GF Piping Systems

Beyond cool

Mission-critical cooling piping systems for data centers

GF Piping Systems

The Digital Age requires a robust infrastructure to power it

On an average day, there are countless occasions, many times passing unnoticed, that for even the most simple tasks we do, we are highly dependent on the internet: Every second, we perform millions of transactions digitally, from emails, access information, and interact on social media, to make payments, compute all kinds of processes, and even realize medical procedures.

Vital to society

Data centers are simply the engine of all this, a beating heart full of life that is -relentlessly and without room for error- receiving, processing, and sending information wherever it is required. This critical organ is currently required to exponentially increase its capabilities because as the Digital Society grows and becomes the global norm, so do new technological advances that require more speed in connectivity and data processing, as well as the data already generated and processed also needs to be stored and available for the future.

Like every vital organ, there is a critical weakness that can jeopardize the entire organism, and in the case of Data Centers and the digital infrastructure, that is the cooling system. Increasingly powerful computers generate even more significant amounts of heat that need to be cooled in a more efficient way than up until now, as it is necessary for the current context to reduce to zero the carbon footprint of this vertical, whose operation already consumes enormous amounts of energy.

The risk of overheating

Every bit processed in one data center generates heat, but we are talking about terabytes of information being processed per minute, which translates into way too much heat to manage in these facilities. It is vital to keep these processors at an optimal temperature; otherwise, the damage to the system can be dramatic. Overheating compromises the life of costly hardware, thus increasing the cost of operation. Hence, cooling plants are as critical as the microchips themselves, as the last one cannot survive without the other.

Liquid cooling is a must

Moreover, the latest generations of chips are so powerful that traditional air cooling has become completely outdated and is forcing owners and operators to explore other, more efficient, but so far also more risky ways of cooling. This is the case of Direct Liquid Cooling and Immersion Cooling, where the coolant medium directly interacts with the microchips.

The road to sustainable cooling

Along with the aforementioned challenge of the need for more powerful cooling loops in data centers, we are also faced with the imperative responsibility to make them as energy-efficient as technology allows, transforming Data Centers into sustainable and future-oriented assets. Every MW of energy not consumed has not only a direct impact on the operators' pockets but mainly on the environmental repercussions of this gigantic infrastructure on a global level, as it represents 2,4% of the global energy consumption today.

Complete engineered system solutions

This is leading us, as a strategic partner of some of the most prominent owners of the hyperscale and co-location market, to a high-stakes game to develop the necessary innovative technology to enable safe liquid cooling circuits in their data centers, as well as to help conceive heat-recovery systems to reuse all that energy transformed by the chips for district heating services or in nearby industries. This combination of solutions drastically reduces the energy consumption and energy loss that data centers are responsible for, thus reducing their carbon footprint and paving the way to a greener future.

Efficient liquid cooling

The road to sustainable cooling is not an easy one, but it is worth the journey. The future of our digital world depends on it. While the stakes are high, and the challenges are significant, the reward - a sustainable, resilient, and efficient digital heart - is priceless. Beyond the technical challenge, the quest for sustainable cooling is a beacon of hope to rethink the present into a better, greener, and more sustainable future.

About GF Piping Systems (2022)

- Established: 1802 (Georg Fischer AG) in Schaffhausen, Switzerland
- Sales GF Piping Systems: 2'160 million Swiss Francs
- Sales Georg Fischer (Corporate): 3'998 million Swiss Francs
- Employees GF Piping Systems: 8'085
- Employees GF Corporate: 15'207
- Sales companies in 31 countries
- Production sites in 36 locations in America, Europe and Asia

Added value for mission-critical facilities

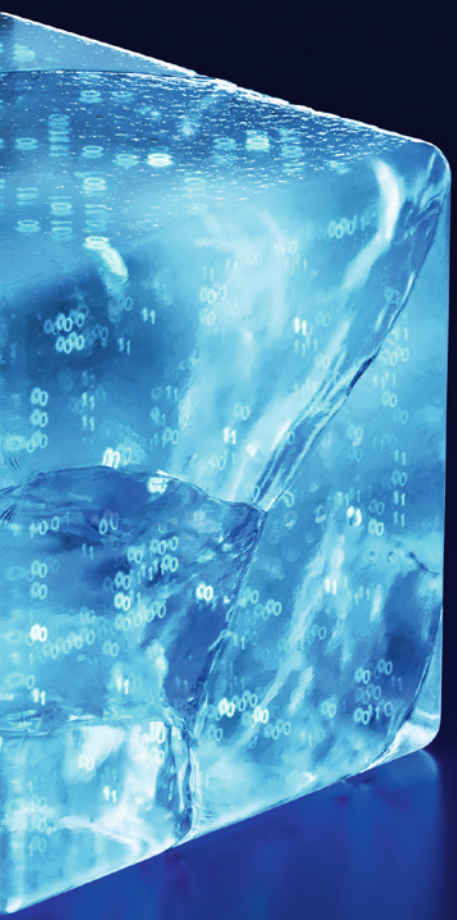
Beyond efficient

Supporting the digital infrastructure with innovative, energy-saving solutions that make the collective global footprint and productivity more sustainable. Complete piping system solutions with energy efficiency up to 25% higher than metal pipes during operation.

Improving energy efficiency for life

The drive to net-zero puts increasing pressure on efficiency improvement and risk mitigation concurrently. How can engineered plastic piping systems improve operational efficiency? Can plastic piping systems be utilized in construction and industrial sites? What benefits do these systems offer? Which applications and locations?

As a company active worldwide, GF Piping Systems' mission is to show our commitment to sustainability by supporting our customers' success with innovative, energy-saving solutions that make the collective global footprint and productivity levels more sustainable. With proper installation, our world-leading solutions can provide several advantages to building owners and industrial leaders, helping them improve energy efficiency for life.

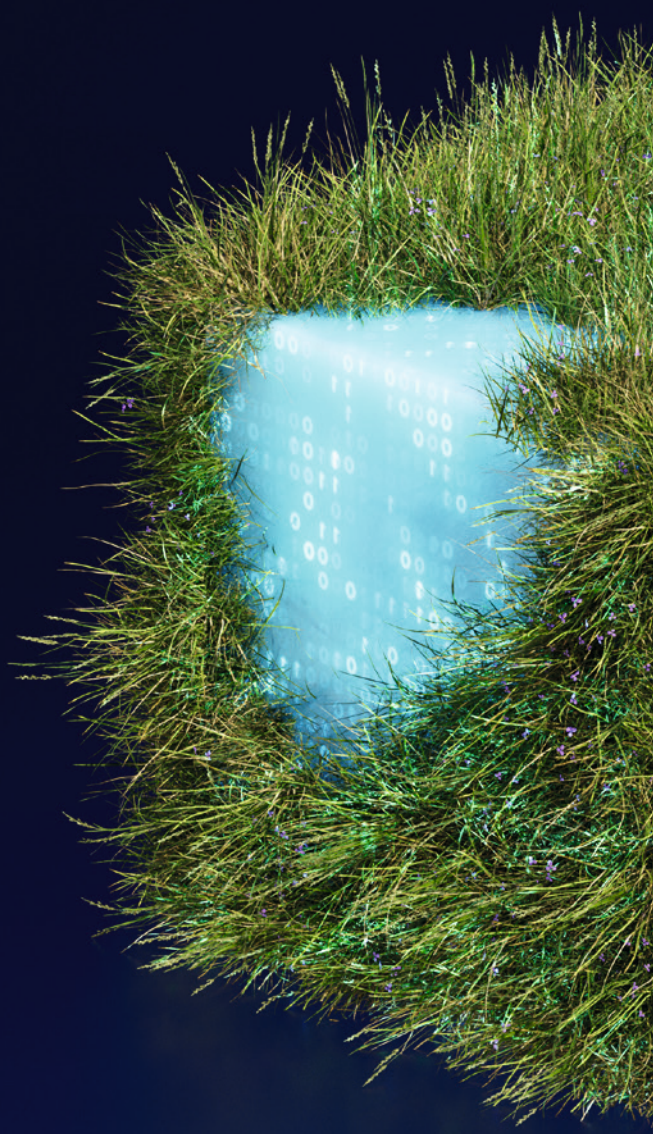


25% higher energy efficiency than metal pipes

Added value for mission-critical facilities

Beyond sustainable

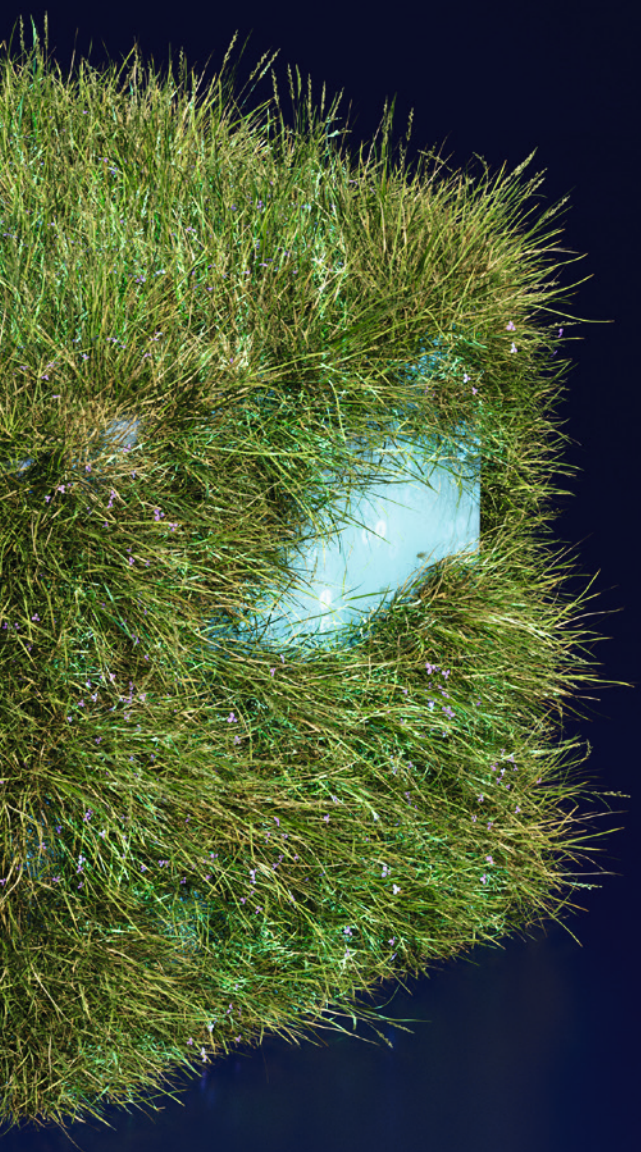
A far lower carbon footprint than metal alternatives, from raw material production to manufacturing, transport, and operation. Lighter products with an efficient and longer life-span for an environmentally friendly piping system.



Future impact

The carbon footprint of GF Piping Systems products is dramatically lower than the alternative in metal, from the point of view of the production of raw material and the fabrication of the components, such as pipes and valves. But they are also about 25% more efficient than metal pipes during operation, thanks to better energy retention and a smooth internal bore of pipe, allowing the application to operate up to 100% of capacity during the entire life-span.

Furthermore, GF Piping Systems is one of the more sustainably managed companies in the world also because of the care we take of our employees and the people we impact through our activity, as well as the commitment we have with our investors, providers and customers.



80% lower carbon footprint

Low carbon solutions over its entire service life. What if your piping systems reduced your carbon dioxide balance by 80% compared to metal systems?

Added value for mission-critical facilities

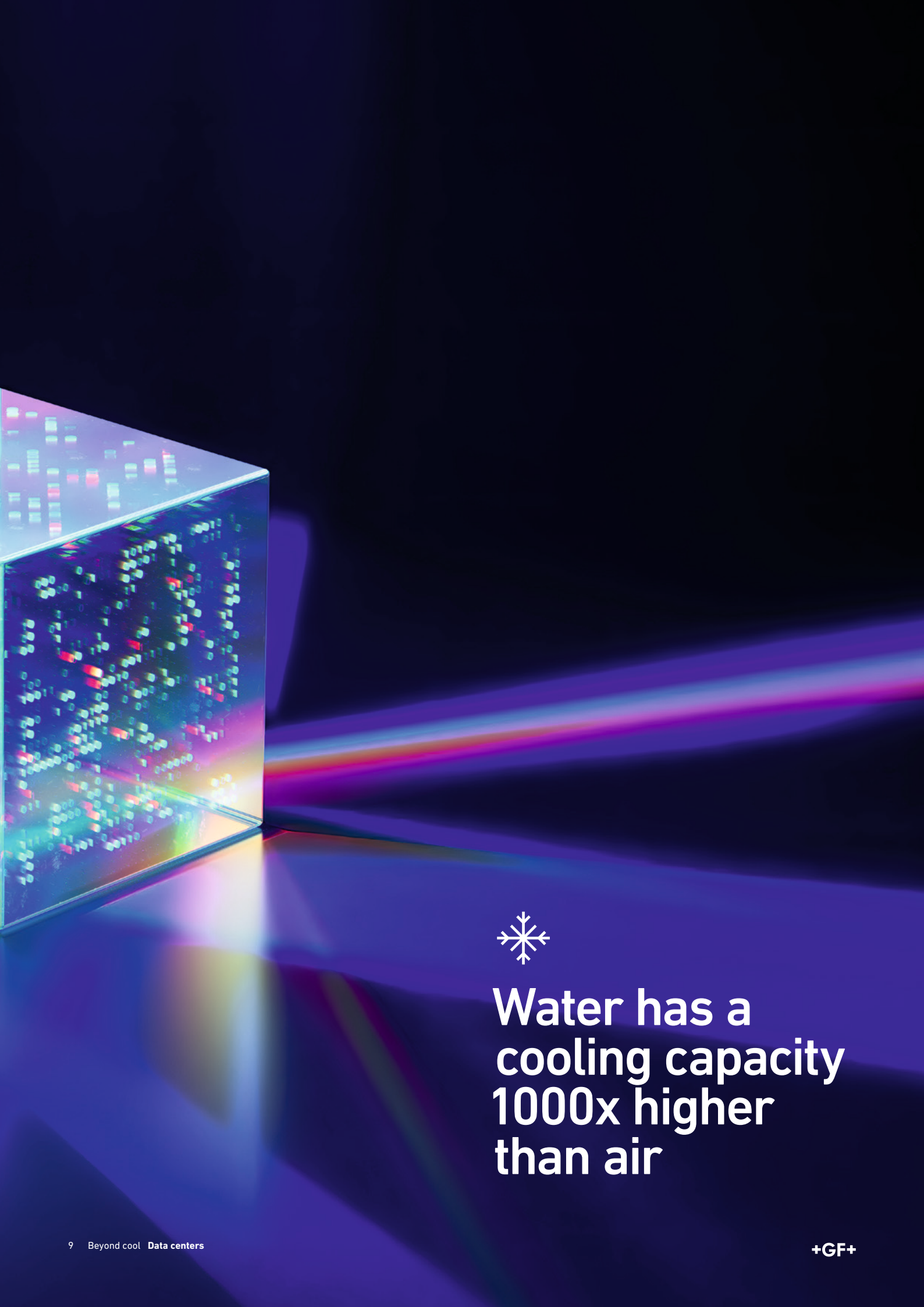
Beyond innovation

Optimized power consumption making Liquid Cooling a reality through reliable, corrosion-free, state-of-the-art piping components. Paving the way for the net-zero mission-critical facility of the future.

The future is Liquid Cooling

As global IT demand continues to explode with technologies such as AI, ML & VR, many operators are turning to liquid cooling applications to address ever-increasing heat loads. GF Piping Systems is developing best-in-class thermoplastic piping systems to meet the pressing needs of the new generation of Data Centers; enabling designers to efficiently deliver effective, sustainable, and environmentally friendly liquid heat rejection solutions.

The transition from metal systems to thermoplastics allows owners to significantly reduce the overall weight of piping systems and greatly reduce the installation time.



Water has a cooling capacity 1000x higher than air

Added value for mission-critical facilities

Beyond manufacturing

Off-site prefabrication provides a seamless, fast, and highly accurate installation process for small to large data centers. As data servers become faster and faster, so does our time-to-market.

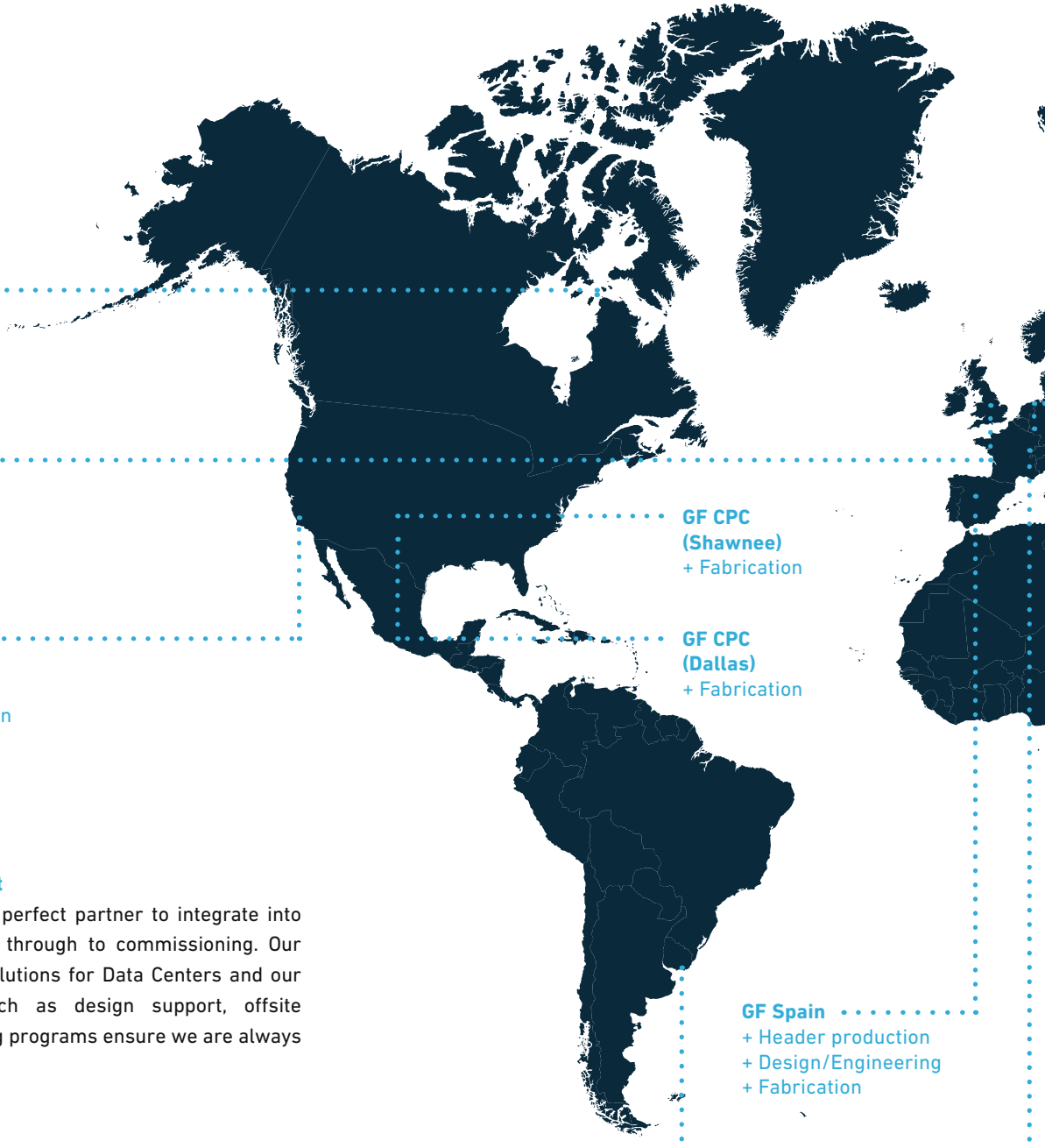
Off-site Manufacturing

Engaging with GF Piping Systems early encourages collaboration and integration that ultimately brings value to your project. Especially in environments like data centers, a seamless transition from GF Piping Systems to the construction site is vital, and exceptional product quality is necessary.

Our products hold industry-recognized approvals through established facilities with highly trained personnel. Relying on skilled installers specialized in thermoplastics provides increased levels of accuracy. Defect variability is as well reduced, leading to reduced lifetime system costs. To be even more cost-efficient, an early engagement with contractors can drive out risk allocations.

4x shorter time-to-market

Beyond integration partner



GF Canada
+ Design/Engineering
+ Fabrication

GF UK (Coventry)
+ Data center modules
+ Fabrication
+ Skids (build to print)

GF US (Irvine)
+ Custom products
+ High-purity fabrication
+ Fabrication
+ Skids

GF CPC (Shawnee)
+ Fabrication

GF CPC (Dallas)
+ Fabrication

GF Spain
+ Header production
+ Design/Engineering
+ Fabrication

GF Brazil
+ Design/Engineering
+ Fabrication

GF Switzerland (Schaffhausen)
+ Custom products
+ Fabrication

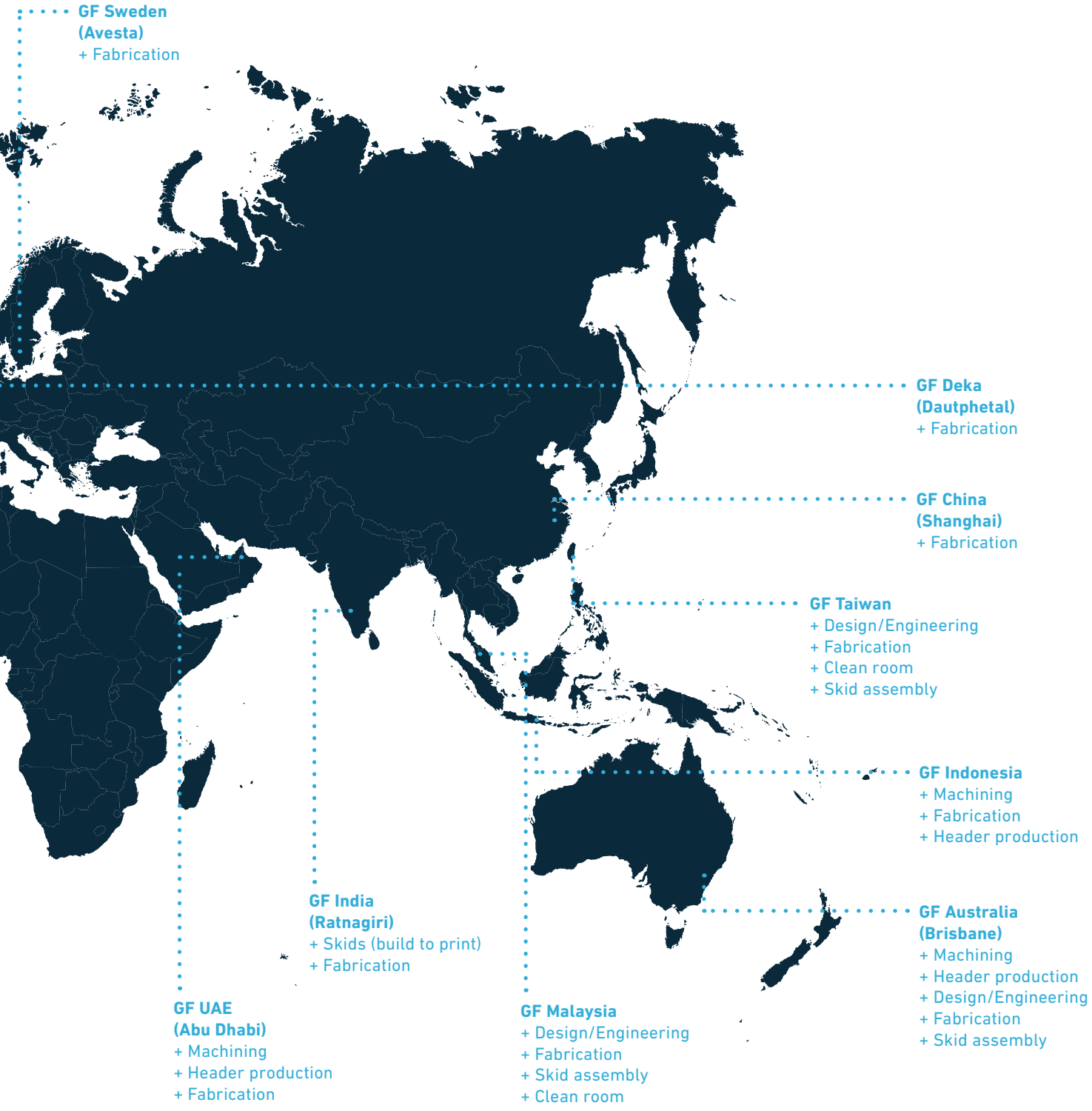
Beyond connected support

GF Piping Systems is the perfect partner to integrate into your project from design through to commissioning. Our mission-critical cooling solutions for Data Centers and our specialized solutions such as design support, offsite prefabrication, and training programs ensure we are always ready when you are.

Beyond-fast response

With short project and operation lead times for semiconductor plants, our highly skilled project managers, engineering services, state-of-the-art welding technology, and advanced stock management can ensure we meet your tight deadlines on time, every time. Our global offsite prefabrication and customization network can support your needs, providing quality and operational excellence you can repeatedly trust.

Project support at every step of the process to achieve construction excellence.



Trust the leaders

Beyond partnerships

Advance engineering
A first step ensuring the most efficient design for your application and optimizing the prefabrication process

Quality and consistency
Installation done by certified professionals in a controlled environment, following our QA/QC standards and providing Ultrasonic NDT to the welds when required to comply with this level of safety.

Global network
Always close to your project. Our 14 international workshops and 31 international companies collaborate to provide consistent quality locally, what you need, when, and where you need it.

Labor reductions

Save hours on-site, improve quality and Health & Safety. Speedy computer-controlled welding with low-weight piping reduces time on-site to a minimum.

Sustainability

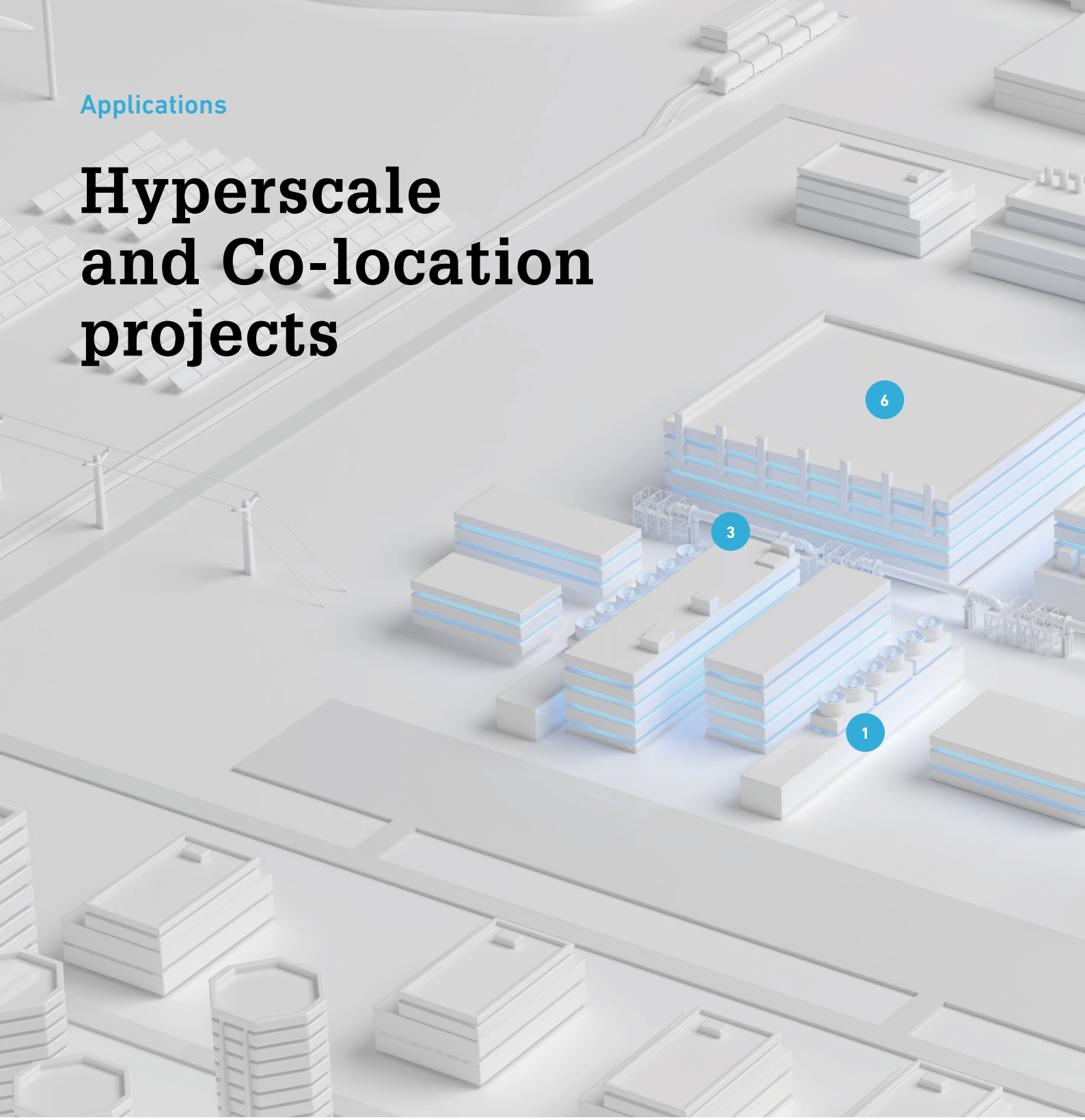
Reduce your carbon footprint with low-weight, long-life-span plastic pipes. GF Piping Systems' ESGs are ambitious and transparent for the whole company and complete life-span of all products.

Advanced engineering

Metal to plastic pipe design transition, supported by experts. Optimize design for your application and off-site fabrication.

Applications

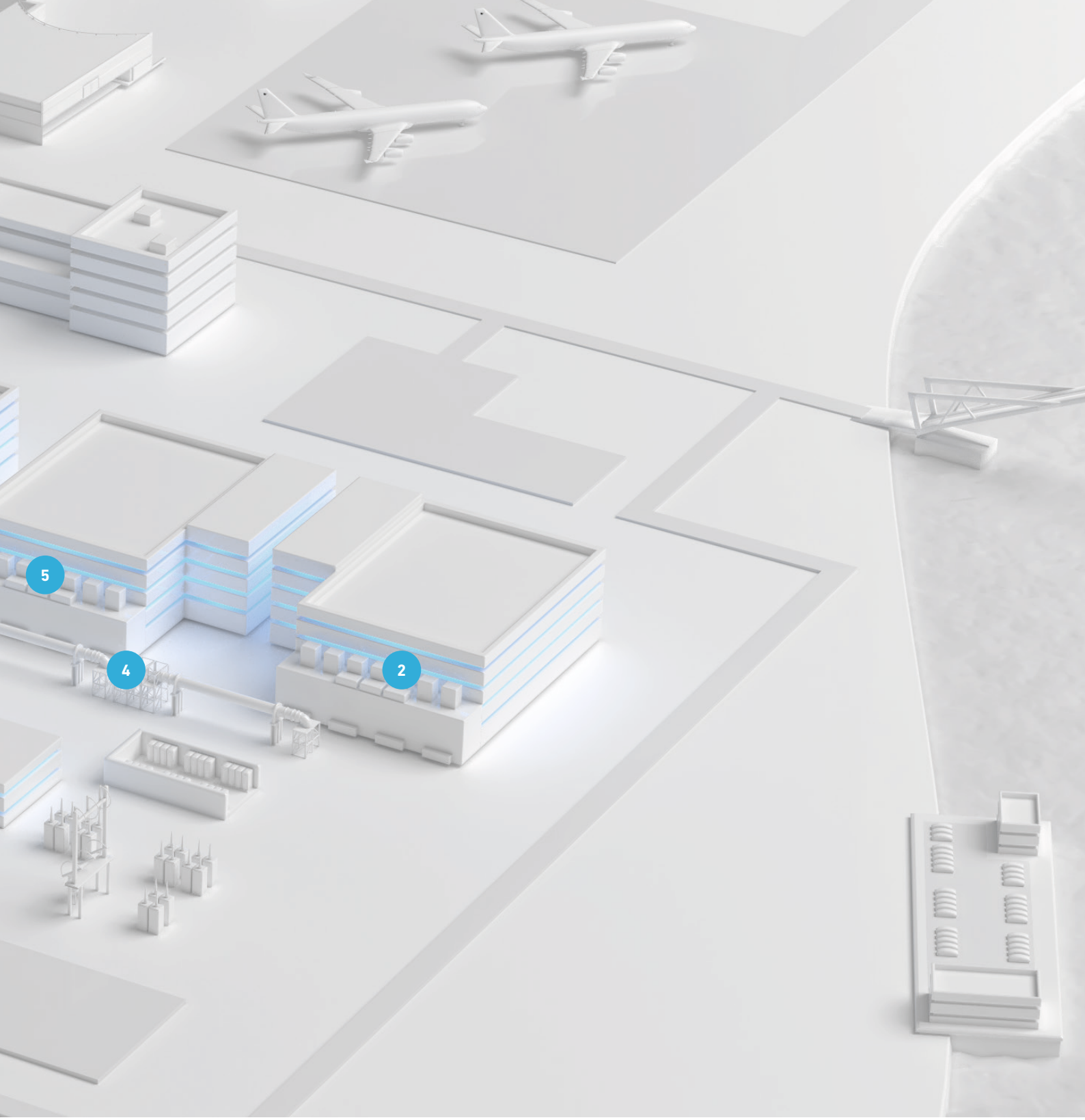
Hyperscale and Co-location projects



Trust the leaders

GF Piping Systems' experience of more than 30 years in supporting the semiconductor industry's efforts to build the most sustainably managed fabrication factories is the foundation of our offering to Data Centers. Our global teams help the industry manufacture some of the world's most advanced technologies while still supporting their mission to use water resources more sustainability, reduce their carbon footprint, and lessen their impact on the environment.

1. Cooling tower yard
2. Roofline piping modules
3. Chiller plant
4. Condensed water plant room
5. Data hall – AHU connection
6. Computer rooms



Virtual tour

Would you like to explore our extensive portfolio showcasing how GF Piping Systems sets itself apart from the competition in the data center vertical? Take a virtual tour and immerse yourself in the most relevant solutions tailored for medium and large data centers.

More information at
data-center-app.gfstools.com

Application know-how

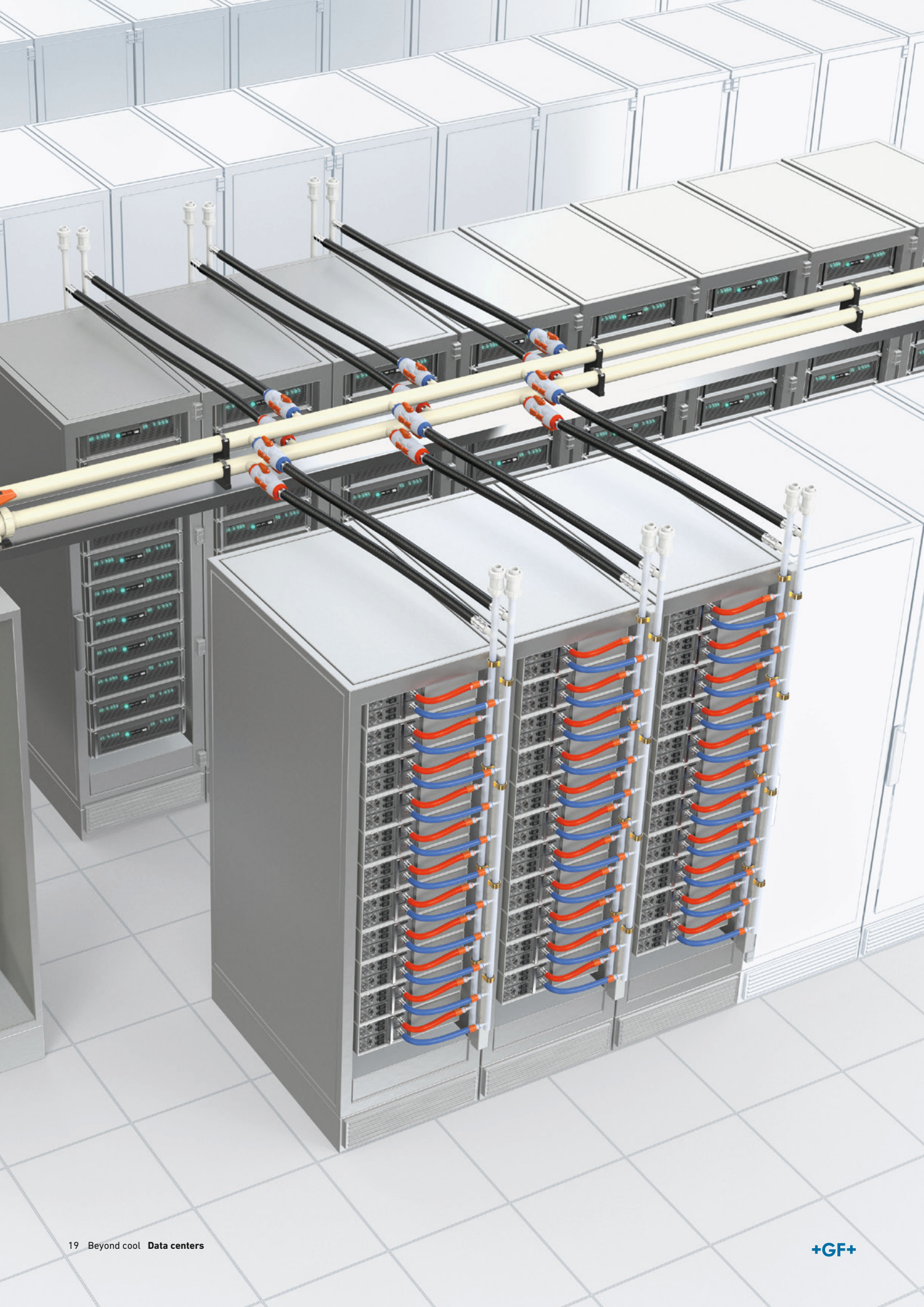
Beyond specialized

Direct liquid cooling for white spaces and data halls

While using liquid-cooled servers offers clear efficiency benefits, it also raises safety and reliability issues as pressurized water moves closer and closer to the CPUs. GF Piping Systems is the world's expert in high-quality pressure-bearing plastic pipe systems and has years of experience in the semiconductor manufacturing industry, developing user and application-specific systems with real added value for all stakeholders.

Benefits

- Clean water: micro-channels, no metals
- Retrofit: weight, speed, minimal flushing, no hot working
- Zero maintenance: No corrosion; no metals, no inhibitors
- Flow: low pressure drop
- Engineering support: hydraulic analysis, exp/contraction isometric, etc
- Prefabrication: simple, speedy installation pressure-bearing plastic solution



Application know-how

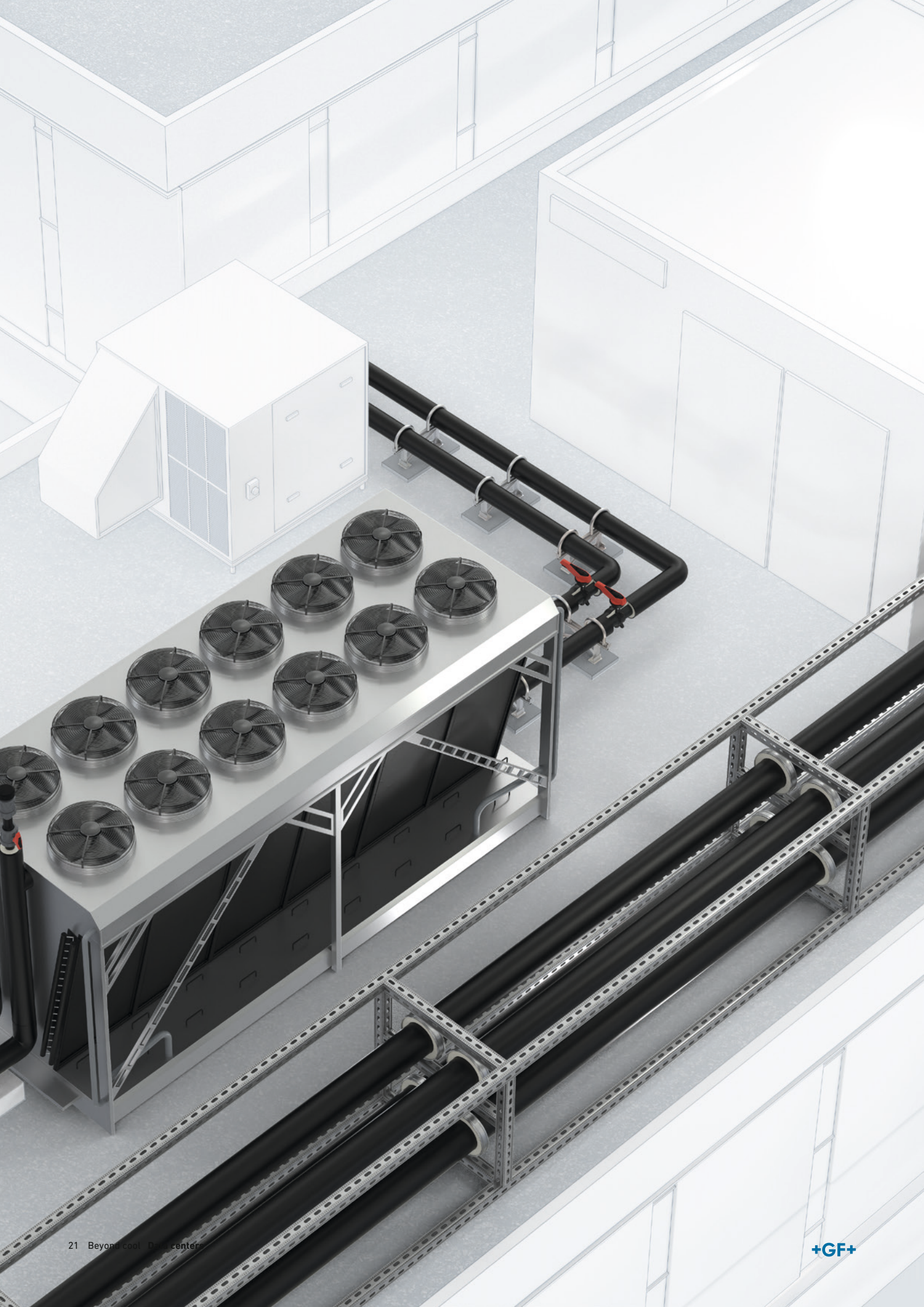
Customized solutions

Chilled water on rooftops

Pipe systems on rooftops for chillers and condenser units are open to environmental conditions daily and seasonally. Ambient conditions of -25°/-13°F for several days are not uncommon in Northern Europe, and direct sunlight on black pipes can cause surface temperatures of +70°C / +158°F. These extreme temperatures and general weathering (wind, rain, UV light) create demanding conditions. GF Piping Systems' PE-100 black and COOL-FIT are designed for a life-span of 25 years with continued high performance under such harsh conditions.

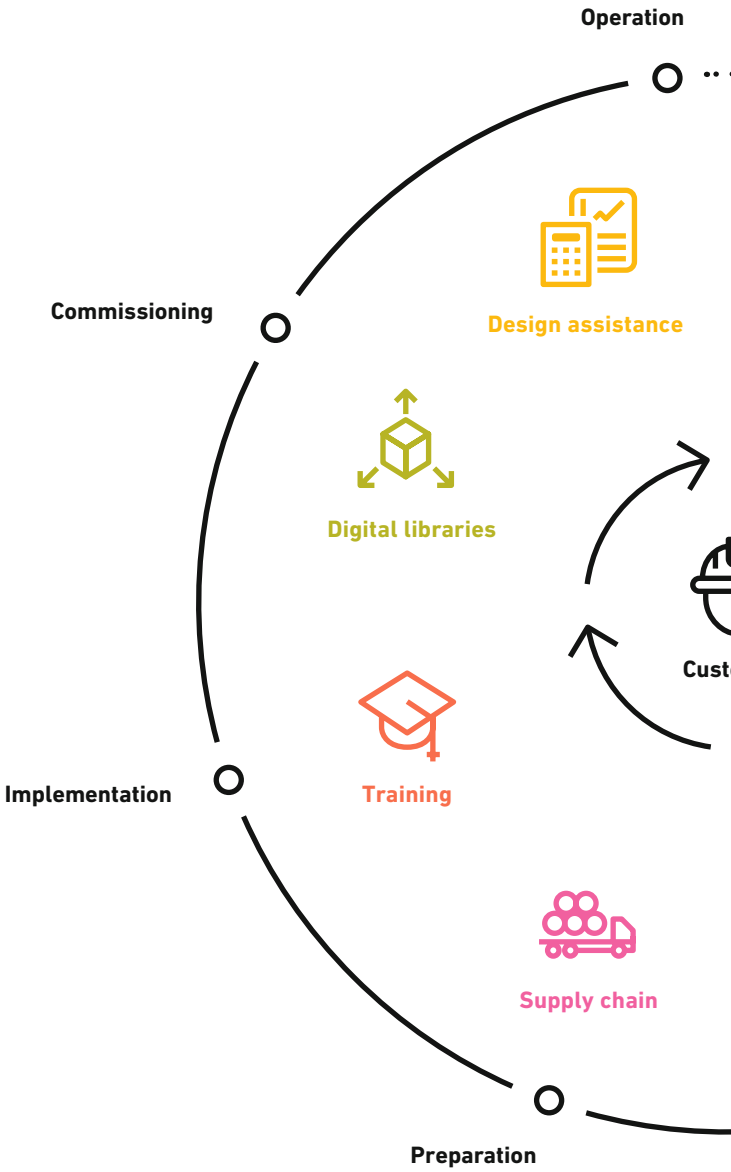
Benefits

- Efficiency, pressure drop down to a minimum (full bore fittings and valves)
- Quick and 100% drip-free connections for maintenance of blades
- 100% reliability and 25-year designed life-span
- No corrosion and no metallic residue, complete pressure-bearing plastic solution



Specification to operation

With Specialized Solutions, the global leader GF Piping Systems provides project support every step of the way to achieve construction excellence. Allowing owners and planners to concentrate on their daily business without interruption.

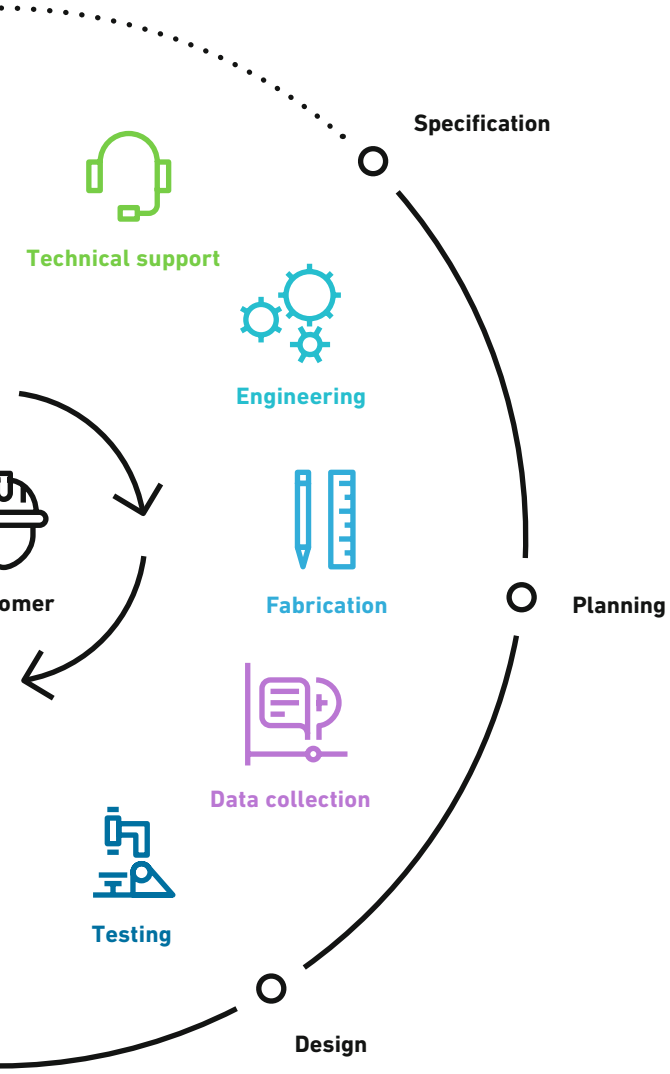


Jointing technologies

As a market leader, GF Piping Systems is a pioneer in developing advanced welding machines for technologies such as Electrofusion and IR. Additionally, we offer a wide range of jointing solutions, including solvent cementing, ensuring reliable and durable connections for data center applications.

Bespoke plastic piping systems

Our comprehensive product portfolio includes a variety of bespoke plastic piping systems designed specifically for data center applications. From factory preinsulated systems to double containment solutions, we have the necessary products to meet the unique requirements of any data center project.



Advanced engineering: From metal to plastic
GF Piping Systems provides engineering and design support every step of the way, from part modification of an existing product, to full-system design from customer piping and instrumentation diagrams.

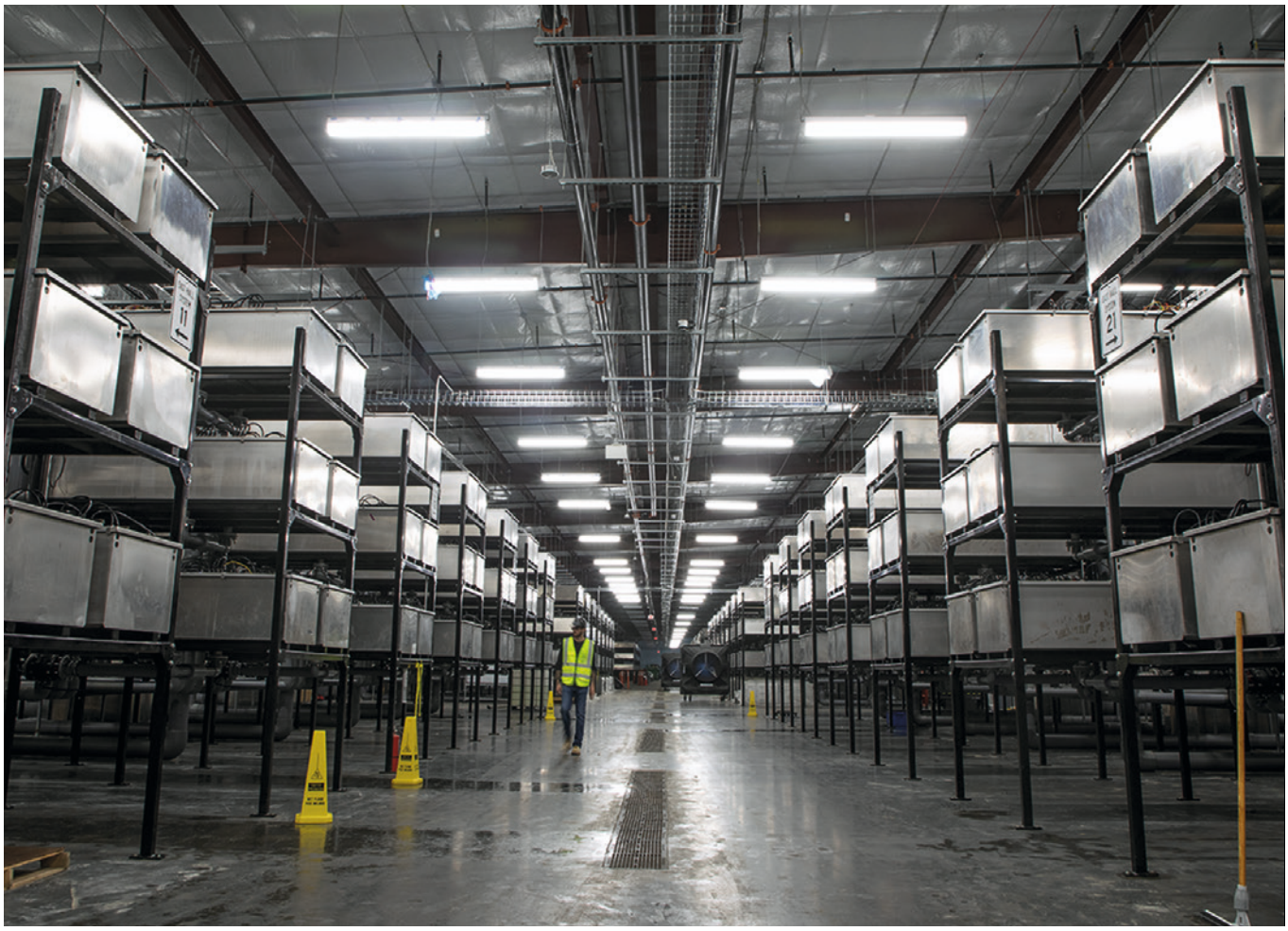
Off-site Manufacturing: Beyond the response
Helping speed up site work activities by prefabricating systems and standard products, including complete modules and installation sections off-site and delivering them directly to the place of use. With prefabrication workshops around the globe, customers save costs and time and increase their system reliability with proven and certified Piping Systems quality.

Ultrasonic Non-Disruptive Testing: Beyond security
The integrity of a piping system is essential to a Data Center. Our Ultrasonic NDT solution present at our prefabrication workshops provides scientific proof of weld quality at the point of installation.

More information at
gfps.com/specialized-solutions

Off-site prefabrication for immersion cooling

Rhodium Enterprises, Temple (Texas, US)



Problem / Solution

Rhodium Enterprises, a Data Center company specializing in Bitcoin mining, executes the critical process of cooling their servers to direct submersion into a liquid coolant. This achieves maximum efficiency but also requires piping with high levels of corrosion, chemical, and heat resistance.

In order to execute their latest data center project in Temple (Texas, US), they needed to design and install an extensive piping network of several miles of pipes in CPVC, where GF Piping Systems provided them with design engineering support and the preassembly of laterals and spool pieces in Schedule 80 ChlorFIT®.

Results

The project accounted for 17,000 solvent-cemented joints finished prior to delivery, cutting the installation time on-site and reducing inventory management requirements.

From 6 months to 6 weeks with Off-site Manufacturing

Dublin, Ireland

Problem / Solution

At a new Hyperscale data center in Ireland, the Mechanical Contractor Dornan Engineering, in charge of the project, installed circa 8km of piping required per building for phases 5 and 6, providing cooling for systems with a combined power capacity of 70MW.

The ecoFIT (PE100) system was selected for the mission-critical process cooling water application deployed on the roof of the building and also for the double-walled rainwater condensate drainage systems. GF Piping Systems provided further solutions like Advance Engineering to support design and installation processes, as well as prefabrication of all the pipework for the roof-top modules in our facilities, under a controlled environment and executed by certified installers, providing this way maximum quality.

Results

The mechanical contractor of this hyperscale project, Dornan Engineering, stated that thanks to GF Piping Systems' prefabricated pipe modules they could speed up to only 6 weeks the installation time needed for the process water system, compared to the 6 months they planned, according to previous experiences for the same application in other phases of the same project.

Training ensures the highest possible quality standards

Kirby Group Engineering, Co-location Data Center in Zurich, (Switzerland)

Problem / Solution

The international mechanical and electrical contracting company Kirby Group Engineering, which was established in Ireland in the 1960's, provides full-service mechanical and electrical engineering contracting capability for data centers. Kirby and GF Piping Systems have been successfully working together for over ten years.

Kirby started constructing the 10MW cooling capacity data center in 2020, 15 km north of Zurich, Switzerland. For data centers, the cooling plant is mission-critical. Finding professionally qualified personnel is one of the biggest challenges for international project delivery, and in 2020, COVID-19 only exacerbated this challenge. Kirby continuously ensures that their contractors and personnel installing the cooling system are trained and certified correctly. The ever-increasing time pressure on construction sites means that installers have to work quickly and accurately – every step in the process needs to be precisely planned and executed, and all personnel needs to be trained on how to handle jointing and installation of materials – whether they are traditional metals or more advanced engineered plastic systems.

Results

Kirby chose the local service support package of fast and reliable handling, deliveries, and training from GF Piping Services, Switzerland. To ensure the installation of the plastic pipes was performed correctly, Kirby entrusted the company to provide butt fusion and electro-fusion training in-house and on-site for ecoFIT fittings and pipes in PE100 to the Kirby installers (MSA 2.1 & SG160 machine training). For maximum quality control, Kirby ensures the installer places a label on each weld, identifying the welder, cooling time, and time of joint. A second trained installer checks every weld to ensure quality control.

Leitwerk AG, Baden Cloud

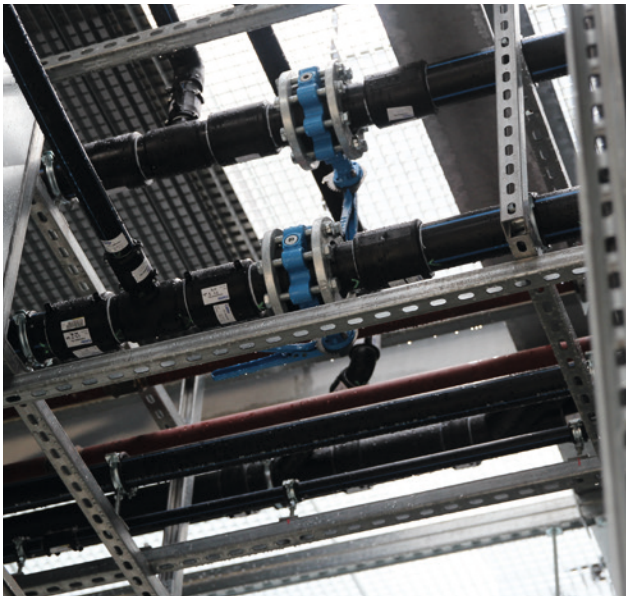
Problem / Solution

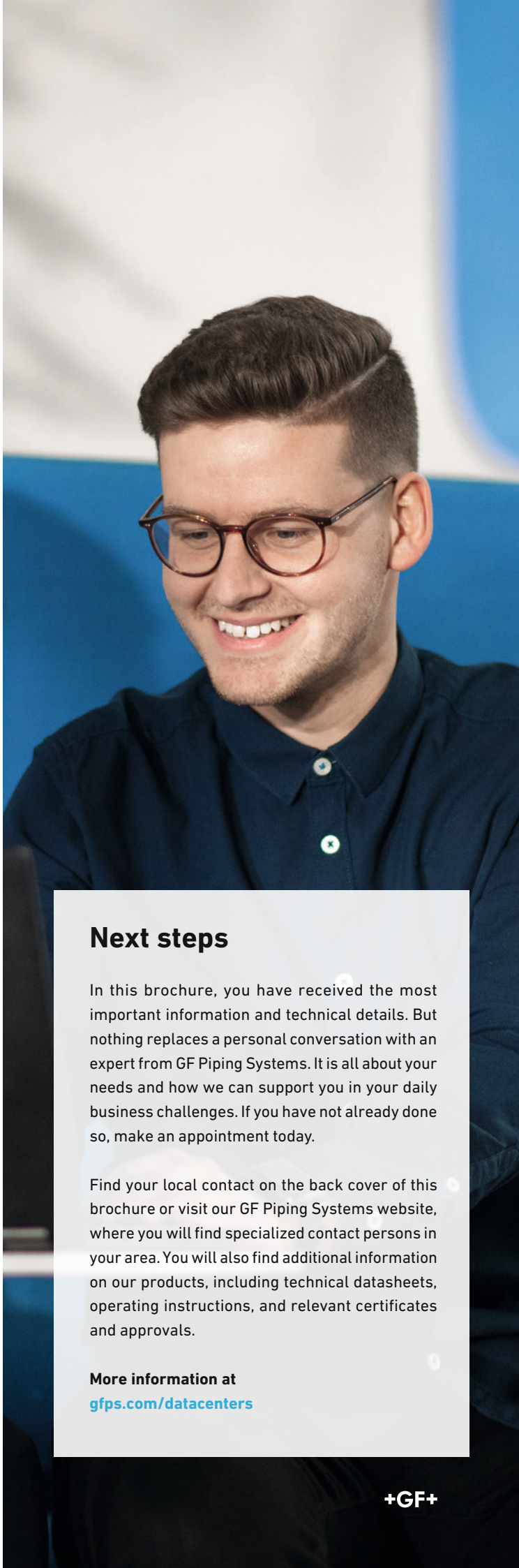
As more and more hardware resources are needed in modern data centers, many companies are hitting the limits of their capacity. Which is why, as a regional partner, LEITWERK AG is offering modular IaaS (Infrastructure-as-a-Service) solutions in the form of BADEN CLOUD®. The services cover a broad spectrum, from colocation (rental of IT space) all the way through to managed services comprising a full IT package. Besides protection against hacker attacks, a redundant power supply and a state-ofthe-art extinguishing system, data center cooling in particular plays a key role in secure operation.

The devices in data centers become extremely warm during operation. An adequate cooling system must therefore ensure that the right temperature is maintained at all times. And so LEITWERK AG decided to install COOL-FIT 4.0 from GF Piping Systems at the Appenweier site. The fully pre-insulated plastic piping system offers distinct advantages over conventional piping systems: corrosion-free, it requires barely any maintenance and can be installed in up to half the time thanks to its low weight.

Results

LEITWERK AG is aiming for CO2 neutrality in the operation of its BADEN CLOUD®. To that end, the company was looking for a piping system that is both energy-e ciency and reliable. Thanks to the low thermal conductivity of plastic and the pre-insulated design of COOL-FIT 4.0, the system achieves a 30% improvement in energy e ciency. This not only makes the computer center more sustainable, it also reduces the operating costs – to the benefi t of both LEITWERK AG and the customer.





Next steps

In this brochure, you have received the most important information and technical details. But nothing replaces a personal conversation with an expert from GF Piping Systems. It is all about your needs and how we can support 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/datacenters

GF Piping Systems

Local support around the world

Visit our webpage to get in touch with your local specialist:
www.gfps.com/our-locations

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