GF Piping Systems

Improving water quality for life

Sustainable process automation solutions

Challenges in the water industry

The water treatment industry is experiencing several challenges, such as population growth in urban centers, increasingly stringent environmental regulations, sustainable energy supply, climate change, and aging infrastructure. Drinking water is becoming scarcer, and industrial companies are producing more polluted wastewater, creating challenges for water technology in many different industries.

Industrial production processes release large quantities of wastewater that the companies cannot discharge easily; the water needs first to be treated. Therefore, reusing, reclaiming, and recycling water costs money. Improving wastewater treatment and making the most of all water sources is the key to solving this issue.

Another big challenge for the water industry is energy consumption. Energy prices are rising worldwide, and there is a growing call for low-energy production. Wastewater treatment is estimated to consume 1 - 3%[2] of a country's total electric energy output. The largest proportion of energy used in municipal wastewater treatment is in biological treatment, generally 50 - 60% of plant usage[2]. High-efficiency technologies could reduce electricity-related greenhouse gas emissions from the global wastewater sector by up to 50%.[3] The use of low-energy membrane technology for the aeration process and direct treatment of high concentration return streams is also an option.

In addition to regulatory and environmental considerations, reducing operating costs remains a top concern for wastewater managers. Energy consumption occurs at every stage, from the primary treatment to the digestion of sludge products, and energy costs often represent the largest portion of operating expenditures in a wastewater treatment plant. With world energy consumption expected to increase by 28% between 2015 and 2040[3], demand for high-efficiency, intelligent wastewater technologies grows. Additionally, the shift in focus from the energy efficiency of single components or products to optimizing efficiency throughout an entire system with the correct combination of technologies results in reduced carbon emissions and lower lifecycle costs.

[1] **Progress on household drinking water, sanitation and hygiene 2000-2017. Special focus on inequalities. New York: United Nations Children's Fund (UNICEF) and World Health Organization, 2019.**

[2] **Malcolm et al., 2011; Taylor, 2005; USEPA, 2006**

[3] **U.S. Energy Information Administration, International Energy Outlook 2021; eia Independend Statistics & Analysis; www.eia.gov**

785 million people globally

Worldwide, 785 million people lack access to clean water.[1] Focusing on innovative technologies can help us use water more responsibly, decrease consumption, invest in processes such as desalination, and avoid contamination and the deterioration of the resource.

Answering the world's water challenges

Rising demand for water

By 2030, water demand will exceed supply by 40 percent.[4] GF Piping Systems can help counteract these challenges by reducing non-revenue water and shortening cycle loops.

40% increase

Increased strain on systems

Wastewater reuse will triple by 2030 (reaching 9.8% of the world's needs), and desalination will double (2.3%).[5] To withstand this load increase we enable these processes with the sturdiest equipment and the best design advice.

Industrial burden

By 2030, the industrial sector will withdraw 1'500 Bn m3/year of water. We help close the loop, limit the impact and increase water safety and industrial sustainability.[6]

Growing rehabilitation costs

As water is a dwindling resource, the world will need to spend $1'785 billion for water system rehabilitation by 2030.[7]

$1'785 billion by 2030

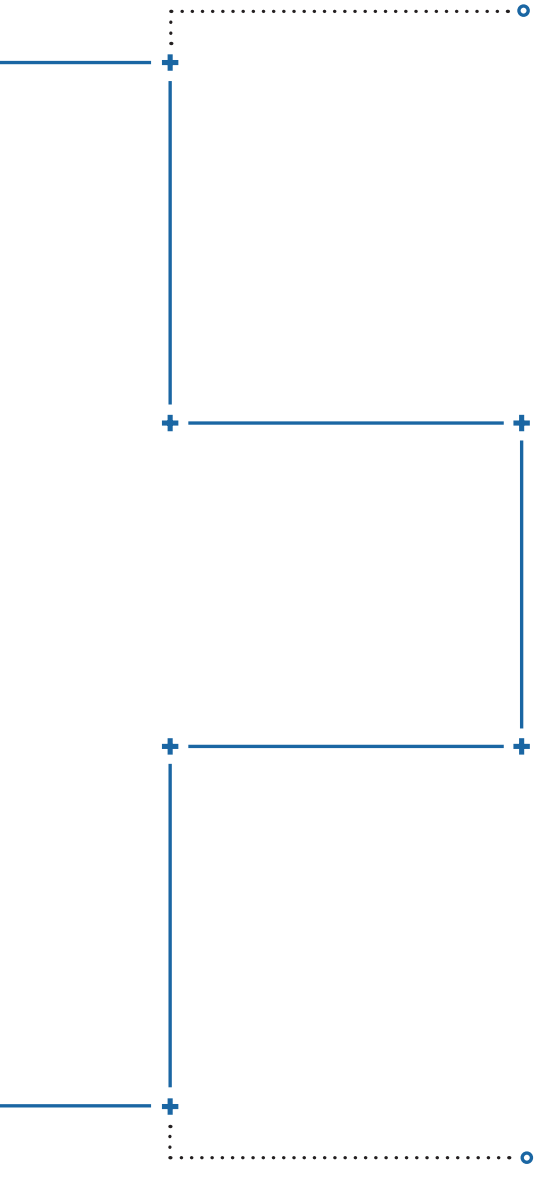
[4] UNEP IRP - Policy Options for Decoupling Economic Growth from Water Use and Water Pollution. Urama, Kevin & Bjornsen, Peter & Riegels, Niels & Vairavamoorthy, Kalanithy & Herrick, Jeffrey & Kauppi, Lea & Mcneely, Jeffrey & McGlade, Jacqueline & Eboh, Eric & Smith, Michael. (2016).

[5] Global Water Funding: Innovation and efficiency as enablers for safe, secure and affordable supplies. Lloyd Owen, David. (2020).

[6] Charting our water future: economic frameworks to inform decision-making, 2030 Water Resources Group (2009). International Water Management Institute.

[7] Global Water Intelligence (2018) Financing Water to 2030. Media Analytics Limited, Oxford, UK.

[8] United Nations Department of Economic and Social Affairs (UN DESA), 2018 Revision of World Urbanization Prospects.



Distributed water treatment network construction

With 68% of the world's population living in cities by 2050, building decentralizing treatment facilities inclusive of intensified processes to support the expanding urban population will be 2.7x cheaper to construct than rebuilding the same infrastructure, just larger. GF enables full-remote operation with its digitally-enabled process automation solutions.[8]

Inhibited GDP growth

Poor water quality inhibits growth: GDP growth was reduced by 1.51% to 2.33% in areas where water courses are heavily polluted. We measure, control and automate the water and systems that will help remedy this.[9]

Carbon emissions

0% - the Water Industry shall become carbon free at latest by 2050. Today, it's 10% of the world's emissions! GF are committed to reducing the CO_2 emissions by 21% by 2025 within our production processes and facilities, and ensuring 70% of product sales deliver social or environmental benefits.

Lost productivity due to water inequality

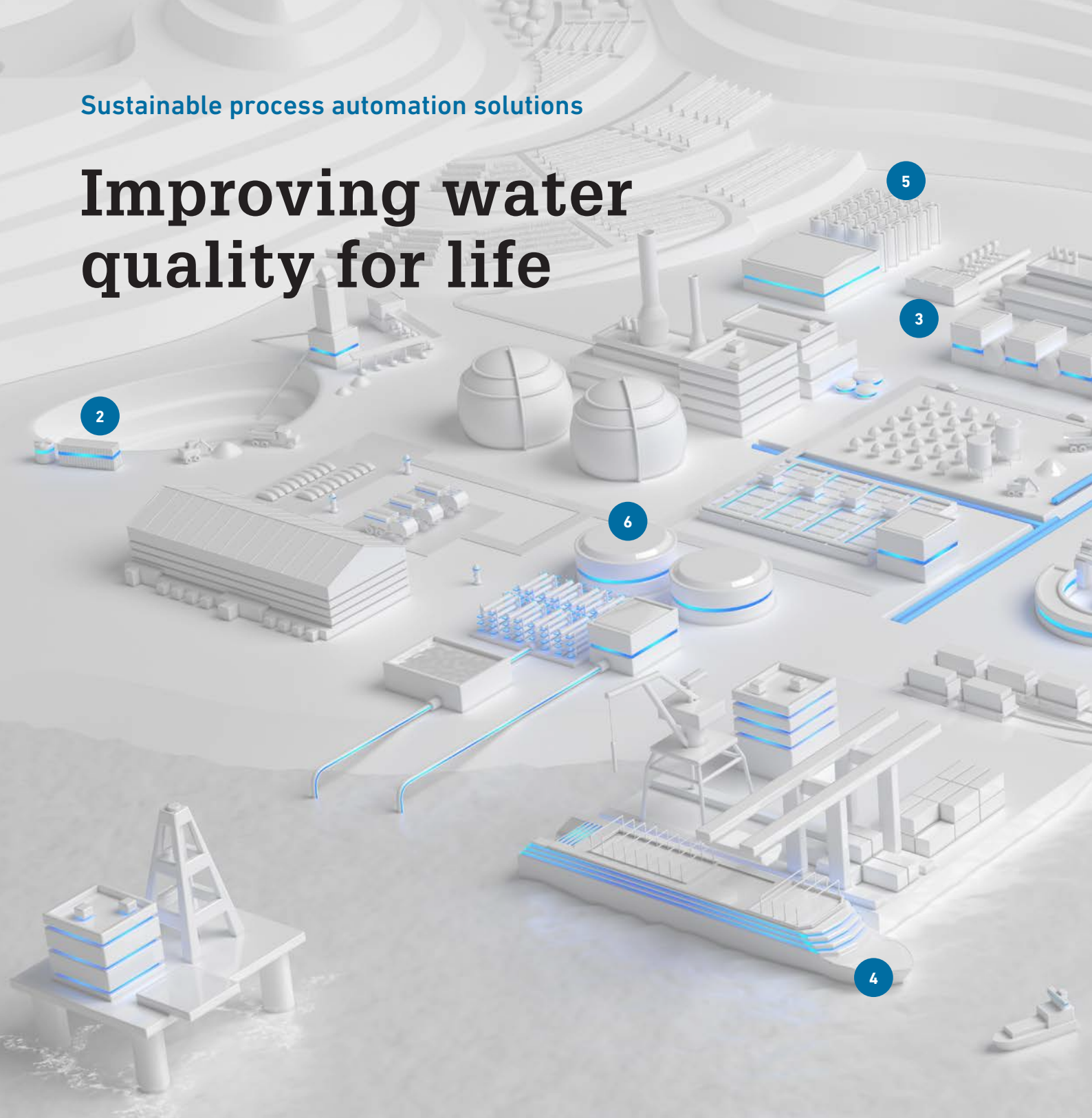
9.1% of all DALYs (disability-adjusted life years) and 6.3% of all deaths worldwide stem from inadequate water, sanitation and hygiene conditions. This represents $46.1 billion of lost productivity every year – making "water for all" a net-economic profit. We aim to be a link in that chain.[10]

[9] **The World Bank Group Action Plan on Climate Change Adaptation and Resilience. Washington, DC: World Bank, 2019. Richard Damania et al.**

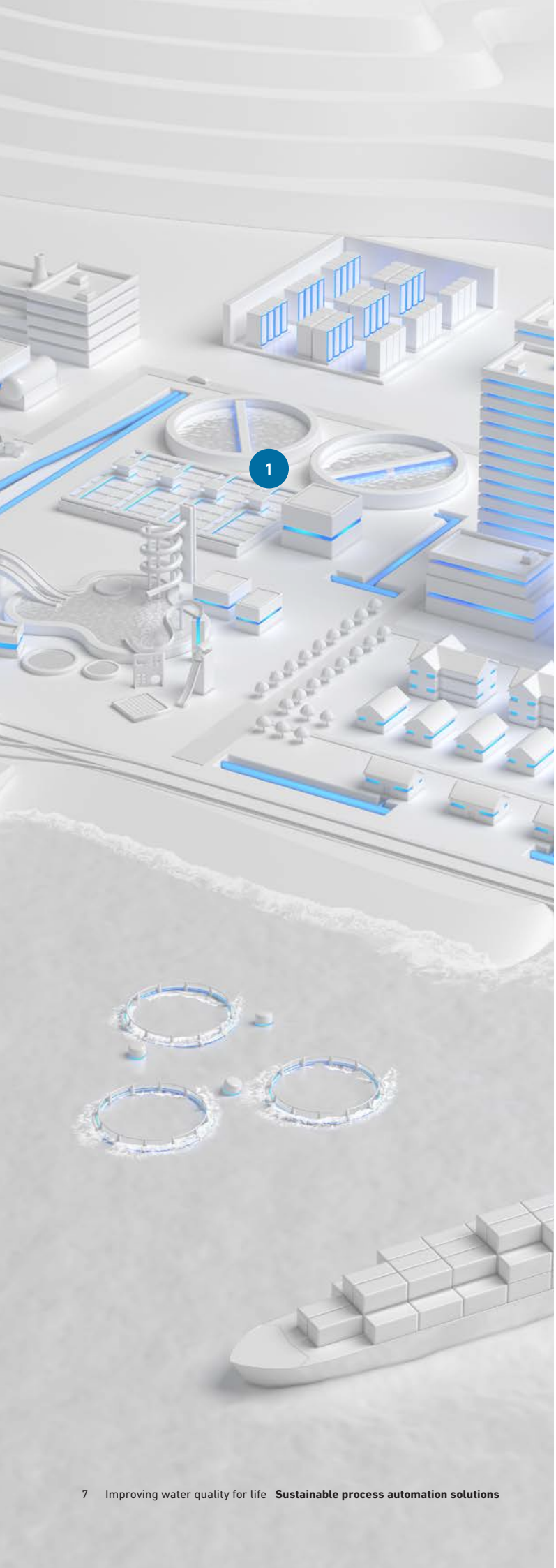
[10] **Water, Sanitation and Health Team. (2003). Domestic water quantity, service level and health. Guy Howard and Jamie Bartram. World Health Organization.**

Sustainable process automation solutions

Improving water quality for life



At GF Piping Systems, we offer deep application knowledge of the entire water treatment process. Including guaranteeing high water quality and system availability, providing reliable measurements, fulfilling stringent regulations, and helping customers build the first time right.



1. Water treatment plants

Water is increasingly treated closer to where it is used, so operators may sometimes be situated quite far from their assets. Digitalization enables us to bridge the gap. It also allows process optimization, energy improvement, and total cost expenditure reduction.

2. Water networks

Prefabrication and IoT ready products – integrated approach between plant and network to have a system overview. Decentralized membrane filtration systems have the potential to supply safe drinking water in low-income countries.

3. Production plants

Reduction of leakage with corrosion-free plastic systems results in the highest level of safety and reliability, optimal control of production processes, reduced operating costs, and less downtime.

4. Marine sector

Space and weight are a big challenge for the Marine sector. With plastic piping onboard instead of metal piping, they make the vessel lighter, lower fuel consumption, and impact the environment less.

5. Chemical process industry

Chemical plants require the highest level of safety, but are also challenged with highly polluted wastewater. This is why plant operators appreciate a combination of both a safe and easy system integration for more efficiency in the work process with minimal manual intervention, faster set-up times, and easy diagnosis.

6. Desalination plants

The salt-water treatment environment is highly corrosive, wearing plant assets down rapidly and demanding constant pH level monitoring. Furthermore, waste and brine disposal is a challenge the industry requires support with.

Wastewater reuse and water infrastructure

Populations are increasing, especially in cities. Urbanization concentrates water use, which increases the burden on water infrastructure and health and environmental impacts of water pollution.

68% of the world's population will be living in cities in 2050[11]: centralized networks aren't designed for those loads, and enlarging them one-to-one might be the most costly option. With the existing climate change scenario, almost half the world's population will be living in areas of high water stress by 2030[12], while nearly 80% of the world's wastewater will be discharged untreated.[13]

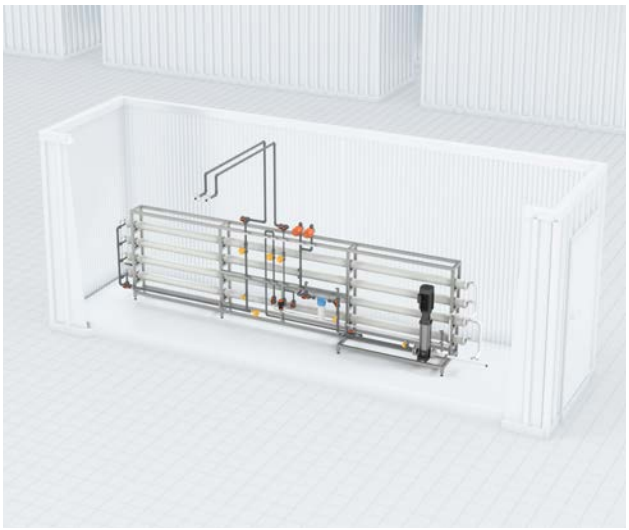
Safe, clean drinking water systems and adequate sanitation that effectively disposes of human waste will be essential for sustainable cities and will be key to meeting the environmental challenges of the future. That is where distributed treatments, micro-utilities, and decentralized solutions come into play. These solutions are being used in the new neighborhoods of cities, industry, and in remote locations globally.

A decentralized water and wastewater treatment strategy can provide the efficiency and flexibility needed to deal with water challenges around the globe. It's a smart alternative for communities considering new systems or modifying, replacing, or expanding existing wastewater treatment systems. Prefabricated systems fit in tiny spaces, work off-the-shelf, and offer a scale-effect as a standard component of water treatments of the future.

Decentralized water treatment systems need automation to turn them into distributed systems. Operators can centrally operate them and leverage all the new horizons of IoT and Industry 4.0. Connectivity is key; thanks to digital solutions, we can gain valuable insights to set up the water treatment systems more efficiently for mechanical parts and valves, sensors, transmitters, controllers, and actuators. Offsite fabrication and engineering deliver systems that directly integrate into any plant design.

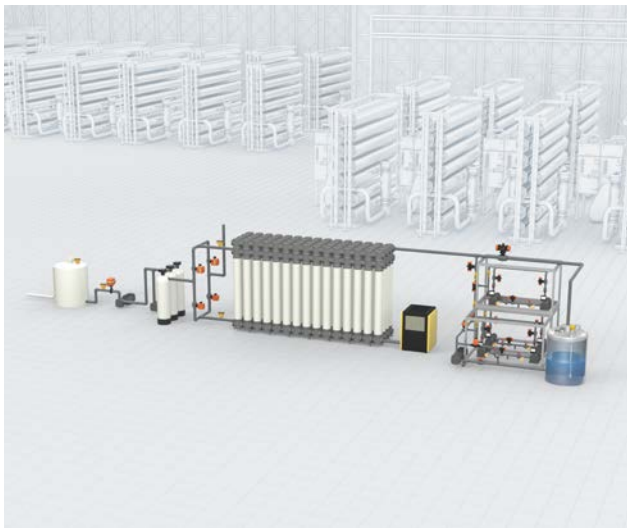
Almost half the world's population will be living in areas of high water stress by 2030.[12]

Main applications



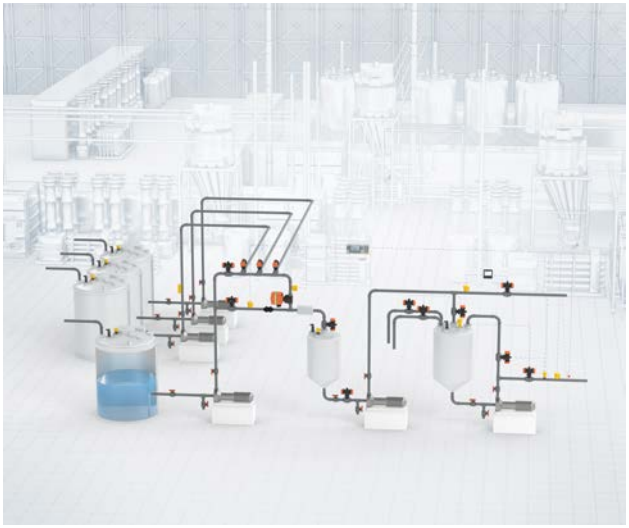
Reverse Osmosis

Reverse Osmosis enables to produce drinking and process water from any raw water quality (e.g., brackish or saltwater). Decentralized membrane filtration systems have the potential to supply safe drinking water in low-income countries. GF Piping Systems offer a maximum of security and profitability for efficient processes, for instance by eliminating maintenance costs caused by rust and deposits.



Ultra Filtration

Remove bacteria (e-coli, cryptosporidium), reduce turbidity and purify water. It is also a convenient replacement for sand filters in a tiny space.



Chemical dosing/dilution

Dosing and/or diluting chemicals requires highly specialized and reliable workflows, especially with aggressive chemicals. With a selective combination of pressure control valves, flow meters, and control instrumentation, double containment system for safe transport of harsh chemicals.

[11] **WWAP (United Nations World Water Assessment Programme)/UN-Water. 2018. The United Nations World Water Development Report 2018: Nature-Based Solutions for Water. Paris, UNESCO**

[12] **International Decade for Action 'Water for life'; www.un.org/waterforlifedecade/scarcity.shtml**

[13] **2017 UN World Water Development Report, Wastewater: The Untapped Resource www.unesco.org/new/en/natural-sciences/environment/water/wwap/wwdr/2017-wastewater-the-untapped-resource/**

Energy consumption and drinking water

Ensuring drinking water supply worldwide is one of the key challenges today and one of the most important and fastest-growing industry sectors. Water intake, production, purification, and distribution systems must adapt to diverse regional conditions. Despite the differences, consistently high water quality is required throughout the whole process, demanding the system solution. Wherever groundwater is difficult or even impossible to reach, other ways must be found to make water available to the population in the right quantity and quality. With the high-quality system solutions of GF Piping Systems - offering pipes, valves, actuators, measurement, and control instruments all from one source - the optimal compatibility of all components is warranted.

Analysis of data collected by smart sensors is a key requirement. Knowing the needs and the treatment potential anytime has a significant potential for operating cost improvement. Digital is a way to provide better and improved process expertise to the plant owners and operators.

Our complete range of valves, actuators, measurement and control devices, and world-renowned piping systems is paired with application know-how. So you can futureproof your entire piping system with intelligent integration and gain insight and efficiencies effortlessly across the whole installation.

GF Piping Systems makes things better with plastic piping systems thanks to less corrosion, using lightweight material, and making them easy to install.

How can we help lower operational and overall costs with our process automation solutions?

We guarantee high water quality with our deep application knowledge of the entire water treatment and chemical processes. We use state-of-the-art technology and easy system integration for a more efficient work process with minimal manual intervention, faster set-up times, and easy diagnosis. Our Process Automation solutions make connecting, monitoring, and managing your field devices easy.

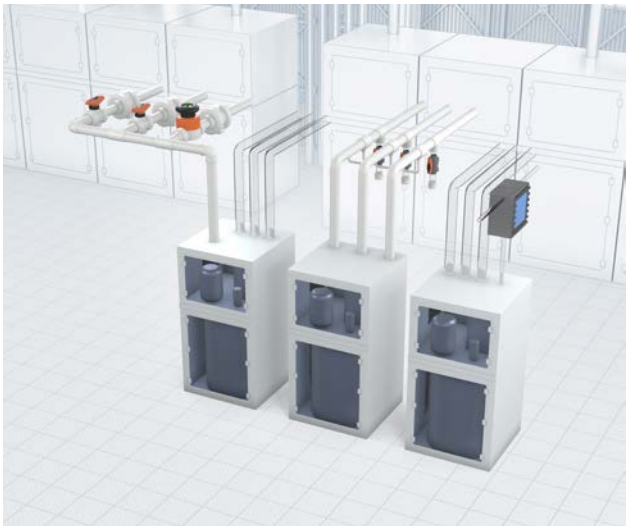
Main applications

Media filtration

Membrane technology is a future-oriented technology and includes diverse filtration techniques that are all based on different degrees of membrane porosity. This technology is increasingly being implemented to harvest drinking water and process water from surface water and seawater. Due to the need of several flow processes (activated carbon, back wash, rinsing), filters are made of numerous valves and bypass actuators, combined with adapted measurement and control technology.

Storage tank

In every manufacturing and processing plant, a tank is required to store liquid media. GF Piping Systems offers fast, reliable, and safe tools for filling and emptying tanks. Our product range comprises of a large spectrum of piping systems including measurement, control, and actuation technology, automatic and manual valves as well as an extensive array of valves for demanding applications.



Chemical distribution

Transporting chemicals in the highest quality, different concentrations and exact dosing is mandatory. Choosing the appropriate piping system including automation offers many advantages such as increased productivity, decreased production and maintenance costs and improved product quality.

Industrial wastewater treatment

Water supply is one of the first, most obvious challenges of urbanization; the second is maintaining water quality. Power plants, petrochemical complexes, steel mills, processing facilities, and many other water-intensive industries are increasingly forced by authorities to clean their wastewater before disposal into rivers and lakes and pre-treat their effluents before disposing them to municipal sewers. In many industries, wastewater treatment plants are small chemical plants themselves.

Corrosion resistance and staff safety are the top priority issues for waste-containing piping systems. The maintenance team has to shut down the entire plant to locate, identify, and solve the issue in case of any disruption. Improving water and wastewater infrastructure maintenance and preventive maintenance, including the reliability of monitoring and control systems, plays a central role in addressing these challenges.

How does process automation improve water quality?
Providing a stable and reliable water supply will require easy system integration for more efficiency in the work process with minimal manual intervention, faster set-up times, and easy diagnosis.

When it comes to water use, industries increasingly have to lower their impact and to close their water loop. Industry 4.0 and, in particular, the IoT present new improvement opportunities in asset management such as real-time remote monitoring, intelligent water metering, or preventative maintenance driven by alarming. Process automation makes it easy to collect data, see a system's health, and constantly improve and optimize processes. It is the key to reducing water treatment plants' costs and enabling the next generation of plant automation (process modeling, digital twins, and AI). Smart end-to-end water networks offer the opportunity to improve productivity and efficiency while enhancing customer service.

Smart water solutions improve the efficiency and reliability of the water infrastructure by better collecting and analyzing data. Monitoring a combination of pH, chlorine, reduction potential (ORP), temperature, and conductivity is the first step in achieving the optimum process conditions.

Main applications

Neutralization

Local water authorities require the neutralization of industrial wastewater discharge to protect the ecological systems in the surrounding lakes, rivers, and oceans or protect the local sewer networks and treatment plants. It is more efficient to perform the neutralization process in tanks rather than making the adjustments in a flowing piping system. The neutralization process can be complex and is different for each industrial location. Operators must meet environmental health and safety requirements to prevent fines and penalties. Reporting effluent discharge is important to the process.

Mixing batching

In processes where various chemicals are mixed, batching is a cost-effective way of doing this. Each chemical line has an actuated valve and flow meter wired to a controller. The controller controls the opening times of each line hence a recipe of chemicals is accurately mixed. If the mix is passed into a tank, a level sensor is used to measure the amount of liquid. After this, the tank isolation valve is opened, and mixed liquids can be sent to the next process step.

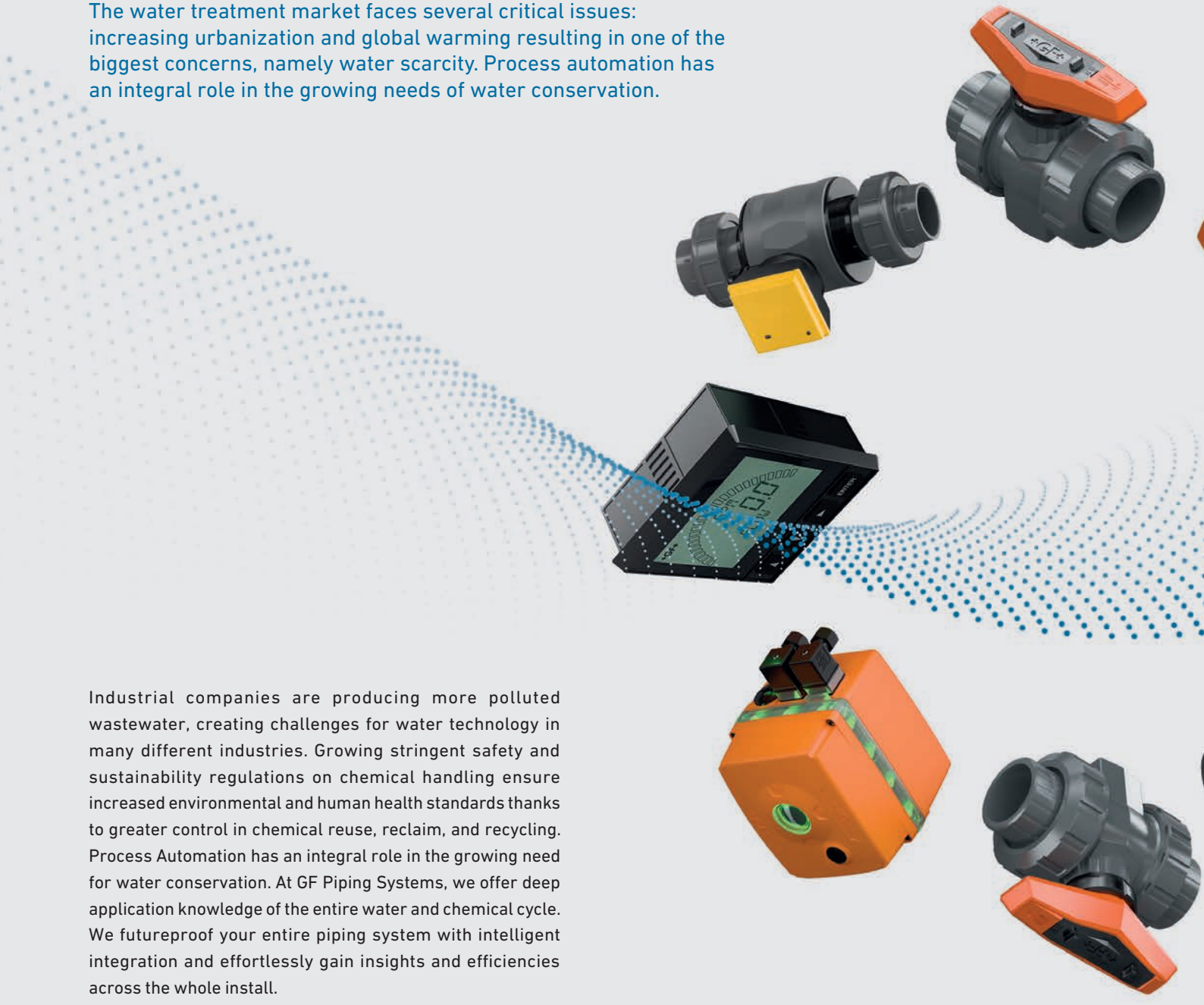
Filling of tanks

In manufacturing and processing plants, tanks are required to store liquid media. GF Piping Systems offers fast, reliable, and safe tools for filling and emptying tanks. Our range comprises a large spectrum of piping systems, including measurement and control technology, automatic and manual valves as well as an extensive array of valves for demanding applications.

Together as one

We make Process Automation easy

The water treatment market faces several critical issues: increasing urbanization and global warming resulting in one of the biggest concerns, namely water scarcity. Process automation has an integral role in the growing needs of water conservation.



Industrial companies are producing more polluted wastewater, creating challenges for water technology in many different industries. Growing stringent safety and sustainability regulations on chemical handling ensure increased environmental and human health standards thanks to greater control in chemical reuse, reclaim, and recycling. Process Automation has an integral role in the growing need for water conservation. At GF Piping Systems, we offer deep application knowledge of the entire water and chemical cycle. We futureproof your entire piping system with intelligent integration and effortlessly gain insights and efficiencies across the whole install.

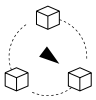
- Non-corrosive solutions
- Higher efficiency around the water cycle with increased productivity
- Lower operational and overall costs

One user experience throughout the whole control loop

GF Piping Systems is your experienced partner with a full portfolio of measurement, control, and actuation components, which are easy to install and use and have local support through all project phases. We offer the full package with our products and solutions, providing top-quality installation, a highly skilled team of experts standing by our customers' side every step of the way worldwide, and digitalized services ensuring a project is at the forefront of the market.

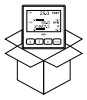
Design (Planning phase)

Easy planning thanks to application-specific solutions making an effortless combination around the complete control loop.



Select (Ordering phase)

Easy to select and order via configurators and matching components throughout the whole portfolio.



Install (Building phase)

Easy planning thanks to application-specific solutions making an effortless combination around the complete control loop.

Own (Operation phase)

Easy monitoring once installed, including spare part availability. Long lifetime and low maintenance make for low downtimes.

www.gfps.com/processautomation

One community, one purpose

How we’re already helping to improve water quality

Ekopak – Belgium

Ekopak uses the process automation offering from GF Piping Systems to outfit its containers sold as "water as a service" to provide sustainable water to customers. There is a high fluctuation of quality at the inlet of the system, meaning Ekopak needs to constantly monitor water quality at both the inlet and outlet of the system, as well as in between to regulate the process. The Belgian company considers monitoring and process automation as the key to operating and delivering consistent quality to customers. GF Piping Systems solves the issues of Ekopak throughout their entire process, working closely with a sustainably minded company for a more sustainable future.

Pure Life Carbon – Canada

The innovative green agricultural tech company Pure Life Carbon is blazing new trails in the food production industry and needed a partner with reliable, sustainable solutions. The Canadian company provides a carbon negative alternative grow media to peat moss for growing crops and with GF Piping Systems found a process automation solution that ensures their production runs smoothly while staying low maintenance. They use GF's technology extensively in their treatment tanks, measuring flow, temperature, pH levels and pressure. Pure Life Carbon prefer to use GF components as their operating environment is primarily water with a proprietary chemistry added to it. The durability of the GF products and their sustainability and resistance to breakdown are key to longevity and the partnership.

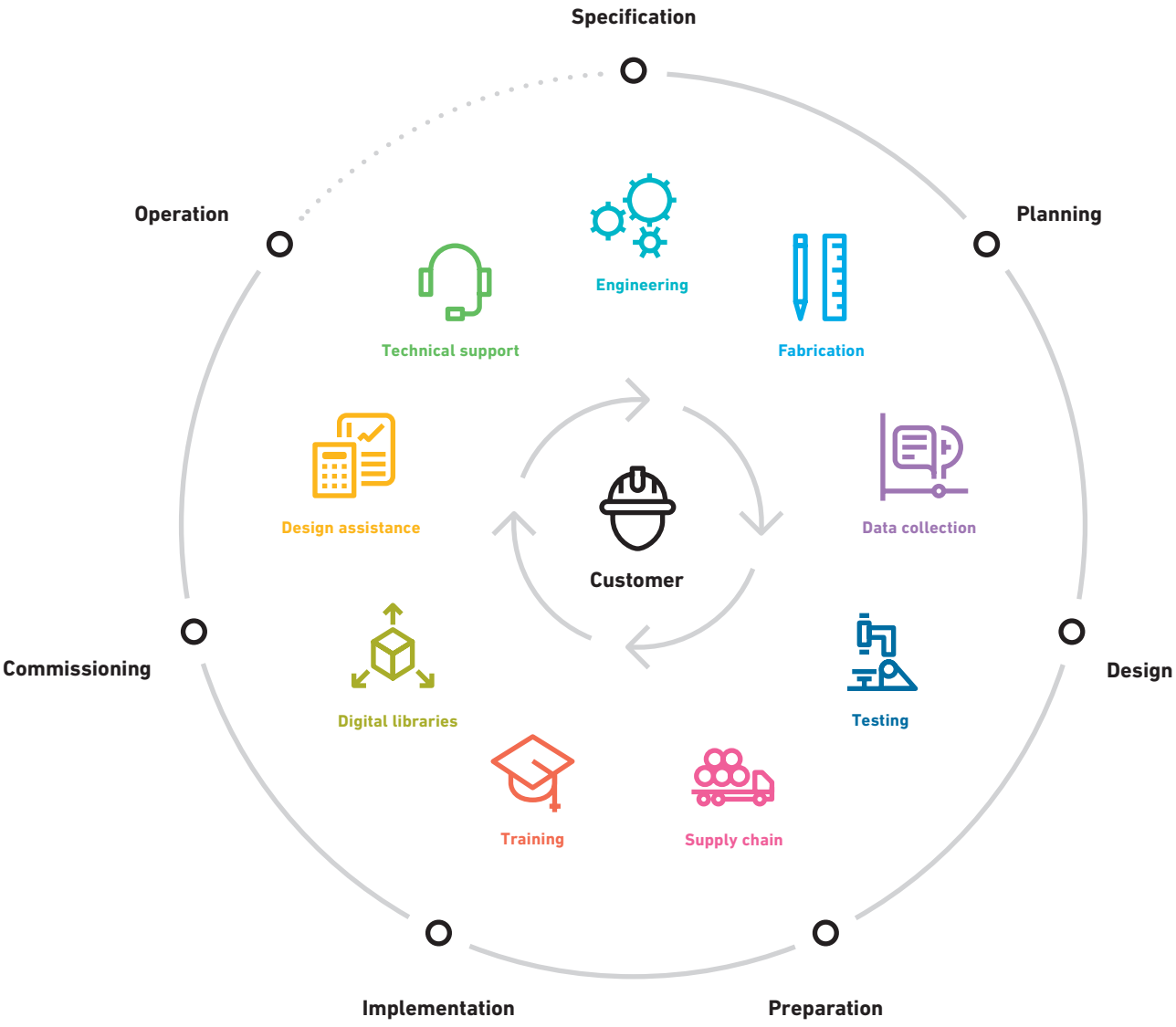
Rochem – India

When delivering containerized water treatment solutions, Rochem Separation Systems has been relying on GF Piping Systems for over 20 years. The Indian navy is one of the primary end customers of the desalination, wastewater treatment and zero liquid discharge solution provider. With systems that need to run a capacity between two and 200 tons per day, the company faces a variety of challenges. Rochem values in particular that GF Piping Systems has stood by their side and supported by providing solutions to all types of problems, be it with various types of instrumentation or engineering expertise to be a one-stop shop process automation systems provider.

Water Innovations – USA

As water grows more scarce, water quality gets increasingly loaded with dissolved solids over time – Water Innovations specializes in ion exchange and water recycling to produce deionized water. They allow customers such as printed circuit board manufacturers or aerospace engineering customers to closed-loop recycle their own water to meet their water quality requirements. GF is a long-term, strategic partner of Water Innovations, supplying a wide variety of process automation products. Reliability, support and assistance from GF Piping Systems meant that Water Innovations resorted to using the whole family of products to help their customers recycle hundreds of millions of liters of water.

One partner from specification to operation



Ready when you are

GF Piping Systems provides project support to achieve construction excellence, allowing owners and planners to concentrate on their daily business without interruption.

Engineering

Increase the efficiency of your project with tailor-made analysis packages from GF Piping Systems. We can help to minimize project risks by diminishing incorrect calculations or wrong material selection. Rely on GF's experience in fast project implementation and choose our durable, safe, and reliable piping systems delivery. Established knowledge, guiding you through.

Digital libraries

The libraries cover three key areas for designing, creating, and maintaining a project: Building Information Modeling, the Plant Design Software, and the CAD Library helping you reduce costs and construction times while ensuring design accuracy and integrity. Reduce time and effort while ensuring design accuracy and integrity.

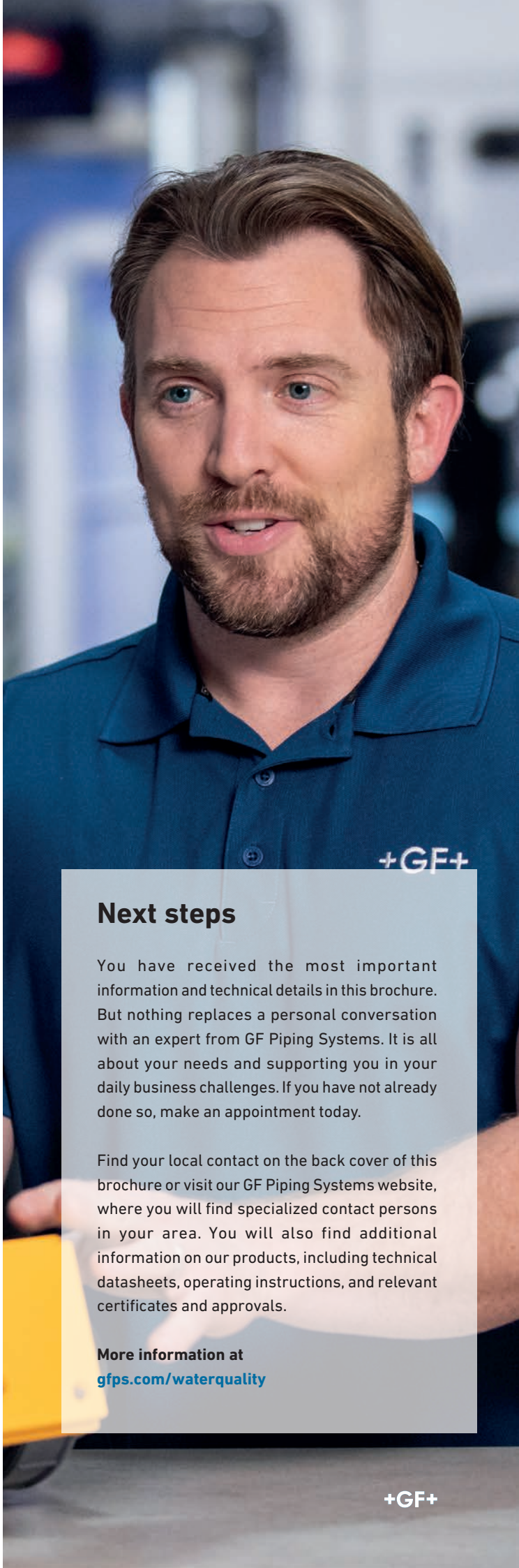
Custom product design and prefabrication

Focusing on your individual needs and application, GF's customizing teams forge tailored solutions, developing custom-made parts to complete systems or special solutions produced in small series, personal consulting, and offsite prefabrication. Through our global network, we offer a wide range of comprehensive solutions. Tailored innovation, inspired by you.

Instructional and virtual reality training

Installers can master installation techniques related to our portfolio in a safe environment using our instructional courses or our pioneering virtual reality training modules. With each module, your team of installers can become better prepared for the experience of being on-site, welding, and installing our world-leading piping systems.

More information at
gfps.com/specialized-solutions



Next steps

You have received the most important information and technical details in this brochure. But nothing replaces a personal conversation with an expert from GF Piping Systems. It is all about your needs and supporting you in your daily business challenges. If you have not already done so, make an appointment today.

Find your local contact on the back cover of this brochure or visit our GF Piping Systems website, where you will find specialized contact persons in your area. You will also find additional information on our products, including technical datasheets, operating instructions, and relevant certificates and approvals.

More information at
gfps.com/waterquality

Local support around the world

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