG 6, the so called water goal but also many other associated SDGs. This is due to the growing realization by governments and partners of the significant damage that untreated wastewater impacts negatively on the environment and to public health. In many parts of the world, the lack of treatment of domestic wastewater is responsible for many deaths and illness. In addition, however, there is the increasing threat of wastewater from other sources. Many industries use hazardous substances in their processes, or produce wastewaters which have such high-levels of organic content that they deplete oxygen from receiving waters. Without adequate treatment, the impacts to environment and health can have catastrophic consequences.

Extreme climate events are also adversely affecting water availability. This has resulted in acute water shortages in many cities around the world. It is against this background that wastewater treatment and reuse are becoming increasingly significant, not only to protect water resources from contamination, but also to augment freshwater use. Much can be done to reuse water in industry and reduce discharges to the environment. Achieving Wastewater Zero is a gold standard that can be achieved with some effort, with unquestionable benefits. It is also important to realize that actions that support reduced wastewater discharges often result in significant savings in raw materials and energy.

The responsibility for monitoring the discharge of wastewater rests with regulatory authorities, whose institutional settings varies across the world. Most industrial wastewater is produced in cities, or urban agglomerations of some description, with public sewers the preferred disposal route. There is however risk that discharges can go unmonitored and hidden when combined with other less hazardous wastewater. This is a problem and without extensive monitoring, needs an ethical and responsible approach by those with the potential to pollute. In these situations, the application of the "polluter pays" principle becomes difficult to enforce.

It gives me great pleasure to endorse this publication Wastewater Zero to raise ambition for SDG 6.3. The monitoring of SDG 6 has been made a high priority by UN-Habitat and UN-Habitat were responsible for leading the development of a dedicated monitoring mechanism, bringing together many UN agencies and partners together with WHO and UN Statistical division under the auspices of UN-Water. Subsequently UN-Habitat, together with World Health Organization and UNSD, were appointed the custodian agencies for 6.3,1, specifically related to wastewater and water quality.

It is against this background that this report can trigger a needed and timely "call to action" to industry and business. UN-Habitat are therefore delighted to support this endeavor and congratulate the World Business Council for Sustainable Development for preparing this report. It gives clear, practical guidance on where to start and some good examples from around the world. UN-Habitat will continue to support this area of work through our programs and projects thus putting the ideas into action.

Let us all look forward to reducing pollution, protecting lives, and saving the planet!

Maimunah Mohd Sharif
Executive Director of the United Nations Human Settlements Programme

1 Executive summary

Industrial wastewater pollution is responsible for significant environmental, social and economic losses. The cost of business as usual far outweighs the cost of action to fix the problems linked to industrial wastewater pollution and misses opportunities for business to make progress on biodiversity, climate change and water security to achieve the Sustainable Development Goals (SDGs). In raising the ambition for SDG 6.3 – which calls for halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse – businesses must commit to Wastewater Zero.

In making this commitment, business can minimize physical, regulatory and reputational risk and be an early mover in a market that predictions indicate will be worth more than USD $50 billion annually by 2024. Moreover, raising the performance of wastewater management strategies can also contribute to water, biodiversity and climate targets.

Business materiality and risk assessments often underestimate wastewater pollution and externalize the risk to other stakeholders. The apparel and food, beverage and agricultural sectors are two examples where greater collective efforts are necessary to accelerate actions that reduce the impact of wastewater pollution downstream of operations and throughout value chains.

The action framework we present in this report provides six areas where business should focus its attention:

1. **Circularity:** Incorporate principles of circularity throughout the organization.
2. **Targets and metrics:** Establish targets and metrics based on science and context.
3. **Valuing water:** Value water to minimize negative externalities and incentivize reuse.
4. **Disclosure:** Improve disclosure beyond compliance.
5. **Partnerships**: Invest in public-private partnerships.
6. **Value chain:** Incentivize and support value chain partners.

In taking these actions, business should collaborate at sector, industrial cluster and basin levels to establish standardized and transparent mechanisms that create a common vision and monitor progress. Critical to collaboration is engagement with public authorities to create an enabling environment that provides incentives for investments in wastewater infrastructure that protects public health and the environment in a cost-effective way.

The time for action is now. Business needs to commit to **Wastewater Zero**.

Figure 1: Wastewater Zero Commitment

ZERO POLLUTION:
Commitment to treat all wastewater and ensure that effluent quality meets or exceeds relevant regulatory requirements in facilities and by suppliers

ZERO FRESHWATER:
Commitment to not increase absolute freshwater withdrawals and to increase the proportion of reused and recycled wastewater used in facilities and by suppliers

LOW-CARBON TREATMENT:
Commitment to treat all wastewater using low carbon technologies that are in line with corporate net-zero GHG emissions targets

2 Call to action for business

The protection of the aquatic environment, both inland and at sea, has become one of the few overarching goals of the international community with a level of awareness previously unseen. Businesses together have a direct impact on more than 70% of the water pollution and use. Consequently, the containment of discharges, planned or unplanned, authorized or not, is a must, not only for environmental protection but also for business continuity, globally.

In the next three decades, demand for water will increase by 50-70% in the domestic and industrial sectors. Water stewardship is becoming increasingly important as scarcity and quality concerns continue to grow.

Wastewater is truly an untapped resource. Industry, agriculture and households convert 56% of global freshwater withdrawals to wastewater in the form of domestic and industrial effluent and agricultural drainage. Over 80% of this wastewater flows back into the ecosystem without treatment or reuse. This take, make and dispose system is the foundation of the linear economy. Unfortunately, this is business as usual.

Wastewater reuse represents an affordable and sustainable source of water, energy, nutrients and other recoverable materials. The benefits to human health, economic development and environmental protection far outweigh the costs of treating and reusing wastewater.

Water-related risks, while local in nature, can disrupt business operations globally, have material cost implications and damage reputations. Additionally, businesses are beginning to recognize the direct economic benefits of deriving more value from natural resources, including water. Addressing water-related risks is fundamental to business sustainability and its license to operate.

Developing plans to create a positive impact requires two seemingly opposing skills – holding fast to a vision for the future, while being flexible enough to adapt to events as they unfold. Within this, there are steps that business must take:

- Recognize the true economic, social and environmental value of all sources of water.
- For new investments, incorporate water stewardship principles into the design from the beginning.
- For existing facilities, establish a baseline indicating how, where, when and why you use freshwater, and implement investments to improve wastewater efficiency, recycling and reuse.
- Educate employees and surrounding companies on the impacts of your actions. Only by sharing knowledge can others recognize and follow the positive effects of your actions, opening new pathways to robust operations and ensuring long-term freshwater availability.

In the optimization of global supply chains, the choice of lowest cost solutions has often coincided with lower standards in terms of environmental and social protection legislation and enforcement. Industries cannot continue down this path as the international community places increasing weight on accountability criteria in their assessment of corporations and their activities. Compliance does not confer resilience.

This report, the action framework it articulates and the commitment it compels business to make can help businesses join us in raising the ambition and actions to meet to meet SDG 6.3's target: better water quality.

Arcadis is dedicated to working in partnership with its clients to improve quality of life, and water is essential to life. Arcadis supports the SDG and actively works on improving clean water and sanitation (SDG6) and aquatic life (SDG14). We also see the opportunity to deliver long-term business value to our clients through more efficient management of industrial water resources.

Peter Oosterveer
CEO, Arcadis

As a leading global manufacturing company, DuPont depends on a stable water supply to make quality products that serve society. We understand that although the importance of water stewardship is a global issue, water withdrawal, consumption and quality, must be managed locally. Increasing competition for water demands immediate action, and a steep change in the way that companies manage water. We recognize the need to manage the water needs of today while securing water for the future. We also recognize that we cannot do it alone and must collaborate with our stakeholders in new innovative ways to address underlying shared water challenges.

Alexa Dembek
Chief Technology & Sustainability Officer, DuPont

Veolia is the global reference company in the provision of environmental services, for both industries and public authorities alike, and already has a substantial range of offerings encompassing risk assessment tools, technological, operational and social solutions. However, by listening to and working ever closer with our clients and other stakeholders we are constantly striving towards creative new ways of addressing the challenges that the sustainable use of water presents.

Olivier Brousse
Senior Executive Vice President Strategy & Innovation, Veolia

3 Business and SDG 6

Sustainable Development Goal (SDG) 6 aims to ensure the availability and sustainable management of water and sanitation for all. This report guides business in raising the ambition and actions to meet SDG target 6.3: Better water quality.

WBCSD supports business in contributing to the eight SDG 6 targets (figure 2) through the development of business-led solutions, multi stakeholder collaboration and advocacy efforts.

In the midst of the decade of action to deliver the SDGs, it is imperative to accelerate progress on global climate targets, halt biodiversity loss and ensure enough water is readily available for domestic, industrial and agricultural requirements to help achieve sustainable development. Accelerating action on industrial wastewater treatment and reuse can support these interdependent objectives.

SDG 6.3 which is the focus of this call to action, seeks to halve the proportion of untreated wastewater discharged into our water bodies:

"By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally."[1]

Indicator 6.3.1 tracks the proportion of domestic and industrial wastewater flow safely treated.

While the SDG 6 monitoring program does not include any specific indicators for recycled or reused wastewater, there is consensus that wastewater treatment targets must derive optimal value from water used for industrial purposes, including maximizing efficiency, industrial water reuse, wastewater recycling and extraction of materials and energy.

This report focuses on **point source pollution**; however, **non-point source pollution** – or **diffuse pollution** – is a significant contributor to freshwater pollution. For example, in Europe, 18 % of reported (under the Water Framework Directive] surface waterbodies and 14 % of reported groundwater bodies are under significant point source pressure, compared to 38% of reported surface waterbodies that are under significant pressure caused by diffuse sources.[2] Agricultural runoff, specifically nitrogen and phosphorus from fertilizers, composes part of this.

Figure 2: SDG 6 targets

The Organisation for Economic Co-operation and Development (OECD) estimates that nitrogen pollution (impacting various systems, including territorial, freshwater and marine ecosystems and climate) will cost the European Union (EU) between EUR €70 billion and EUR €320 billion per year.[3]

WBCSD is supporting the development of a nitrogen impact pathway, as part of the Food System Impact Valuation Initiative (FoodSIVI), that aims to measure and track nitrogen impact reductions in the food system. Also, as part of addressing scope 3 greenhouse gas (GHG) emissions for nitrogen-based fertilizer companies, we will develop a "value chain pathfinder" as part of the SOS 1.5 project.

Glossary of key terms

Domestic wastewater – wastewater that is produced by people, primarily from households

Industrial wastewater – wastewater that is produced by industry

Reuse – water that does not require additional treatment or reconditioning to use more than once

Recycle – water that requires additional treatment and reconditioning to use more than once

4 The urgency for action on wastewater management

The United Nations World Water Assessment Programme (WWAP) estimates that urban households and industries discharge 80% of wastewater without treatment directly into the environment,[4] with generally higher levels of treatment seen in high-income countries and generally lower levels of treatment in low-income countries.

A business-as-usual approach is not sustainable. Industrial wastewater pollution can lead to significant environmental, social and economic losses and failing to manage wastewater appropriately will have severe impacts on biodiversity, freshwater availability, climate action and human health:

- Pollution, including point source pollution from industry, has been increasing significantly and is a key driver of freshwater biodiversity loss.[5]
- Wastewater pollution significantly impacts freshwater availability, severely impeding the attainment of several SDG 6 targets.
- Improper management of industrial wastewater contributes to GHG emissions and impedes adaptation to climate change, undermining the realization of the Paris Climate Agreement goals.
- Pollutants from wastewater can find their way into recreational waters, municipal water supplies and the food chain, posing significant human health risks.

The cost of action to eliminate industrial wastewater pollution through low-carbon treatment processes and extracting value from wastewater streams, including water, materials and energy, is significantly cheaper and has additional co-benefits.

Widespread discharge of untreated industrial wastewater contributes to significant biodiversity loss

Industrial wastewater discharge has jeopardized critical ecosystem services such as nutrient cycling, primary production, freshwater provisioning, natural water purification, human health and recreation.

Effluents containing toxins and large amounts of dissolved organic matter, heavy metals and dyes have led to the eutrophication of water bodies due to phosphate and nitrate nutrient accumulation. Severe cases have resulted in species migration or disappearance and increases in dead zones for fisheries. It has also impacted humans through waterborne diseases and economic losses.

A 2019 report from the Inter-governmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) found that wastewater discharge, along with pollution from mining and agriculture, oil spills and toxic dumping, has significantly impacted freshwater resources, leading to a 40% increase in alien species since 1980.[6]

Freshwater ecosystems contain more species per unit area than marine and terrestrial ecosystems. However, these distinct ecosystems are under increasing threat, with a significant decline in freshwater species. The Living Planet Index 2020 recorded an 84% reduction in freshwater species since 1970, one of the significant factors being the degradation of freshwater sources.[7] Extinction threatens 27% of the 29,500 freshwater-dependent species that the International Union for Conservation of Nature has assessed so far.[8]

Untreated industrial wastewater and wastewater treatment processes contribute to GHG emissions

Wastewater – both treated and untreated – is a source of GHG emissions, including carbon dioxide, methane and nitrous oxide. Wastewater releases GHGs during the degradation and release of organic matter and through the energy used in wastewater treatment. However, emissions from untreated wastewater (domestic and industrial) represent at least three times the emissions generated from conventional wastewater treatment, such as primary sedimentation, activated sludge process and disinfection.[9]

UNTREATED WASTEWATER

Methane emissions from untreated or partially treated wastewater (industrial and domestic) accounts for an estimated 4.5% of global non-carbon dioxide emissions. By 2025, methane emissions from untreated wastewater could reach 1.6 million tons of carbon dioxide equivalent per day.[10] Additionally, the United States Environmental Protection Agency (EPA) projects that non-carbon dioxide emissions from wastewater will account for 36% of waste emissions by 2030.[11]

With more than 80% of all wastewater released to the environment going untreated, treating organic matter prior to release will significantly reduce GHG emissions.

TREATED WASTEWATER

Wastewater treatment produces carbon dioxide, methane and nitrous oxide during biological treatment processes. Carbon dioxide is also emitted as part of the energy requirement for wastewater treatment processes. When investing in wastewater treatment, it is important to also consider the energy source and processes in order to minimize GHG emissions.

Global methane emissions from industrial wastewater treatment are estimated at roughly 2.4 tera-grams (Tg)/year, which accounts for approximately 0.43% of total methane emissions globally.[12] The pulp and paper industry (particularly that originating in developing and Eastern European countries) is the largest contributor of industrial methane emissions from wastewater treatment, followed by the meat and poultry industry.[13]

Nitrous oxide is a potent GHG emitted during wastewater treatment processes. Although these emissions are relatively small (3% of estimated total anthropogenic nitrous oxide emissions) eliminating them will contribute to overall GHG emission reduction strategies.[14]

Improving wastewater management will also enhance climate adaptation measures related to securing water supplies for domestic, agricultural and industrial use through water reuse and recycling. While improved wastewater management can significantly contribute to the goals of the Paris Agreement, only 3% of nationally determined contributions (NDCs) mention wastewater management.[15]

Industrial wastewater pollution significantly impacts the agricultural sector

The World Health Organization (WHO) and Food and Agriculture Organization of the United Nations (FAO) estimate that 10% of the world's population relies on food grown with contaminated wastewater.[16] In some regions, farmers use wastewater for crop irrigation as an alternative to freshwater. The agricultural sector uses untreated or partially treated wastewater for the irrigation of some 20 million hectares of crops worldwide (7% of total cropland).[17]

Nutrients found in wastewater, such as phosphorus, potassium and nitrogen, can support plant growth; however, certain minerals, including inorganic salt, can limit plant growth and negatively impact agricultural yields.

The World Bank recently estimated that highly saline water negatively impacts crop yields globally by 11.0 to 13.5 %[18] (the discharge of untreated urban wastewater accounts for high rates of salinity, in addition to other causes). This correlates with site-specific studies (see box 1).

Untreated wastewater irrigation can lead to numerous environmental issues and impact human health. One of the main issues is the build-up of heavy metals in soil, plants, food chains and, ultimately, in human beings.

Wastewater recycling and reuse can meet a significant proportion of projected industrial water demand

Industrial water withdrawals account for approximately 20% of total global withdrawal, with regional variations: in Europe it is about 45% and in Asia under 10%.[19]

Water-intensive industries, such as power generation, microelectronics, pulp and paper, oil and gas, mining and metals, and textiles, are searching for ways to use water more efficiently, particularly in water-scarce environments. Industrial water pollution limits opportunities for the safe use and reuse of water sources to augment freshwater supplies, particularly in water-scarce regions.

Globally, projections indicate that water demand will exceed supply by 40% by 2030 and that industrial water demand, separated into energy (75%) and manufacturing (25%), will increase by 85% and 400% respectively by 2050. This brings projected cumulative annual industrial water demand to about 2,426 km^3 by 2050.[20]

Estimates show that it is possible to meet approximately 38% of existing industrial water demand by effectively recycling and reusing wastewater.[21] This potential would increase significantly as industries adopt measures for water-use efficiency.

Households produce 380 km^3 of domestic wastewater annually worldwide. Projections show that this will increase by 24% by 2030 and 51% by 2050.[22] Recycling and reusing domestic wastewater would make a significant contribution to meeting projected increases in water demand for both domestic and industrial uses.

Box 1: Industrial wastewater pollution decreases farmer revenues and increases costs

A 2018 study by researchers at MIT looked at 63 industrial sites in India identified by the government as “severely polluting” and estimated the costs of their pollution for downstream agriculture. They found that on average, there was a 9% reduction in yield compared with a corresponding district immediately upstream of the same site in the same year. A 2013 study on the impact of industrial water pollution on rice production in Viet Nam estimated that water pollution caused a yield reduction of 12%. The study researched 214 farmers in a polluted area and reported additional input costs for these farmers to compensate for the possible productivity losses.

Source: Hagerty, N (2018). The Costs of Industrial Water Pollution to Agriculture in India and Khai, Huynh & Yabe, Mitsuyasu. (2013). Impact of Industrial Water Pollution on Rice Production in Vietnam.

The economic impact of industrial wastewater pollution is greater than the cost of fixing it

A 2019 report by the World Bank[23] suggests that in regions downstream from heavily polluted rivers, GDP growth is lower by a third (see box 2).

The direct and indirect economic impacts of industrial wastewater pollution manifest themselves in reduced economic returns in agriculture and significant social and environmental externalities. This is especially true in the case of developing countries. While it is difficult to obtain relevant global data, disaggregate data for domestic and industrial wastewater, and fully quantify these impacts, there is clear evidence from local studies that economic losses are high.

A recent report by the World Resources Institute (WRI) estimates that the annual cost to reduce **pollution caused by industrial wastewater is USD$ 87.4 billion, about 0.1% of global GDP** (with the total cost for eliminating industrial, domestic and agricultural freshwater pollution estimated at USD $291 billion per year).[24]

Investing in industrial wastewater pollution prevention and abatement to reduce direct costs to industry, increase agricultural revenues and reduce indirect costs related to environmental and social externalities is significantly greater than the cost of inaction.

Box 2: Economic impact of water pollution

When the biological oxygen demand (BOD) level exceeds 8 mg/L – a level at which studies consider rivers heavily polluted – GDP growth falls significantly in downstream regions – by 0.82%. This compares with a mean growth rate of 2.33%, implying that countries lose around a third of growth. When studies restrict the sample to only middle-income countries, where BOD is a bigger problem, the impact increases to 1.16%, implying that countries lose almost half of growth. In high-income countries, where BOD levels are lower, GDP only declines by 0.34% in regions downstream from heavily polluted rivers.

Source: Damania, R., Desbureaux, S., Rodella, A., Russ, J. & Zaveri, E. (2019). ***Quality Unknown: The Invisible Water Crisis.*** World Bank Group.

5 An action framework for business

The scale of inadequate wastewater management and its impacts is significant and the risk to business is multifaceted. Wastewater pollution risk can often originate from value chain partners and manifest itself downstream, meaning that business needs to look beyond the fence to fully assess and manage risk.

This calls for collective action where sectors, industrial clusters and multistakeholder partnerships at a basin level collaborate to establish **standardized and transparent mechanisms that create a common vision and monitor progress.** The action framework consists of six areas where business must act – individually and together.

1. Incorporate principles of circularity across operations

Business can incorporate circularity in water use by implementing wastewater management strategies such as:

Prevention – by reducing wastewater generation through water-use efficiency or product replacement or decreasing the use of harmful chemicals in industrial processes.

Reduction – by treating all wastewater.

Recycling – by implementing closed-loop industrial processes; creating by-product synergies between industries and industry and agriculture.

Reuse – by ensuring the safe use of wastewater and the materials in it.

These practices create greater resilience to water scarcity, optimize cost and future-proof operations.

The adoption of fit-for-purpose wastewater recycling and reuse is an essential practice in incorporating circularity in water use, which involves treating used water to a quality acceptable for its intended reuse while posing the least risk to the user. Furthermore, it enables industries to overcome limitations, such as lack of capital, technology and skilled manpower, that come with the need to treat wastewater to a quality that is higher than that required for its next intended use (see box 3).

2. Establish targets and metrics based on science and context

Only 12% of respondents to CDP's water security questionnaire in 2019 reported that they set pollution reduction targets, while 47% of companies monitor the quality of their discharges.[25] Regulatory standards most likely determine monitoring and companies may use compliance as a target proxy. Such approaches might not drive appropriate actions that prevent freshwater pollution or increase wastewater recycling and reuse. Companies should establish

Box 3: Public-private partnership for water that is fit-for-purpose

In Southern California, where industries have suffered from water supply disruptions due to severe drought, SUEZ and the West Basin Municipal Water District are working together on an innovative technology to recycle wastewater and produce five types of reusable water treated to a level appropriate for purpose. These include tertiary water (industrial and irrigation use); nitrified water (industrial cooling towers); secondary treated wastewater purified by micro-filtration, followed by reverse osmosis (RO) and disinfection (groundwater recharge); pure RO water (refinery low-pressure boiler feed water); and ultra-pure RO water (refinery high-pressure boiler feed water). This has helped produce more than 750 million m^3 of recycled water and reduce dependence on imported water from 80% to 60% in the past 20 years.

targets that respond to science-based and context-specific freshwater and biodiversity status; and metrics to monitor progress should go beyond effluent quality.

Science-based targets (SBT) specify for companies how much and how quickly they need to reduce specific impacts and dependencies on the environment. SBTs for freshwater, oceans and biodiversity are currently under development, each of which should drive actions to reduce wastewater pollution.

At a site level, water circularity metrics can measure the circularity of a facility's water sourcing, use and discharge as contributions to a net reduction in water demand within the watershed. Such a metric goes beyond effluent quality and can drive decision-making that favors wastewater recycling and reuse.

We will publish a guidance on water circularity metrics in 2021 as part of our Circular Transition Indicator work.

3. Invest in public and private sector partnerships

Some of the drivers for collaboration include enhanced access to technical knowledge, compliance, finance and influence. Partnerships can range from sharing infrastructure to collaboration with industry peers to form a consortium to share knowledge.

The use of public infrastructure to collect and treat industrial wastewater is common practice. In Europe, approximately 25% of capacity remains to treat additional wastewater (domestic and industrial).[26] Proactively engaging with the public sector to identify opportunities to use existing wastewater treatment capacity should be an early action to improve wastewater management.

Public-private partnership (PPP) models for industrial wastewater are usually based on the fundamental idea that municipal treatment plants or utilities can supply treated wastewater to industries. Such models can take either a bilateral approach, where public and private enterprises engage in finding a solution to a common problem, or a multilateral approach, where multiple entities and organizations create a solution for the common good (see box 4, box 5, box 6 and box 7).

Braskem

Box 4: **Aquapolo – wastewater reuse delivering multiple benefits for the private and public sector**

At its inauguration in 2012, Aquapolo was the largest wastewater reuse project in Brazil. A public-private partnership including Braskem, the largest petrochemical company in Latin America, Sabesp, the public water operator for São Paulo and Foz do Brasil, a waste management company, developed and financed the plant. The facility has the capacity to produce 1,000 liters per second of recycled water for reuse, supplying a petrochemical complex located in São Paulo. Braskem, which uses approximately 65% of Aquapolo's capacity, has signed a 41-year contract for this supply, guaranteeing revenue to cover operating costs. While serving the growing demands of industry, the project has also enabled an increase in the supply of drinking water for human consumption, which estimates suggest saved over USD $50 million during the water crisis of 2014-2015.

Box 5:
Wastewater as a resource

Mondi Group's Syktyvkar mill in Komi, Russia, operates a wastewater treatment plant that treats its own industrial wastewater and that of the local community. The plant recently made upgrades worth USD $139 million to improve its treatment processes in addition to replacing old biofuel boilers and turbines. This resulted in a reduction of chemical oxygen demand (COD) emissions by 22% in 2017 as compared to 2015. The mill dewaters and reuses all the bio-sludge produced at the wastewater treatment plant as biofuel in an energy plant operated by Mondi, providing energy for central heating in the town. Mondi Group's investment will help substitute 128 million m^3 of natural gas with the biofuel, thus saving money and resulting in a total green energy generation capacity of 170 MW. Additionally, Mondi sells the sludge produced from primary treatment processes to fiber-producing industries or brickmakers as raw materials. It sells the ashes to industries that can make use of sludge ash. These material recoveries allow Mondi to minimize waste and generate additional revenue.

Box 6:
Water in the circular economy

International Paper's mill in Madrid, Spain, is a state-of-the-art example of public-private partnership (PPP) in action. This is the first mill in the European Union to produce 100% recycled containerboard using 100% recycled water in partnership with the local municipality. The mill is the exclusive partner for Fuenlabrada's community recycling program, bringing in over 400,000 tons of recovered material annually, much of it from the local area. In turn, the mill produces over 1,000 tons per day of containerboard using reclaimed wastewater in a process linked to the municipal system for both water supply and wastewater treatment. Onsite, the mill operates a unique anaerobic wastewater treatment system, minimizing sludge waste generation. The system also produces enough biogas to replace 25% of traditional fossil fuels for the mill's energy needs. It sends the partially treated effluent to the municipal treatment plant, where it undergoes further treatment and then returns to the mill for reuse. This process saves over 2 million m^3 of water each year, equivalent to the consumption of about 60,000 people. In a water-stressed region that is seeing increasing demand for water resources, this PPP creates economic and sustainable benefits for all stakeholders, including the local community, the municipal partner and International Paper.

Box 7:
Affordable recycled water for multiple users

In Western Sydney, several plastic manufacturers, a paper recycler, a food processor, a racecourse and a golf course purchase recycled water for 90% of the price of drinking water, although the water is treated by ultrafiltration and reverse osmosis. The Rosehill Recycled Water Scheme is a partnership for sustainability, involving the above users, Water Utilities Australia (owner), Sydney Water, and Veolia as the operator. The scheme will reach its tenth year of operations in 2021, contributing to the economic and environmental viability of the industrial sites, within the regional water management scheme.

4. Support and incentivize value chain partners

Businesses collaborate with both upstream and downstream value chain partners, incentivizing them to adopt business practices that promote water conservation, wastewater treatment, reuse and safe discharge. The apparel and footwear industry is a good example of an industry undertaking a collaborative initiative to minimize the release of hazardous chemicals to prevent pollution and ensure safer production (box 7).

Most leading companies have a supplier code of conduct incorporating wastewater management expectations that form part of the criteria against which they screen or assess suppliers periodically, supported by corrective measures and capacity building.

One of the main challenges in wastewater management is capability and ensuring those that operate wastewater treatment facilities and technologies have the appropriate skills. Business should work across sectors and value chain partners to support capacity building efforts. This could include the development of standardized training and certification programs.

Box 8:
Road Map to Zero program – reducing the impact of hazardous chemicals

More than 150 leading fashion brands, chemical suppliers and textile manufacturers have come together in a collaborative initiative to reduce the chemical footprint of the apparel and footwear industry. Beginning in 2011, the signatories have committed to a joint roadmap to reduce adverse environmental impacts in their value chains, especially to reduce air and water pollution due to the release of hazardous chemicals and ensure safe production. They promote this through the development of aligned, industry-endorsed guidelines and tools for sustainable chemical management, along with a network of stakeholders across the supply chain to manufacture safer products. In 2014, they released the first Zero Discharge of Hazardous Chemicals Manufacturing Restricted Substances List (ZDHC MRSL). Since then, the guidelines and innovative solutions for wastewater treatment and chemical management have evolved and companies throughout the industry have implemented them.

5. Value water to minimize negative externalities and incentivize reuse

Water valuation as a resource differs from the price and cost of water. Water valuation should consider the financial cost and the economic, social and environmental impacts and dependencies as well.

Valuing water can influence industrial water and wastewater management in three main ways: establishing a business case on the supply side for reducing freshwater consumption, reducing the release of hazardous substances into freshwater sources and incentivizing an adoption in wastewater recycling and reuse.

Understanding the value of water within a basin context can lead to an appreciation of how water pollution negatively impacts value: how it impacts society, the environment and the economy. Applying approaches such as the Natural Capital Protocol helps better understand the negative impacts of freshwater pollution when developing a cost-benefit analysis of various investments.

In many places the financial incentive to recycle and reuse wastewater is lacking, largely because the price of water is so low. To be an attractive option, companies should consider the value of reusing water in the long term, including the additional benefits of securing supplies and the lowered impact on the environment and society stemming from reducing freshwater withdrawals. Variable water tariffs for industrial water use already factor such valuations into their use (see box 8).

6. Improve disclosure beyond compliance

In the 2019 CDP Global Water Report, only 10% of companies surveyed reported risks linked to water pollution.[27] Given the widespread and interconnected nature of freshwater pollution risk, coupled with its potential to have a significant negative impact on socio-economic development and environmental integrity, more companies should report such risks.

The low number of businesses reporting risks related to water pollution may be because the most significant freshwater pollution risk for many businesses is related to regulatory fines and penalties, which are often low and immaterial to financial performance. Businesses should understand the impact of freshwater pollution not just within their own operations and assets, but downstream and throughout their value chain. This becomes more critical as freshwater pollution may pose a risk to the source of water supply. Therefore, integrated watershed management and supply chain integration have become crucial approaches in understanding the company risk profile and more fully capturing freshwater water pollution impacts.

The Global Reporting Initiative (GRI) Standard 303 for Water and Effluents provides clear guidance on what companies should report on for wastewater, including information related to interactions with water as a shared resource, the management of water discharge-related impacts and water discharge.[28]

Box 9: Benefits of treating and reusing wastewater

During periods of supply scarcity, policies prioritize household demand over industrial demand, potentially leading to supply restrictions for industrial users. For instance, in India the average industrial water tariff for municipal water supplied by utilities is approximately USD $0.68 per m^3. In times of water scarcity, when municipal water is in short supply and governments place stringent restrictions on groundwater abstractions, industries resort to buying water from private water tankers, at prices of USD $0.83 per m^3 and above. This can significantly increase operational costs or threaten business sustainability. However, consultations with Indian businesses suggest that the treatment of industrial effluents to produce water for industrial use would only cost around USD $0.24 per m^3 and the treatment of municipal water would cost around USD $0.09 per m^3. Therefore, it is both prudent and profitable to invest in wastewater treatment technologies for long-term operational sustainability. There is also a significant potential for the emergence of public-private partnerships for municipal wastewater treatment and reuse for industrial purposes.

6 The business imperative for action

Wastewater management is a material issue for sectors that are highly dependent on good quality freshwater for operations or where there is high potential for wastewater pollution from operations. It also has far reaching impacts on other material issues, such as biodiversity, climate change and human health.

Reduced regulatory risk and related fines

National or state level jurisdictions usually establish regulations that include thresholds, limits and reporting requirements. In the absence of established regulations, business should seek to adopt recognized industry standards, such as the Zero Discharge of Hazardous Chemicals (ZDHC) Wastewater Guidelines.

Businesses can avoid regulatory risk through adequate wastewater treatment and its reuse, which will ensure that they remain within discharge limits and maintains the required quality of wastewater during discharge.

According to recent data from CDP,[29] reporting companies across various sectors suffered from losses of more than USD $65 million and USD $107 million in fines and penalties for 2019 and 2018, respectively. It is likely that a significant portion of these fines are related to wastewater regulation violations.

These figures from CDP and other country-level analyses indicate that fines levied for wastewater regulations do not cover the full economic impact of violations. As societal and political pressure grow to fully implement the polluter pays principle, it is likely that the size and frequency of fines levied for wastewater regulation violations will increase. In managing this risk, business needs to be fully aware of policy and regulatory developments and anticipate changes incorporated into long-term scenario planning and materiality assessments.

Reduced physical risk related to water availability and quality

CDP's 2019 Global Water Report indicates that 89% of reported water-related risks were physical.[30] Physical risks are related to water quantity and quality. Wastewater impacts both and can mitigate quantity and quality risks by offering an alternative supply.

Industry is in a good position to reuse or recycle wastewater internally. Actions include the direct use of untreated wastewater for different processes and operations. For example, industry can use water from cooling and heating for cleaning and washing. It is possible to sufficiently treat processed water to match the quality needed for the intended purpose and that has greater potential for recycling.

Wastewater treatment and reuse can improve water availability for industries and further reduce water source contamination. This strengthens resilience and optimizes costs, an imperative as water scarcity increases.

Wastewater can serve as a cost-efficient, sustainable source of water (see box 8). Reduced dependence upon municipal water supplies will improve water availability for community use (see box 9).

Reduced reputational risk related to social license to operate

Reputational risk results from performance and external perceptions of water use, pollution and behavior that may have a negative impact on the company's brand, which could influence purchasing decisions and risk social license to operate. Effects on local aquatic systems and community access to water can alter public perceptions rapidly.

Highly polluting and water-intensive industries encounter greater reputational risk. For instance, the mining and metals industry faces risks such as dewatering of mines, tailing ponds and acid mine drainage.

Systematic tracking and monitoring of water availability and quality at a local level coupled with ongoing engagement with local stakeholders can help companies avoid this risk.

Opportunity to trade reused water and recovered materials from waste streams

There are market options to trade wastewater as a resource. The potential to recover materials that are commercial commodities and can generate energy from the treatment process drive these options.

Agriculture and industrial purposes can use reclaimed water produced from wastewater treatment, and the water can even be potable depending upon the level of treatment. Certain industrial sectors have higher potential for wastewater reuse (Table 1).

Table 1: Sectors with high potential for use of treated wastewater

Sector	Purpose of water reuse
Textiles	• Washing • Bleaching, dyeing • Cooling towers
Iron & steel	• Cooling towers • Furnace cleaning • Fire-lighting systems
Oil & gas	• Boiler makeup water • Process for production of purified terephthalic acid • Cooling towers • Enhanced oil recovery • Hydraulic fracturing
Food & beverage	• Fabrication • Washing • Dilution • Cooling towers
Pulp & paper	• Major production processes (for example, washing, bleaching, etc.)
Mineral extraction	• All production processes

Similarly, certain industrial sectors have higher potential for recovery of materials from wastewater (Table 2). Recovery and sale of these resources can contribute to additional revenue generation for industries.

Depending on the organic content and other factors, wastewater can potentially produce up to five times the amount of energy needed for the wastewater treatment process.[31] Anaerobic digestion can convert the organic compounds present in wastewater into methane-rich biogas used to heat wastewater treatment reactors and generate electricity.

Certain sectors, such as distilleries and breweries, pulp and paper, organic chemical industries, meat and poultry and dairy industries, may have higher potential for biogas production due to the amount of degradable organic matter present in the generated wastewater.

Wastewater treatment facilities also have the potential to produce heat and power for the grid, resulting in greater cost savings.

Opportunity to develop technologies and services to treat and reuse water efficiently

Projections indicate that the global wastewater recovery systems market will exceed USD $50 billion by 2024, with the food and beverage, metals mining and pharmaceutical sectors being three of the biggest application sectors.[32]

A wide variety of technologies exist around the globe to treat wastewater and recover by-products. However, companies need to assess technologies in order to choose the one that is best suited to their quality needs and that does so in an energy-efficient and cost-effective manner. Identifying the cost-benefit of technology options is an important step (box 10).

Ongoing research and innovation are essential to addressing evolving wastewater management challenges, such as reducing energy demand from wastewater treatment processes, achieving greater filtration rates at lower cost and promoting water-use efficiency to reduce wastewater generated.

Emerging contaminants, such as pharmaceuticals and microplastics, require further investigation as to their prevalence, health and environmental impacts to inform appropriate technology options.

Technology providers should engage with business to identify and test appropriate technologies. This is possible through country-, sector- or application-specific collaborations where industry needs inform technology development and a group of industry partners can co-finance and test new technology.

Table 2: Sectors with high potential for recovering and reusing material

Sector	Recovered material	Potential applications
Textiles	• Urea • Sulfide • Sodium hydroxide	• Used in construction industry to make clay-fired bricks • Anerobic treatment of textile sludge to produce biogas
Iron & steel	• Chromium • Zinc • Copper • Mercury • Lead • Nickel • Cadmium	• Used as an additive in Portland cement • Source of micronutrients in fertilizers and soil stabilizers • Adsorbent in water purification
Dairy	• Nitrogen • Phosphorus	• Used as a fertilizer (especially for acidic soil)
Agriculture	• Pesticides • Insecticides	• Used for production of energy post-anerobic digestion • Used for composting • Used as a fertilizer for crops
Pulp & paper	• Fiber • Lime and causticizing residuals • Ash	• Reused as a component of paper and board production (refers to wood fiber recovered from the process) • Used for production of energy post-anaerobic digestion • Used for brick and cement production • Used as a material for composting and landscaping product applications and landfill capping • Animal bedding

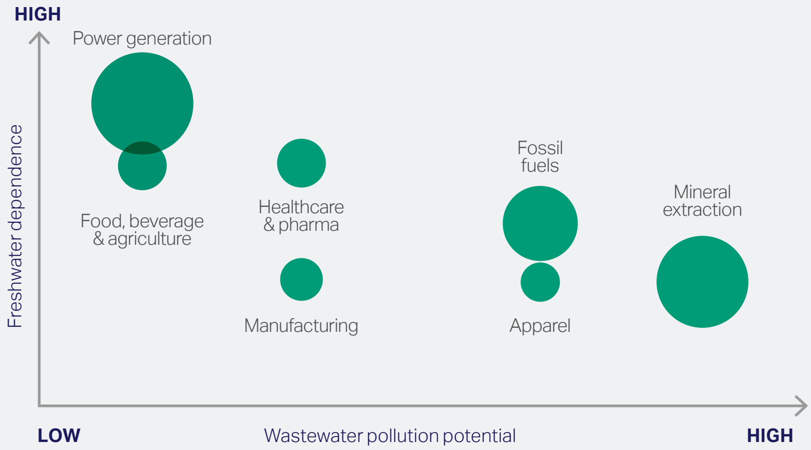
Pollution risk exposure of key sectors

Wastewater pollution presents a risk to sectors where there is high dependency on good quality freshwater for operations or where there is high potential for wastewater pollution from operations. The CDP Global Water Report 2019 found that the mineral extraction (36%), power generation (34%) and fossil fuel (24%) sectors are most exposed to water pollution risk (all sources of water pollution, including wastewater).[34] These sectors reported the highest occurrence of primary risk drivers related to water pollution, including "declining water quality", "pollution incidences" and "regulation discharges quality/volume" that have the potential to have a substantive financial or strategic impact on their business.

What this risk exposure fails to fully capture are the impacts and dependencies of wastewater on freshwater.

For example, the apparel sector has high pollution potential (estimates suggest that 20% of industrial wastewater pollution worldwide originates from the fashion industry) and reported a lower risk exposure (7%), indicating that the burden of wastewater impact risk is passed on to other stakeholders (such as farmers, other downstream industries). Given the widespread application of reused wastewater in agriculture and its high dependence on freshwater, the risk exposure of the food, beverage and agricultural sector (12%) is also lower than expected. This may indicate that the sector is significantly underestimating risk related to wastewater based on its dependencies for safe wastewater reuse and freshwater availability.

Figure 3: Priority sectors where action is most needed[33]



Box 10:
Wastewater – a cost-efficient, sustainable source of water

Arcadis has developed a novel technique known as Water Kaizen Blitz (WKB). Built on the principles of lean manufacturing, the WKB entails a short, intense dive into understanding how, when, why and where a company uses water in manufacturing operations, with the development of ideas for water efficiency and the quantification of estimated savings, capital costs and return on investment. Arcadis deployed this technique for a chemical manufacturing company, identifying 15 project opportunities, each with a return on investment of less than two years, saving more than USD $3 million a year with a capital investment of only USD $760,000.

7 Key enablers for raised ambition

Government policy and regulations are the levers that can create a variety of incentives for businesses action and fuel innovation. Together, policy, economic incentives and innovation are critical to accelerating wastewater treatment and reuse.

Policy and regulations can promote industrial wastewater treatment and reuse

Assessments of various industrial sectors suggest that regulations are the largest drivers for business to manage wastewater effectively. As discussed in the previous section, potential risks arising from non-compliance, such as reputational damage, risk of litigation and financial losses resulting from sanctions and closure of operations, compel business to act.

The regulatory framework for industrial wastewater treatment and reuse varies across regions. While principle-based regulations provide high-level guidance to industries, prescriptive regulations have been far more successful in driving concrete action and industry stewardship.

Prescriptive regulations catalyze change through required action. For instance, the EU's Urban Waste Water Treatment Directive led to a 61% reduction in biochemical oxygen demand load, a 32% reduction in nitrogen load and a 44% reduction in phosphorus load in treated wastewater throughout the EU between 1990 and 2014.[36] It achieved this through simple and clear targets in the directive, which prescribe specific actions for industries, helping them focus their efforts.

Similarly, the US Clean Water Act of 1972 was effective in reducing water pollution from point sources by enforcing precise guidelines that defined the type and quantity of effluents that could enter water bodies from industrial wastewater discharges. It continues to drive business action for wastewater treatment through various incentives.

Governments usually punish non-compliance with fines. The trigger, frequency and scale of fines vary by municipality and country. In jurisdictions where enforcement and fines are low, some companies may see these fines as a cost of doing business (see box 11).

Box 11: A review of water pollution fines in Bangladesh

Bangladesh is an important hub for the global textile industry, making up approximately 80% of its total export revenue. Levied fines are part of the regulatory enforcement scheme and aim to punish and deter polluters. However, research shows that levied fines are arbitrary and regulators do not penalize repeat offenders heavily. Furthermore, estimates show that violating regulations can be cheaper than investing in wastewater treatment technologies, thereby disincentivizing compliance.

Source : Haque, N (2017). "Exploratory analysis of fines for water pollution in Bangladesh

Fines must balance incorporating all externalities related to non-compliance and incentivizing investments by business to ensure compliance. Governments should use policies and regulations to incentivize reuse (see box 12).

Multiple drivers are incentivizing businesses to accelerate wastewater treatment and reuse

Economic instruments and water scarcity create incentives for businesses to treat and reuse wastewater. Other benefits, such as optimizing operational cost and resilience in times of water scarcity, also drive business action.

Market based instruments (MBIs), and economic incentives (EIs) can be effective in driving change. MBIs and EIs harness market forces to accelerate wastewater treatment. They play a significant role in stimulating technological improvement and innovation, spurring companies to find least cost means of limiting wastewater discharge.

FINANCING INSTRUMENTS – LOANS

Low-interest loans that are dependent on recipients meeting specified criteria are becoming increasingly common for environmental, social and governance (ESG) issues.

Public-private partnerships are an effective mechanism that can help industries leverage access to capital. International development agencies and financial institutions can be a source for debt financing.

FINANCING INSTRUMENTS – BONDS

Governments and business have long used bonds to finance infrastructure projects. In the last decade, green bonds have gained traction in raising money for climate and environmental projects, including wastewater management infrastructure.

In 2019, Silicon Valley computer giant Intel secured USD$150 million in tax-free bonds from the state of Oregon. The company will use the money raised to finance the USD$ 600 million wastewater treatment and reuse project in Hillsboro, Oregon. Once completed, the project will enable the recycling of about 1 billion gallons of wastewater per year.

Blue bonds – which finance projects related to ocean conservation – are also relevant for wastewater management investments through reduced marine pollution. Globally, issuances of blue bonds have already crossed USD$10 billion as of 2020.

Box 12:
Water reuse certificates – an innovative mechanism for wastewater management

To drive adequate wastewater treatment in the Indian state of Maharashtra, 2030 Water Resource Group has proposed water reuse certificates (WRCs) – an innovative market-based mechanism – to promote the trading of recycled wastewater. The team and the Maharashtra Water Resources Regulatory Authority (MWRRA) have collaborated to:

- Design two separate tradable permit mechanisms to promote the trade of WRCs among large municipal corporations and among leading private industrial sector water users, wherein 1 WRC equals 100 m^3/day of recycled wastewater;
- Create specific targets based on the assets deployed/planned in the urban sector and the number of water-use closed loops possible in the industrial sector;
- Roll out guidelines and an MWRRA-led regulation to galvanize the use of WRCs; and
- Develop a blockchain and an Internet of Things (IoT) backbone to operationalize WRC harnessing of cloud computing possibilities.

Through the right fiscal and institutional incentives, the 2030 Water Resource Group expects the tradable permit mechanism to maximize the use of wastewater treatment assets, mobilize financing for water infrastructure and disruptive technologies through private sector participation, and build institutional resilience through information technology-based innovations.

OFF-BALANCE SHEET FINANCING

A common form of off-balance sheet financing (OBF) is partnerships such as special purpose vehicles (SPVs). Such partnerships jointly commit or raise funds to build and operate infrastructure. The benefits of SPVs are that partners can share the risks and access blended finance from private and public sources.

For wastewater management, which is both a public and private sector issue, SPVs provide a formal mechanism creating accountability for financing, building, operating and maintaining infrastructure that benefits the public and private sector (see box 13).

EFFLUENT DISCHARGE FEES

In many jurisdictions, effluent discharge fees are an effective incentive. For instance, in Germany such charges were as high as USD$ 2.5 per m^3 of water in 2002. A company can reduce these charges by using best available technology for treatment or investing in treatment facilities.

Palm oil and rubber processors in Malaysia have been subject to a variable fee for biological oxygen demand (BOD) discharge, which the country is strictly enforcing. This has led to a two-thirds reduction in BOD emissions in the first year and a 99% reduction after 7 years.

Policy-makers can have significant beneficial impacts through the development of appropriate incentives for industries that align business decisions with environmental preservation.

INNOVATION HOLDS THE KEY TO CATALYZING BUSINESS EFFORTS TO ADVANCE SDG 6.3

Innovation is often associated with advancements in technology. Serious challenges remain in terms of financing and following structured models for research and development (R&D). There is a significant gap in institutional capacity to develop commercially viable low-cost alternatives for cutting-edge technologies. Academic institutions largely focus on R&D aimed at wastewater treatment; but mainstreaming the application of such research is limited. Researchers, academic institutions, government departments and business must work more closely together to foster innovation.

Companies can collaborate on open innovation with technology providers, such as by setting up shared R&D facilities to identify products, processes and technologies that undertake cost-effective wastewater treatment and reuse. This requires a pre-competitive partnership among industrial peers and would help overcome impediments of high cost and the absence of technical know-how, skills and required infrastructure.

Additionally, businesses have come together to create eco-industrial parks using waste materials from one industrial operation as raw material input for another. Industrial parks are also an effective means of augmenting and securing cost-efficient water supplies while ensuring its safe treatment at the same time.

A good example is the China-Singapore Suzhou Industrial Park in China that has brought together over 60 Fortune 500 companies with a residential population of more than 600,000 people. The park allows for tailored water supply, effluent collection and treatment processes that maximize the use and reuse of available water and other materials.

These collaborations bring multiple benefits, such as pooling the best available technology, reducing and sharing of risk in ways that optimize future technical performance, and providing security for investors.

Box 13: **A special purpose vehicle for addressing municipal and industrial water challenges**

Rustenburg Municipality, a water-stressed area in South Africa, faced the dual challenge of increased water demand from domestic and industrial sources and reaching wastewater treatment capacity. Public finances could not meet investment needs, which led to an engagement with local mining companies. The municipality and mining companies established an SPV – the Rustenburg Water Services Trust – to finance and operate new water infrastructure: 50% of the SPV's revenue comes from mining companies who have a 25-year agreement to off-take non-potable treated wastewater. After seven years of operation, the Rustenburg Water Services Trust had cash reserves of USD$12 million.

The SPV has realized several benefits: secured supplies for mining, reduced dependence on freshwater sources for industry that is increasing freshwater availability for other purposes, and improvements in downstream water quality through better wastewater treatment.

8 Call to action for policy-makers

Achieving the SDGs requires unprecedented collaboration between government, business and civil society. The business actions described in this report can be most effective if the right enabling environment is in place. Government policies and regulations are a very important lever for business action on wastewater management.

Pollution prevention and reduction at the source is the most effective policy response in terms of minimizing health and environmental impacts and intervention costs. Business should proactively engage in developing public policies and regulations to find solutions that protect public health and the environment in a cost-effective way.

We direct the following policy asks at a global level for relevant multilateral institutions and processes and at a national or state level for governments with jurisdictional responsibilities for water and wastewater management.

Global

The United Nations Convention on Biological Diversity (UNCBD) must recognize the **essential role of improving wastewater management in meeting renewed global biodiversity goals** and provide the necessary political impetus to enable effective collaboration between the private and public sectors.

The United Nations Framework Convention on Climate Change (UNFCCC) must promote the **inclusion of effective actions to manage wastewater as a contribution to nationally determined contributions** (NDCs) and through appropriate mechanisms that **engage with non-state actors such as cities**, particularly in regions where climate change significantly impacts water security.

The United Nations must **prioritize wastewater management**, promoting the co-benefits of addressing domestic, industrial and agricultural sources of freshwater pollution, in order to achieve all SDG 6 targets. Furthermore, it is necessary to make efforts to target finance and capacity building initiatives at those countries that wastewater pollution is impacting the most.

National and state governments

- Establish **clear guidelines, with appropriate thresholds and limits** based on the best available science, for **industrial effluent discharges and wastewater reuse in industry and agriculture**.
- Establish the means to **monitor and enforce regulations**, including accountable institutions, appropriate instruments to incentivize compliance and transparent reporting mechanisms.
- Support and require business to **internalize externalities arising from water pollution** and **wastewater reuse** and integrate their impact and dependencies on nature and the food system in decision-making, risk management, supply chain management and external disclosure.
- Enable **partnerships between public sector bodies and the private sector** to define common problems related to poor wastewater management, co-develop solutions and implement large-scale projects.
- **Incentivize** the **recycling of water by industry** and **the trading of reused water between industry and municipal authorities** through financial and regulatory means.

9 Moving forward

The ambition to achieve Wastewater Zero, whereby no hazardous substances are released into the environment, reused and recycled water make up a larger proportion of industrial water use, and low-carbon treatment technologies treat all wastewater, will make a significant contribution to some of the world's most pressing environmental and societal challenges: biodiversity, climate change and water security.

It is necessary to implement the framework for action, whereby business manages and mitigates risk, internalizes externalities and unlocks value from wastewater, throughout sectors, value chains and geographies. Critical to this is collaboration between the public and private sectors that mobilizes significant financing to build new infrastructure, strengthen institutions and develop the capacities of those professionals responsible for wastewater management.

Late in 2020, we will launch a Wastewater Zero commitment platform, an online mechanism for business to commit to Wastewater Zero, thereby raising their ambitions for SDG 6.3. Business will quantify and qualify their commitment against three goals and report progress annually:

1. Zero pollution: Releasing zero hazardous substances into the environment
2. Zero freshwater: Increasing the proportion of water reused and recycled
3. Low-carbon: Adopting low-carbon wastewater treatment processes

To support this commitment, we will develop a roadmap for business action that embraces the action framework described in this report and aligns with the three commitment goals.

Appendix

We used the following data in figure 3.

Wastewater pollution potential

Data taken from CPCB (Central Pollution Control Board, India) values. These values are based on types of expected criteria water pollutants present in industrial process wastewaters. See the full criteria here: https://www.gpcb.gov.in/Portal/News/124_1_New_Cat_ROGW.pdf. We have graded wastewater pollution caused by various industrial sectors on a scale of 1-5.

Freshwater dependence

Data taken from the *CDP Water Report 2019*, with sectors ranked low to high (in relative terms) on a scale of 1-5.

Risk exposure

Data taken from the *CDP Water Report 2019*, with risk exposure % representing the size of the sector bubble.

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