



Taking care of  
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# Diversey Trend Report

Water and Wastewater Treatment in the Food & Beverage Industry

## Going with the flow – why water conservation is the number one priority for the future of the Global F&B Industry

As global water scarcity intensifies, optimization, water recycling, reuse and treatment is becoming one of the most effective ways of protecting this increasingly threatened resource. In response to the unfolding global crisis and to the specific challenges that face the F&B sector, new trends are evolving. How can you harness these developments in wastewater treatment to significantly contribute towards your sustainability goals and reduce your total cost of ownership - yet maintain profitability and your brand reputation?



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## Foreword from the President of Food & Beverage, Diversey

Water is our planet's lifeblood. It is essential in keeping our environment, economy and society healthy. However, the status of this most precious of commodities is increasingly precarious. Rapid population growth, climate change and geopolitical instability are creating unprecedented pressures. Approximately 771 million people lack access to clean water, which equates to a staggering 1 in 10 people on the Planet<sup>1</sup>.

With the increasing scarcity of drinking water, the reduction of water being sent to waste, and the reuse of wastewater streams is becoming an urgent ecological and economic priority. Although in the past, conserving water or using it smartly may not have been a key priority for the F&B production sector, the new realities are dramatically changing the approach to water treatment. Optimizing water consumption and reusing wastewater is critically important.

## Innovation based on sound water stewardship

The importance of sound water stewardship is reflected in Diversey's commitment to improving water efficiency in our supply chain. We are constantly innovating to find sustainable solutions in the context of working wisely with water, and it remains a key focus of our ESG initiatives.

In combination with the global water treatment chemistries and equipment provided by our parent company, Solenis, our experts offer an unmatched level of service and specialized focus to the food, beverage, dairy, and life science industries. Applying our cutting-edge water treatment solutions to your processing facilities maximizes water reuse to reduce consumption and disposal requirements, removes pollutants to minimize environmental impact, and ensures wastewater discharge compliance - while always maintaining the highest food safety and quality standards.

## Our distinctive approach

As a flexible single supplier, we provide knowledge, expertise, and a full suite of water treatment technologies and hygiene solutions all-in-one-place. With most common water treatment solutions available adopting a very similar approach, this enables us to achieve differentiation. Diversey can help you stay ahead of the curve, as the needs of the F&B industry continue to evolve and change quickly.

Regardless of the size of your facility, Diversey consistently delivers targeted solutions that can be tailored to fit your specific needs and streamline your cleaning and sanitation processes. As a true partner, we work closely to identify your needs and to help protect your reputation and brand with hygiene solutions that drive food safety throughout your operations. With each agreed step undertaken, we ensure that together we get the utmost out of every drop of the precious water you use.

<sup>1</sup> Global water crisis: Facts, FAQs, and how to help | World Vision

# 2 We're all in this together



## Our global responsibility toward water scarcity

The global context of water scarcity is alarming. Around two billion people (26% of the global population) do not have safe drinking water, and 3.6 billion (46%) lack access to safely managed sanitation<sup>2</sup>.

Between two and three billion people experience water shortages for at least one month per year, posing severe risks to livelihoods, notably through food security and access to electricity. The global urban population facing water scarcity is projected to double from 930 million in 2016 to 1.7-2.4 billion people in 2050<sup>3</sup>.

The growing prevalence of extreme and prolonged droughts also stresses ecosystems, with dire consequences for both plant and animal species<sup>4</sup>. It is predicted that if the current trend continues at this disturbing rate, water demand will exceed supply by 40% in 2030<sup>5</sup>.

## Attitudes are shifting

Finding new ways to reduce water consumption is a shared responsibility. Companies across all sectors are responding to this water scarcity crisis by embracing innovative conservation strategies. These include programs to reduce water intake, employ efficient water-saving equipment, reuse and recycle water, and manage wastewater treatment systems.

Water management is not new, and Diversey's AquaCheck program has been pioneering water management in the F&B sector for decades. However, when water availability was not a concern, water reuse may not have been high on the list of investment decisions. With changing times and new technology, the focus has shifted and water is frequently one of the top concerns for all sectors in the F&B industry.

Diversey has ESG targets, including sustainability targets for water consumption, as does every producer in the industry. Water reduction, replenishment, and responsible use are all typically high on the agenda as tolerance toward inefficient water use becomes morally and financially unjustifiable.

<sup>2</sup> UNESCO report on behalf of UN-Water

<sup>3</sup> Imminent risk of a global water crisis, warns the UN World Water Development Report 2023 | UNESCO

<sup>4</sup> Imminent risk of a global water crisis, warns the UN World Water Development Report 2023 | UNESCO

<sup>5</sup> Half the World to Face Severe Water Stress by 2030 unless Water Use is "Decoupled" from Economic Growth, Says International Resource Panel (unep.org)

# 3 An industry with a huge thirst



## The true cost of water in the F&B Industry

The F&B processing industry is one of the most water-intensive sectors. Water is a crucial component that is fundamental to many of the day-to-day operations. Water is used for cleaning; washing and preparing products for processing, as an ingredient in the finished product; and as part of the manufacturing process in cooling, chilling and heating systems.

Every processor and facility is different. Your relationship with water will vary depending on where you are in the world and in what sector of the processing industry you work in. Some with a ready source onsite might still entertain the notion that water is a cheap commodity, but this conveniently ignores that its use has a cost.

It's also necessary to factor in that the water used in typical F&B processes may require treatment to meet required hygienic standards. Taken together, all of these elements contribute to your water footprint and your bottom line. So when looking at the cost of water, you need to understand the total cost of water: extraction, treatment, in-use, and wastewater. Therefore you need a solution that understands and responds to every aspect of a water equation that is becoming more complex by the day.

## The true impact of our water use

Globally, the F&B sector is a major water user, both through direct abstraction and - in countries where a reliable supply exists - from the use of the public water supply. In the UK alone, food and drink manufacture uses around 190 million m<sup>3</sup> of water per year, which represents 56% of total water use by the industry<sup>6</sup>.

Heatwaves, high temperature records, droughts and localized water shortages that often lead to declarations of a state of emergency are producing increasingly familiar headlines in news bulletins across the world. This is driving a knock-on effect in terms of rising water costs and reduced crop yield. A sobering thought, especially when taking into account that food production requires around 25,000 liters to grow and produce a day's supply of food for a family of four<sup>7</sup>.

With the largest companies consuming as much water per year as small countries, the global industry uses around 62 km<sup>3</sup> per year. That almost equates to the total utility water supply for the Middle East and North Africa combined<sup>8</sup>.

<sup>6</sup> Food and drink manufacturing water demand projections to 2050 - GOV.UK ([www.gov.uk](http://www.gov.uk)).

<sup>7</sup> How to Manage Water Usage in the Food & Beverage Industry | SOCOTEC UK

<sup>8</sup> Water for Food & Beverage: Opportunities in water efficiency and gaining value from wastewater ([prnewswire.com](http://prnewswire.com))



# 3 An industry with a huge thirst



## Into an uncertain future

As water scarcity bites - the deeper you have to go to into the well to recover water. Deeper extraction brings new challenges, with contaminants that require different treatment methods, which is prompting the burgeoning growth in solutions available. The F&B sector is a multi-billion dollar global market for water and wastewater treatment technologies. It's a market that is expected to reach \$78.35 billion by 2032, growing at a CAGR of 6.9% during the forecast period of 2023-2030<sup>9</sup>.

As a predictive indicator of the near future alone, this makes it crystal clear how important your choice of supplier is in achieving your goals and protecting your bottom line. You need a supplier/partner who can support both your process hygiene and water treatment requirements. It's essential to manage good hygiene and water quality as a complete system to deliver additional value, increase efficiency, protect assets, meet regulatory requirements, and reduce the environmental footprint of your operations.

Water quality and product quality are inherently linked. However, the water quality you need will inevitably depend on where you use it in your facility. Water within a product, such as a soft drink, obviously needs to be at a high standard for consumer safety. But the water used for cleaning the floors or your fleet of delivery trucks doesn't require the same standard. This is one area where you could focus on using reclaimed water, rather than fresh, to target significant savings.

<sup>9</sup> Water and Wastewater Treatment Market for Food & Beverage Industries 2022-2023 - Global Forecasts to 2032 - ResearchAndMarkets.com | Business Wire



# 4 Wising up to wastewater treatment



## Why a systemic approach is key to successfully maximizing your water

Before initiating a program of water management in your facility, it's important to identify how water is being used and where it is being lost. Effective water management is achieved through a journey. Its benefits are incremental to broader goals rather than being delivered by the 'big bang' of a single project. Using data helps drive better decision-making, while historical analysis, benchmarking, and mass balance are key tools to drive and achieve water improvements.

### *So what should you demand from a process to determine effective and efficient water management?*

Water management begins with understanding where you are today to help define the direction of your water journey. Diversey's AquaCheck takes a systematic approach to define this journey. The first step is AquaScan. AquaScan delivers a high-level overview of your historical water use, effluents, and cost trend analysis. In this first step, we build a baseline, visualize the data allowing us to see patterns, calculate water usage ratios, and ask additional questions about the water usage behaviors (highlighting areas of seasonality).

AquaProbe identifies where you want to go. The mass balance answers the question, "How is the water used in each application, what type of water, and the true cost of water?" With this complete picture, you can determine your priorities and build business cases that lead to water reduction projects. It also enables effective feedback for corporate sustainability reporting and water bill validation. From such a detailed analysis of your water balance, you can identify the largest consumers of water in volume and cost. AquaSolve drives the development of solutions that make the essential water usage improvements your facility needs.

## Your history tells your water story

Historical data helps with understanding past usage patterns. For example, you could be driving energy projects to reduce your utility spend, only to be blindsided by the impact that water has on your total utility breakdown when you consider both wastewater and incoming water costs together.

Knowing where you have been is simply understanding how production variability impacts water usage. By looking at water usage historically, you can see patterns, or you may see spikes of water usage that prompt the necessity for a more detailed inquiry.

# 4 Wising up to wastewater treatment



## The cost of your water mass

A water mass balance begins with following the water through your plant to discover all of the water users, verify when the water goes to drain, and define the water types. A water type provides insight on the cost of water. The benefits of a mass balance help in understanding how and where water is used and its true cost.

Using this insight, your water is then conditioned for its uses; such as ingredient water, Clean-in-Place (CIP), or boiler make up. Water may go through a set of carbon towers, softeners, and reverse osmosis. The reality is, that at each step of conditioning, there is a certain percentage of water that is either captured and a new use is discovered, or more often the water simply goes to the drain.

You need to bear in mind that when the water goes to the drain, the cost to create a conditioned 1 cubic meter of water has increased. Even though you nominally start with 1 cubic meter of water for 1 dollar, by the time the water is ready to be used for CIP, you may have used 1.3 cubic meters. The cost to create 1 cubic meter is now greater than the initial 1 dollar. If the same water requires heat, the cost must be added to the water cost.

Take as an example, the heating of your water to 80° C. This means that the heated, conditioned water you use for the CIP has much greater value than it did before it entered your facility. Defining each type of water based on how it is prepared for each application is called creating the value stream. Simply, as water travels through your facility it gains value. When it leaves your site, the cost of your wastewater should reflect both the cost of the specific value stream, and the cost per cubic meter billed by your water company.

## Revealing unseen opportunities

A mass balance gives a complete picture of water use by application and the value of the water that is being used. Taking this holistic approach to water management makes opportunities visible. Using the information from the mass balance and from understanding your company goals, you can match the focus - such as identifying whether your water use can be improved through low investment options, such as improving CIP rinses.

On most occasions to reuse water requires you make some kind of investment. This requires evidence of a meaningful ROI to justify the action in the first place. By building your business case, you will more likely gain approvals for the water reducing or reusing projects you wish to undertake. Many companies across the processing industry have publicly announced their water use ratio reduction goals. A mass balance also produces the data to highlight sustainability success stories.



# 4 Wising up to wastewater treatment



## Validation that drives action and savings

Validating water bills means that you can typically determine whether a bill is accurate and fair. But it has also revealed cases where meters were misplaced and your incoming water costs involve payment for neighboring operations. It also exposes agreements with the water company that a percentage of the incoming water will be also billed as wastewater, rather than in using a meter to measure this. If you are a beverage company, the percentage should be at an absolute minimum to consider the water in product being shipped off-site, but this is not always the case.

By applying the mass balance or volume of water used throughout your facility with its matching water value can be particularly revealing. Taking the top fifteen water users and overlaying their value, it can become evident where to focus on water quality that doesn't match the requirement for the application involved. For example, it's been identified in some cases that softened water would be sufficient, but reverse osmosis water was being used.

Financial savings can be made, but also a water stream that uses less water conditioning also saves you energy and water. Sometimes this validates that the largest volume is also the largest cost. If you can visually see that your largest water user came for instance from hose drops, this insight will drive recommendations on improving water usage in this area.

## Understanding your water's individual personality

The impact of going through the analysis is dependent on where you start. If you have been working for years on capital projects, then a mass balance can help validate the success and determine the next set of priorities. This supports the contention that each facility is a unique case that requires a highly targeted and tailored approach.

However, regardless of where you start, there are water improvements to be made. Measurement, observation, and experience drive recommendations.

Water usage in connection to your employee's behavior, gives water usage a degree of personality. Perhaps water is left on during a specific shift, or CIPs are rerun, stopped, and started for reasons connected solely to the individual or collective quirks of your employees. The measurement and usage visualization will enable you to establish controls, alerts, and reminders - such as a fixed control that prevents increasing water flow rate, or a change in water nozzles when running hoses. These are low-cost and immediate improvements you can achieve.

# 5 What comes in must go out



## Dealing with the stowaways in your incoming water

Incoming water that comes from a broad range of sources – whether from the mains, a borehole, rivers, the sea, or recycled sources – is inevitably supplied containing various types of impurities and contaminants from mineral, to organic and heavy metal content.

These include dissolved impurities such as carbonates, bicarbonates, chlorides, magnesium, iron and dissolved gasses. Or impurities that are gross and suspended solids, including organic matter such as oil globules, vegetable and animal matter, and inorganic materials such as clay and sand. Adding to this list can be the presence of ammonia nitrate and phosphate, microorganisms such as bacteria, molds, yeast, viruses, protozoa, nematode worms, and disinfectant residues.

Consider... that as water becomes scarcer, your sources may become more marginal and varied over time. This equates to more impurities and potentially higher water treatment costs in the future. Various options are available to treat incoming water and remove the components that can cause problems. For example, an ion exchange process exchanges calcium and magnesium for sodium. The resin gets fully loaded with calcium and magnesium and a regeneration follows. Regeneration is the process of 'cleaning' the resin from calcium and magnesium, while replacing this with sodium through rinsing with a high-concentration salt (brine) solution.

There are a number of key questions involved in realizing any effective water management plan. Taking into account the quality of your water source, to the quality of water required. Do you need an incoming water treatment plan? A mass balance? What potential treatment regime do you need to apply? A removal of gross solids, suspended solids, colloidal solids, mineral removal; or river, sea and water recycling?

If your water source comes from a local river extraction your primary method will combine both physical means and chemical equipment with application of a clarifier, flotation, (sand) filter to achieve the removal of the insoluble material. Your secondary method will involve biological equipment to remove organic (biodegradable) soluble material. While the next stage involves polishing methods, incorporating equipment such as a clarifier, sand filter, active carbon filter, ultrafiltration, reverse osmosis to remove any remaining contaminants.

# 5 What comes in must go out



## The sludge that's difficult to budge

The main goal of wastewater treatment in F&B is in protecting the ecosystem from harmful and toxic elements found in wastewater discharge. Water treatment facilities speed up the natural process of purifying water; these facilities use various processes (e.g., physical, chemical, and biological) to treat the wastewater generated and to remove pollutants and send the purified water back into the environment <sup>10</sup>.

The wastewater from the F&B industry mainly contains high amounts of sugar, flavorings, and coloring additives, which indirectly contributes to the spike of Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) in the discharged effluents.

About 63% of COD cannot be treated using physical processes. Hence, further treatment using chemical and biological processes is required to reduce the pollutants in the discharged effluents. Wastewater treatment technologies used in the F&B industry guarantee safe environmental discharge and reduce wastewater by reusing and recycling, and enabling closed-loop systems.

You will get sludge at each stage of this complex process. All sludge is different, and disposal regulations are getting tighter. While approximately 30-50% of a wastewater plant's operating costs are due to sludge disposal - cost savings can be found. Applying sludge treatment objectives, you can achieve the driest possible cake, a certain minimum percentage of solids to satisfy local landfill requirements, low turbidity filtrate, high throughput (m<sup>3</sup>/h), low cost and no odors – by applying the right expertise. The process includes clarification, thickening, dewatering and incineration.

<sup>10</sup> Water and Wastewater Treatment Market for Food Industry (globenewswire.com)





# 6 A new way of thinking



## The growing need to adopt effective wastewater treatment solutions

Throughout the F&B production journey water hygiene dictates factory hygiene. Recent advances in water treatment have seen the effective development of new treatment technologies to extract every last precious drop from its process value, whilst simultaneously reducing costs to manufacturers and safeguarding our planet's sustainability.

The growth of the water and wastewater treatment market is attributed to the high consumption of water in food processing; the high concentration of organic and inorganic substances in wastewater; stringent purification standards in the F&B industry; and increasing demand for energy recovery technology for biogas production from wastewater.

The rapid increase in demand for wastewater reuse in the F&B industry to improve water efficiency and ensure reliable, clean water sources in process operations is expected to provide significant growth opportunities for suppliers operating in the water and wastewater treatment market going forward.

Water is the most extensively used raw material in the F&B industry. This 'thirst' has a potentially massive impact on the environment and economy as a result of rising water demand and wastewater production. While assumptions that water is an indefinite and limitless renewable resource are very much a thing of the past.



# 6 A new way of thinking



## Brand equity down the drain

F&B manufacturers need to urgently evaluate their water treatment policies and strategies to ensure optimization of water consumption and wastewater reuse, without compromising food safety and customer satisfaction.

Particularly, as consumers become increasingly invested in the moral, ethical, and environmental impacts of their product choices – which means more action and significant transparency are required to demonstrate the manufacturer's commitment to sustainable wastewater treatment. This more ethically attuned and ecologically conscious consumption also means companies can no longer resort to greenwashing to convince consumers of their commitment to sustainability.

"If food and beverage companies don't follow global best practice in water efficiency, or if they don't clean up their wastewater properly, then their brand can be permanently impaired within days." Christopher Gasson, Publisher, Global Water Intelligence <sup>11</sup>.

Keeping up with market demands, legislation, and a growing awareness of water-wise wastewater treatment solutions, does not imply a decrease in operational efficiency targets or, indeed, profit – instead, it signals to the consumer that you are committed to producing F&B products that champion sustainability.

There is an urgent need to move towards wastewater reuse schemes in all sectors; however, improvements are still needed to achieve sustainable water utilization practices and the implementation of cost-effective technologies for wastewater treatment <sup>12</sup>.

<sup>11</sup> Water for Food & Beverage: Opportunities in water efficiency and gaining value from wastewater (prnewswire.com).

<sup>12</sup> Kirby et al., 2003, Water.org, 2021)

# 7 Adapting to the shift in priorities



## What are the challenges facing wastewater treatment plants?

The adoption of new technologies within the F&B industry has been a somewhat slow process due to food safety and hygiene concerns, with the result that growth has been hindered. In addition, the aging and deterioration of existing water infrastructure pose major challenges for the growth of the water and wastewater treatment market.

Due to the fact that water is the most extensively used raw material in the food and beverage industry, this industrial sector has a direct impact on the environment and economy as a result of rising water demand and wastewater production. As a fundamental component of food and beverage production, water has three key roles: facilitator, essential ingredient, and by-product<sup>13</sup>.

Several countries limit the reuse of wastewater because of legal curtailment, and public health and safety concerns. This represents a major challenge for both industries and administrations due to the technical complexity and financial costs involved.

## Public perception - changing consumer minds about re-using treated water

There are significant reputational and financial consequences of putting people, products, or the environment at risk through poorly managed wastewater treatment systems and processes<sup>14</sup>.

F&B companies are more sensitive to consumer concerns about the sustainable use of water and energy than most other industries. This creates a growing pressure to achieve and even surpass environmental goals and charters, with corporate responsibility playing an increasingly critical role in business development. There are practical steps companies can undertake to optimize their procedures and make their processes more efficient, which in turn provides the opportunity to lead the way in water efficiency and sustainability<sup>15</sup>.

When it comes to food industry water management, how many food manufacturing plants are treating process wastewater for reuse onsite? The answer to this is not clear. Nevertheless, the priorities of food manufacturers are to safely maintain their products from contamination, and to protect the reputation and image of their industry in general<sup>16</sup>.

The public perception of what is 'clean' and 'safe' has made food manufacturers wary of reusing treated process water in many cases. As such, food manufacturers most often reuse treated wastewater in locations or situations where it will not come into contact with food.

<sup>13</sup> Wastewater in the food industry: Treatment technologies and reuse potential - ScienceDirect

<sup>14</sup> <https://www.watertechnology.com/print/content/14205649>

<sup>15</sup> Water for Food & Beverage: Opportunities in water efficiency and gaining value from wastewater

<sup>16</sup> Challenges & trends in food industry water management | Water Technology (watertechnology.com)



# 7 Adapting to the shift in priorities



The industry's challenge is to convince the public that treated wastewater can be processed to a quality that is of a higher quality than some municipal drinking water. It's predicted that with the right approach and sufficient transparency and communication regarding treatment processes and quality assurance the public will accept such practices over time, especially in locations where clean water is in short supply<sup>17</sup>.

## A compliant industry?

F&B manufacturing companies are also dealing with increasing pressures from environmental laws and regulations<sup>18</sup>. Across the board there is a need to improve wastewater treatment standards in F&B production. Regulations for wastewater disposal are tightening, putting pressure on reducing the biological load in facility wastewater streams. With polluters liable to face heavy fines, and the reputational risk of public disapproval if local communities are affected<sup>19</sup>.

Both locally and globally, government regulations have become far stricter about treating downstream water that people or animals might consume, which requires producers either to recycle or clean wastewater before it leaves a plant. Upstream water is a concern, too, for process use or cooling.

## Operational Challenges Facing Wastewater Treatment Plants

Operational efficiency is of extreme importance in treatment facilities, and this has spearheaded innovation in the sector. Recently, there have been significant advances in the development of efficient technologies and processes, but challenges still remain.

### 1. Energy Consumption

Energy consumption is one of the biggest expenses in operating a wastewater treatment plant. It's estimated that wastewater treatment consumes 2-3% of a developed nation's electrical power, or approximately 60 tWh (terawatt hours) per year. In municipal wastewater treatment, the largest proportion of energy is used in biological treatment, generally in the range of 50-60% of plant usage<sup>20</sup>.

Advances in biological treatment processes can potentially significantly reduce the energy demand at a treatment plant. Some examples of solutions include: the use of fine screens in primary treatment, membrane technology for the aeration process; and direct treatment of high concentration return streams.

<sup>17</sup> Challenges & trends in food industry water management | Water Technology ([watertechnonline.com](http://watertechnonline.com))

<sup>18</sup> Two Big Trends in Water & Wastewater Treatment for 2022 | TrendMiner - A Software AG Company

<sup>19</sup> Water for Food & Beverage: Opportunities in water efficiency and gaining value from wastewater

<sup>20</sup> 4 Major Operational Challenges Facing Wastewater Treatment Plants ([oxymem.com](http://oxymem.com))

# 7 Adapting to the shift in priorities



## 2. Staff/Manpower Challenges

Operators of water treatment facilities must be adequately trained and certified. They are on call 24 hours a day and are responsible for overseeing everything from leaky pipes and valves to maintenance and troubleshooting of electrical and instrumentation equipment. This work becomes especially demanding during seasonal changes, or from fluctuations in influent.

While there will always be a need for the physical presence of staff to be responsible for overseeing activities at treatment facilities, operator management can account for up to 30% of the operational costs of a wastewater treatment plant. Emerging technologies are utilizing the benefits of automation, reducing the requirement for operator engagement.

## 3. Sludge Production

Sludge is the residue generated during physical, chemical, and biological wastewater treatment. A major environmental challenge for wastewater treatment is the safe disposal of excess sludge produced during the process.

Safe and long-term solutions for the destination of sludge produced by wastewater treatment plants are a vital element of a sustainable functioning facility. The recycling of sludge containing useful organic matter and nutrients in agriculture is considered as the best solution. Some more modern treatment technologies can also reduce the burden of sludge by lowering its production in the first place.

## 4. Footprint

Activated sludge treatment has many challenges - one of the biggest being the footprint it demands. Activated sludge plants are costly to erect and occupy substantial land areas. Primary and secondary processes rely upon vast tracts of land for large and expensive settling tanks and aeration basins. Due to populations constantly increasing, wastewater treatment plants must expand their capabilities too.

Advanced technologies that use smaller process basins by increasing the amount of biomass per unit volume via the addition of media for biofilm attachment - or increasing the biomass concentration - are leading the way in reducing footprint. A smaller footprint means land cost savings, but it also means a significant reduction in CAPEX (less concrete, steel, and equipment).

## Europe tightening regulations on wastewater management

The increasing number of government-mandated regulations for maintaining the quality of drinking water and managing wastewater is another key driver in improving wastewater treatment strategies, processes, and equipment.

In a bid to enforce more stringent regulations to control the reuse of wastewater, governments are clamping down on companies who fall foul of their wastewater treatment requirements, both to ensure public health and safety and to combat irreparable environmental harm.

Wastewater infrastructure is now coming under increased pressure due to population increases and the effects of climate change - such as water shortages. Countries will have to adopt a more ethical and sustainable approach to wastewater treatment as the challenges continue.

In the coming years the wastewater industry will face even stricter controls and regulations, and if countries continue with their inaction in meeting the directive, more penalties are likely to follow and the cost of making the upgrades will rise<sup>21</sup>.

Across the world legally binding environmental regulations, such as the European Water Framework Directive, the US Clean Water Act and the Australian National Water Initiative are in place to protect rivers, lakes, estuaries, coastal waters, and groundwater from pollution. They stipulate treated effluent must meet high quality standards before being released into the environment. F&B companies in breach of water quality requirements risk prosecutions and large fines, and even having their discharge permits revoked<sup>22</sup>.

## New EU regulation on minimum requirements for water reuse

The EU Regulation 2020/741 of the European Parliament and of the Council on minimum requirements for water reuse entered into force on 26 June 2020 and its provision applies in all EU member states from 26 June 2023 onwards<sup>23</sup>.

According to data from the European Environment Agency (EEA) wastewater collection and treatment are improving across Europe. Across the whole EU, about 90% of urban wastewaters are collected and treated in accordance with the EU Waste Water Treatment Directive<sup>24</sup>.

<sup>21</sup> European countries are failing to comply with wastewater legislation (oxymem.com)

<sup>22</sup> <https://www.watertechnonline.com/print/content/14205649>

<sup>23</sup> New EU Regulation on minimum requirements for water reuse | umweltbundesamt.

<sup>24</sup> Waste water treatment improves in Europe but large differences remain - European Environment Agency (europa.eu)



# 8 Ramping up regulatory compliance



## Perspective of the French government

As is the case elsewhere in Europe, in France, used wastewater cannot be discharged without appropriate treatment either via a private wastewater treatment system, or a municipal wastewater plant.

The following laws apply:

1. *Assainissement Non Collectif (ANC)* are privately-owned wastewater treatment plants. This term is used regardless of the size of the treatment plant - the septic tank of a family home or wastewater treatment plant for a large hotel<sup>25</sup>.
2. *Assainissement Collectif* describes all municipal wastewater treatment plants regardless of size.

## Perspective of the German environment agency

From the perspective of the German Environment Agency, the minimum quality requirements and the provisions for risk management are not precise and ambitious enough. The implementation will likely differ widely between and within member states.

As the defined quality requirements are to be complied with when the reclaimed water is delivered from the reclamation facility to the next actor in the chain, any potential deteriorations in water quality during transport and storage remain unaddressed. However, member states may require additional permits for storage, distribution, and use of reclaimed water<sup>26</sup>.

The risk management shall be used to derive further site-specific requirements and measures to ensure that water reuse is safe if remaining risks are identified, or not all legal provisions are complied with. As the regulation only outlines the core elements of the risk management further guidance from the Commission and/or the Member states is needed. The Commission will provide general guidance on the application of the regulation as well as specifications for risk management<sup>27</sup>.

Prior to its application in Germany, some provisions of the EU regulation need to be adapted to the German context and to be integrated in national law, especially with regard to responsibilities and permitting procedures.

In late 2020 the German Working Group on Water Issues of the Federal States and the Federal Government (LAWA) established a dedicated ad hoc working group to develop proposals for the national regulation and implementation of the EU regulation on water reuse.

<sup>25</sup> 24 Le Service Public d'Assainissement Non Collectif (SPANC) - Portail interministériel sur l'assainissement non collectif (developpement-durable.gouv.fr)

<sup>26</sup> Water | Umweltbundesamt

<sup>27</sup> Water | Umweltbundesamt

## Emerging trends in water and wastewater treatment and processes

The sheer diversity of the products, processing steps, and water and wastewater treatment requirements of food and drink companies opens up many exciting ways to access the market.

There are several global trends that are creating huge opportunities for water technology companies: the tightening of wastewater quality regulations, the trend towards environmental efficiency, emerging market growth and water scarcity<sup>28</sup>.

The COVID-19 pandemic has reinvigorated the critical value of resilient, sustainable, and reliable water and wastewater infrastructure, processes, products, and equipment. Governmental institutions and industries around the world have put greater focus upon efforts to adopt sustainable water treatment and wastewater reuse initiatives.

## Treatment of emerging pollutants

The market for water treatment chemicals is expected to grow more than 5% by 2024<sup>29</sup>. Experts believe this increase is due to the rise in groundwater pollution.

The EU and North America (NA) are set to invest in treating emerging pollutants in potable water sources, while wastewater reuse initiatives will be of primary focus in APAC, NA, LATAM, and the Middle East regions. Municipal wastewater reuse initiatives for groundwater recharge efforts will be one of the most significant steps to combat water scarcity in these regions.

Zero liquid discharge (ZLD) refers to a treatment process in which the plant discharges no liquid effluent into surface waters, in effect eliminating the environmental pollution associated with treatment. Apart from this benefit, a ZLD process also makes effective use of wastewater treatment, through recycling, and reuse, thereby contributing to water conservation through reduced intake of fresh water<sup>30</sup>.

## Ongoing integration of Artificial Intelligence (AI) and IoT-Based Treatment System Monitoring Solutions

Smart technology in the form of Internet of Things (IoT) solutions have become a vital tool in assisting end users to achieve greater efficiencies.

Engineers and operators used to be essential onsite. Then, the COVID-19 pandemic shifted the world's workforce to off-site or hybrid work. While essential employees remained, the loss of employees in a plant has led to more digitalization efforts.

<sup>28</sup> Water for Food & Beverage: Opportunities in water efficiency and gaining value from wastewater

<sup>29</sup> How does water treatment in the food and beverage industry work? ([newfoodmagazine.com](https://newfoodmagazine.com))

<sup>30</sup> Zero Liquid Discharge - an overview | ScienceDirect Topics

# 9 Looking ahead



Using analytics, automation, IoT, and self-analyzation trends can help control water and wastewater issues. Utilities and industries have significantly enhanced their investments in utilizing smart sensors for real-time monitoring of assets. In addition, advanced AI-based data analytics platforms are becoming more capable to optimize treatment systems in real time.

Engineers and operators can make better decisions about sustaining water and reducing energy costs by adopting a more digital-friendly plant. From approaches that help save energy to others that keep the flow of water steady, digital transformation may be water sustainability's best friend<sup>31</sup>.

## Continued move toward decentralized modular treatment technologies and process optimization

A particular trending focus has been on decentralized modular wastewater treatment technologies that enable water reuse onsite, in a circular loop to enhance wastewater sustainability. Three primary points are driving this transition.

1. Mounting water costs
2. To reduce the strain on aging centralized infrastructures
3. Reducing capital, operating and power costs while supporting greater treatment efficiency

For these reasons, the acceptance of onsite water reuse strategies is becoming more and more valuable for commercial use. This trend is anticipated to grow as industries expand and communities increase in population size<sup>32</sup>.

## Evaluating water risk as part of an organization's risk management practices

Water is as much a business concern as a sustainability risk. As the impact of the global water crisis is felt in regions across the globe, water considerations and strategies need to be integrated into an organization's risk management and mitigation process across its operations as well as its supply chain.

With pressure from stakeholders, investors and consumers growing and risks becoming more apparent, this trend will likely see more organizations include water in their risk management processes. Risk mitigation strategies and goals in the areas of water conservation, water reuse, desalination, and other niche techniques will be evaluated and implemented<sup>33</sup>.

<sup>31</sup> Global Trends in 2022 for Water & Wastewater Treatment Sustainability - Genesis Water Technologies

<sup>32</sup> Global Trends in 2022 for Water & Wastewater Treatment Sustainability - Genesis Water Technologies

<sup>33</sup> Global Trends in 2022 for Water & Wastewater Treatment Sustainability - Genesis Water Technologies



# 10 Getting ahead of the curve



## Diversey's distinctive wastewater total solution

Keeping up with market demands, legislation, and a growing awareness of water-wise wastewater treatment solutions does not imply a decrease in operational efficiency targets or, indeed, profit - instead, it signals to the consumer that you are committed to producing F&B products that champion sustainability.

There is an urgent need to move towards wastewater reuse schemes in all sectors; however, improvements are still needed to achieve sustainable water utilization practices and the implementation of cost-effective technologies for wastewater treatment <sup>34</sup>.

## How does Diversey address key wastewater issues?

F&B production operations utilize water which results in contamination with impurities. Wastewater treatment via various physical or chemical technologies is required to maximize facility water reuse, minimize environmental impact, and ensure discharge limit compliance. Contaminants can render wastewater unfit for reuse, increasing facility water demands and costs.

Discharge pollutants such as phosphorus and nitrogen can act as a food source for selective aquatic organisms such as algae, excess growth results in oxygen depletion, which also is potentially caused by the presence of organic substances. Extreme pH values, particulate matter and many metals in waste streams are also toxic to aquatic life and can create significant ecological damage.

Failure to comply with discharge limits may also result in significant fines. Wastewater has a direct impact on sustainability, discharge compliance and total cost of ownership.

Diversey address the key wastewater issues related to dissolved and suspended solids, pH, metals, organic substances, chemical and biological oxygen demand, phosphorus and nitrogen-containing compounds. Our solutions maximize facility water reuse to reduce water consumption and disposal requirements, remove pollutants to minimize environmental impact and ensure wastewater discharge compliance.

Using water as a medium for heat transference or other processes is typical in F&B. It's a given that the water must be treated otherwise the whole system will come to a halt very rapidly. Water treatment is a key element of prevention and in minimizing the risks involved.

## Your trusted water treatment partner

You might be beginning to investigate a shift in the emphasis of your approach to water treatment. Or maybe you have recognized that the transition to a future of production in the shadow of water scarcity is happening and is already affecting your business? Perhaps you're a manufacturer already engaged in rigorously implementing a global water strategy, but need to be assured that your current commitments represent your best opportunity as water becomes an even more precious resource?

<sup>34</sup> Kirby et al., 2003, *Water.org*, 2021)

# 10 Getting ahead of the curve



No matter what stage of the water treatment journey you are on, there's a solution to meet your specific goals.

## Delivering expertise across the board

Everyone in the sector will recognize common problems that have to be addressed across the board, regardless of the process or applications involved. However, each has a unique challenge that largely depends on context, which only reiterates the value of accessing expertise and knowhow on all aspects of production. This, and long-term experience of the problems specific to each piece of equipment involved, are essential components/requirements in the process of choosing your ideal water treatment partner.

### We are committed to:

#### Safeguarding quality and safety

Product quality and process safety are critical for the consumer and production personnel. Water quality standards are met through effective service programs and treatment technologies.

#### Supporting a sustainable future

Water scarcity, global warming and process waste must be addressed for our planet. Solutions that reduce water and energy consumption, carbon footprint and environmental impact in food and beverage facilities support a sustainable future.

#### Reducing the total cost of ownership

Resource utilization and productivity are key components of process cost management. Effective maintenance for process reliability, protecting asset investments and maximizing operational efficiency deliver reduced total cost of ownership.

### How Diversey can help you get the most out of your water treatment program:

- Create a tailored plan for incoming water treatment
- Gain a mass balance understanding of where you are using water - and uncover opportunities to save water
- Assist you in focusing on efficient sludge treatment which will deliver some quick wins
- Provide innovative solutions for reclaiming and reusing heavily soiled water destined for the drain

# Conclusion



F&B companies are now at a crossroads. Either they can comply with new guidelines and regulations and be seen as part of the solution, or from any non-compliance, greenwashing, or evident disregard for the long-term health and welfare of the planet, they will be quickly identified as part of the problem.

There is an urgent need to move towards wastewater reuse schemes in all sectors; however, improvements are still needed to achieve sustainable water utilization practices and the implementation of cost-effective technologies for wastewater treatment .

With recent quality concerns, it's more important than ever for manufacturers to treat water and ensure it is safe for consumption. Water treatment methods remove contaminants and particles to provide a high-quality end-product. Processors can also adopt water reuse and recycling techniques to reduce their water footprint and combat freshwater scarcity.

Diversey can support you with your water treatment program and in achieving your sustainability ambitions. Our approach is to manage hygiene and water quality as a complete system to deliver additional value, increase efficiency, protect assets, meet regulatory requirements, and reduce the environmental footprint of your operations. Using our tailored balance of knowledge, expertise, advanced chemistry, and equipment technology our total solution reflects and responds to the changing needs of the F&B industry.

You can be confident that our four key tenets of water treatment - operational excellence - safeguarding quality and safety, supporting a sustainable future, and reducing TCO - are designed to satisfy your immediate requirements, and yet are sufficiently flexible and agile to meet the eventualities of the uncertain future that we all face.

**For more information on Diversey's total water treatment solution, please visit:  
<https://diversey.com/en/solutions/food-and-beverage-production/water-treatment>**



Taking care of  
what's precious™

Diversey's purpose is to go beyond clean to take care of what's precious through leading hygiene, infection prevention, and cleaning solutions. We develop and deliver innovative products, services, and technologies that save lives and protect our environment. For over a century, the Diversey brand has become synonymous with product quality, service, and innovation.

Our fully-integrated suite of solutions combines patented chemicals, dosing and dispensing equipment, cleaning machines, services, and digital analysis. We are a trusted partner; serving more than 85,000 customers in over 100 countries with a network of almost 9000 employees globally.

**For more information, visit [www.diversey.com](http://www.diversey.com) or follow us on social media.**

