Bell & Gossett
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Three ways liquid cooling presents an opportunity for water use efficiency

Why WUE matters to data centers

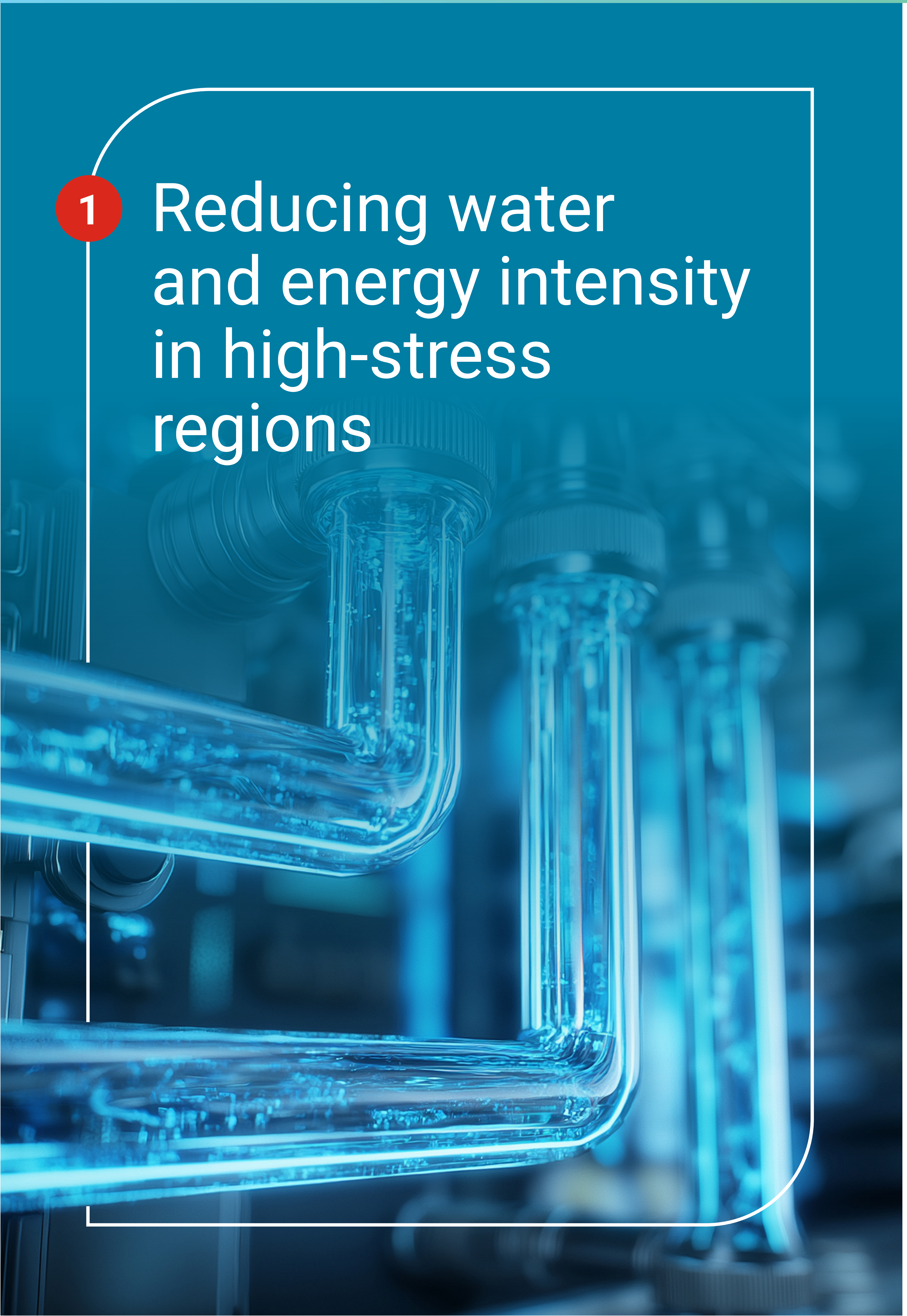
Introduction

The proliferation of data centers in response to AI has reignited the debate around water and energy, raising questions not only about how to quantify it but also how to strike the right balance. Along with power usage effectiveness (PUE), operators are increasingly tracking **water usage effectiveness** (WUE) to understand how efficiently a data center uses water. Improving WUE – ideally driving it closer to zero – typically means using less water, reducing energy demand and strengthening operational reliability.

Liquid cooling plays a central role in that shift. Done right, it helps data centers reduce direct on-site water and energy consumption, balances performance with minimal impact on local communities and transforms facilities into valuable infrastructure assets where thermal use becomes a strategic avenue for heat recovery and district heating.

In theory, this means setting both data center operations and the surrounding area up for **significant efficiency gains**. Understanding how it works in practice, though, means considering the broad picture of a facility.

1 Reducing water and energy intensity in high-stress regions



Today, approximately **40% of data centers** operate in regions facing high or extremely high-water risk. Air-based cooling systems operating in warm, humid regions depend heavily on chillers, fans and evaporative technologies that require a heavy draw of electricity and water.

Alternatively, **liquid cooling** supplants energy-intensive air systems with closed-loop architecture that enables more efficient heat transfer while minimizing evaporative losses and overall power consumption. In some cases, a hybrid approach of air and liquid is employed – an increasingly popular option for retrofit or transitional data center environments.

High-efficiency heat exchangers, such as Xylem's Bell & Gossett **BPX and GPX models**, enable energy-efficient hydronic cooling by delivering compact designs with high surface area for superior thermal transfer in high-performance environments. In liquid-cooled data centers, heat exchangers remove heat generated by servers by transferring a hot fluid (typically a coolant circulating through the equipment) to a cooler fluid (often water or air). Because liquids transfer heat far more efficiently than air, heat exchangers reduce fan and cooling energy, delivering **savings of up to 40%** in applications such as direct-to-chip liquid cooling, while decreasing reliance on water-intensive cooling approaches. This makes heat exchangers a strong fit for data centers in water-stressed regions where reducing water use is essential for long-term operational resilience.

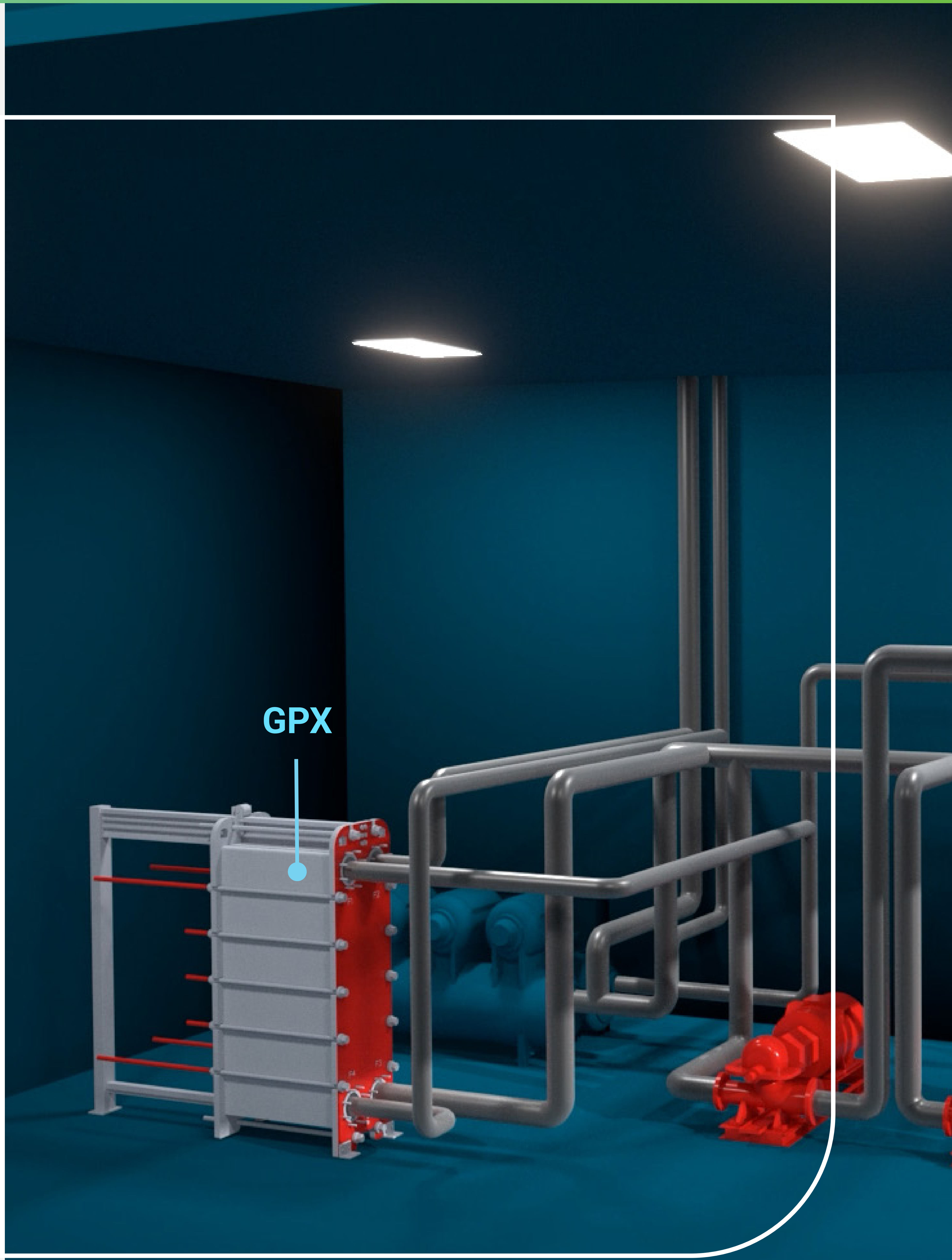
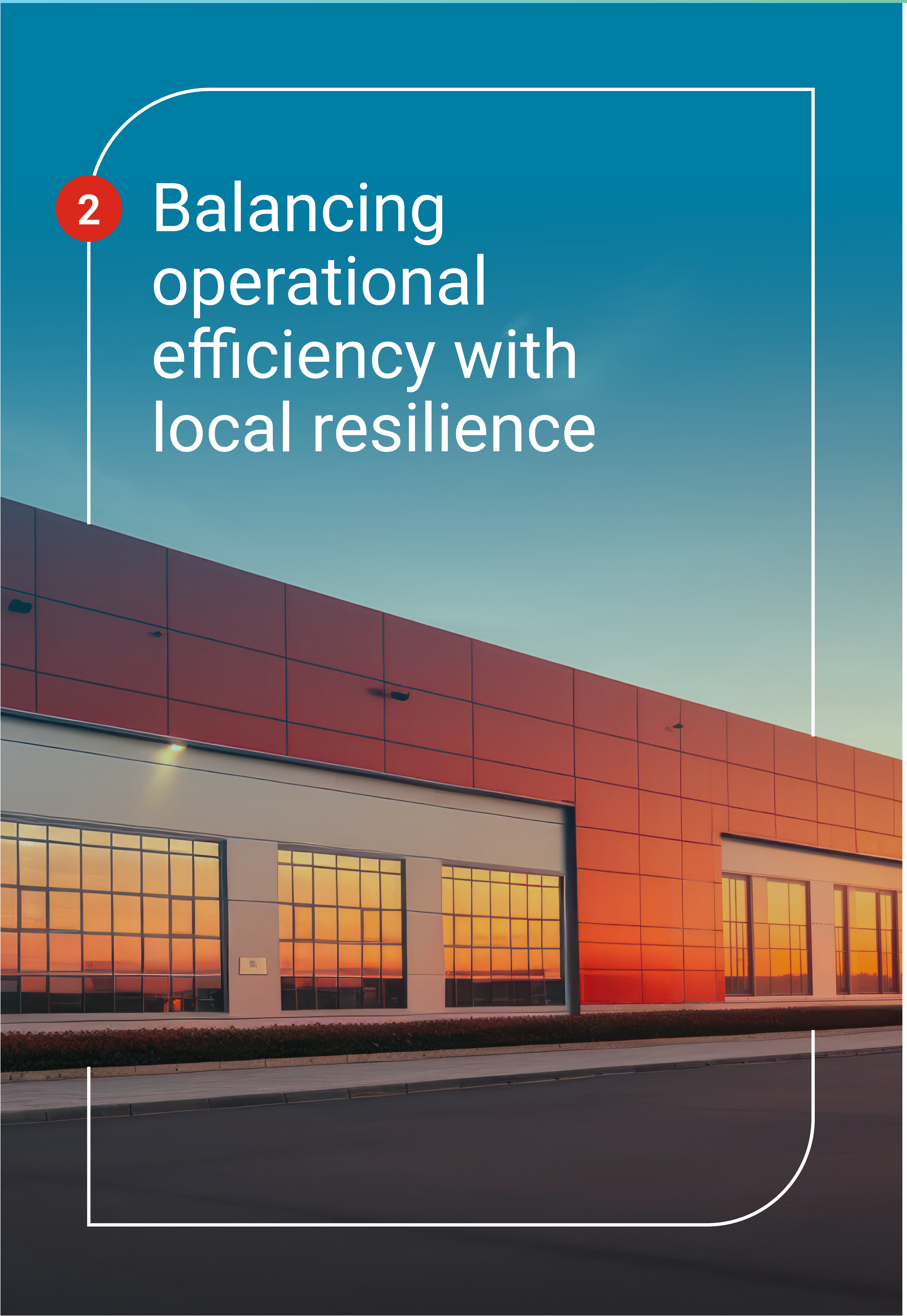


Image taken from our Liquid Logic interactive data center tour, which navigates 3D facility zones to show how Bell & Gossett pumps and hydronic systems support mission-critical cooling performance.

"Water-based closed loop cooling adapts easily to future technologies, supporting evolving data center needs,"

Matt Johnson, business development manager
for Xylem's Bell & Gossett

2 Balancing operational efficiency with local resilience

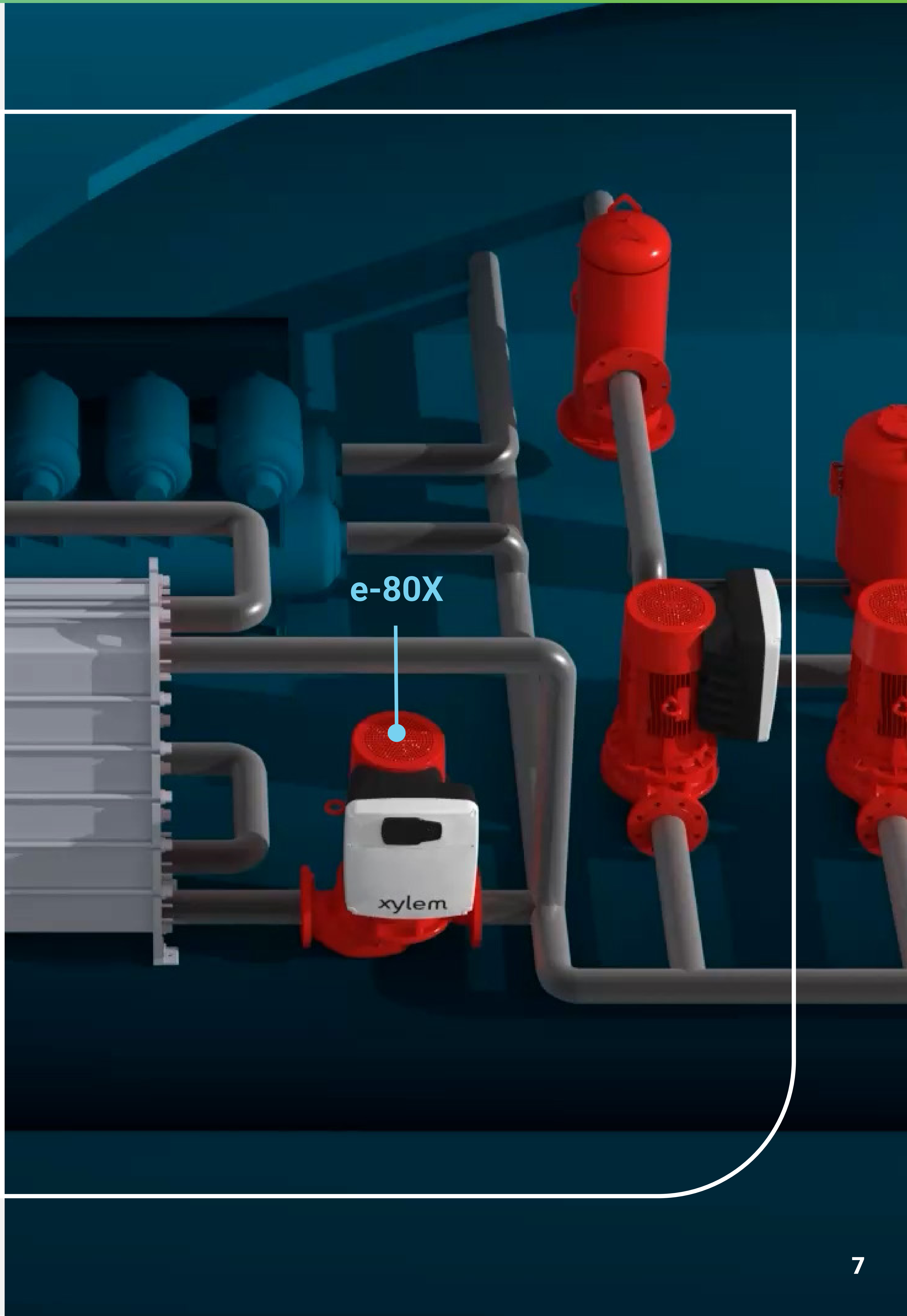


As the data center footprint expands, owners and operators must carefully consider the effects their facilities have on surrounding communities. Poorly sited data centers and inefficient cooling can strain local water supplies and electric grids, leading to infrastructure bottlenecks and community resistance.

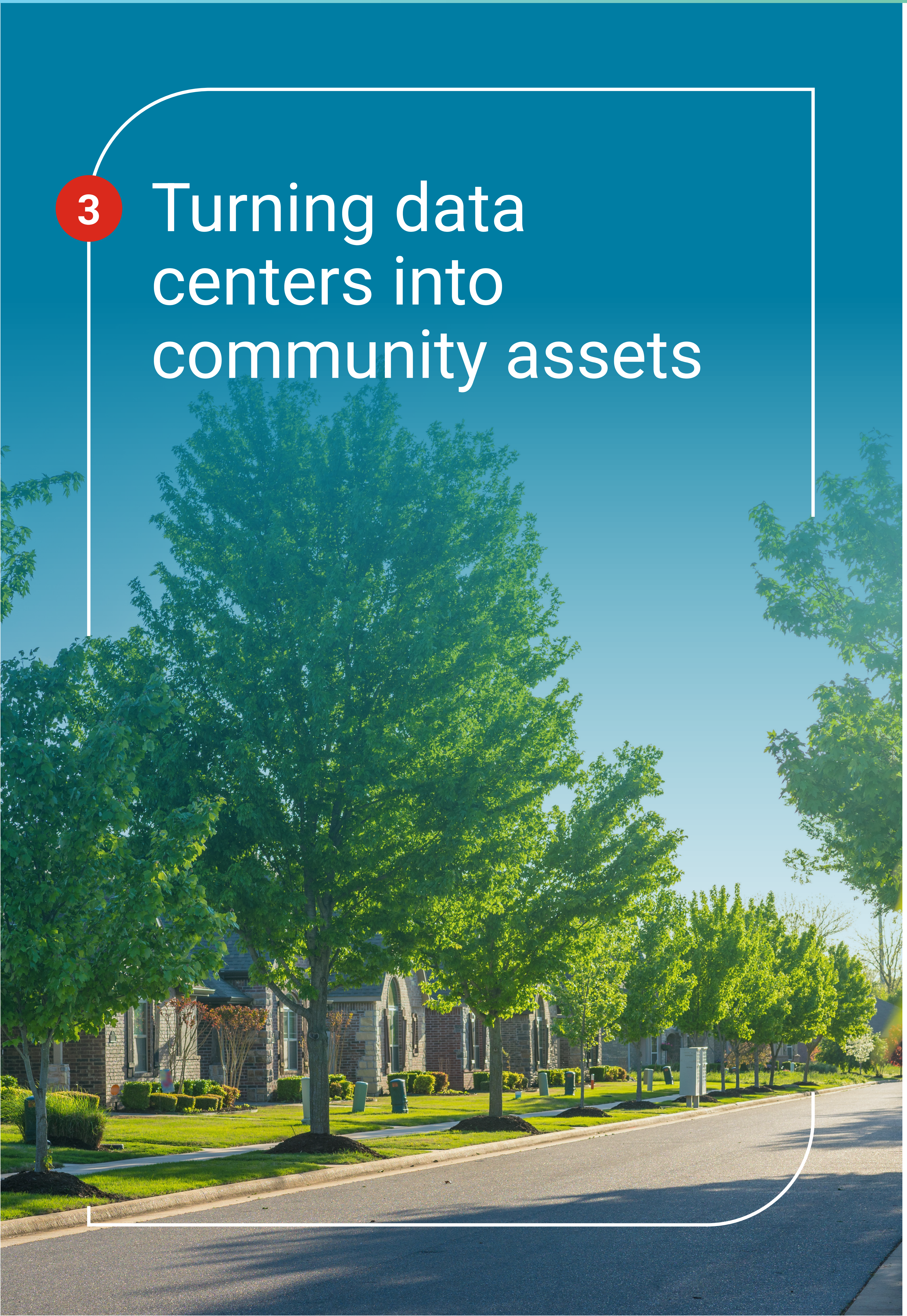
In response, **data center operators are taking a more proactive, collaborative approach**, working with water and wastewater utilities to co-develop water reuse projects, manage diversified water portfolios and jointly invest in solutions that address aging infrastructure, leakage and long-term resilience while reducing dependence on freshwater supplies.

Delivering on these strategies depends on smarter, more connected systems. That includes real-time sensing, metering and analytics to improve transparency, optimize cooling performance and support regulatory and community reporting. That's where Xylem really shines, focused on **"building water-secure communities by enabling real-time monitoring and maintenance tools. This approach facilitates scaling and adapting infrastructure as data center footprints spread geographically,"** Johnson said.

Aligning data centers with local grid modernization efforts further shifts them from passive, high-demand loads to active grid participants and contributors to the overall dialogue surrounding data centers. Bell & Gossett solutions, like the Series e-80 in-line pumps, integrate with variable frequency drives and sensored or sensorless control capabilities to deliver space-saving, energy-efficient performance. The result is cooling and water infrastructure that not only improves WUE and PUE but also strengthens grid stability and supports the transition to more resilient, sustainable energy systems.



3 Turning data centers into community assets

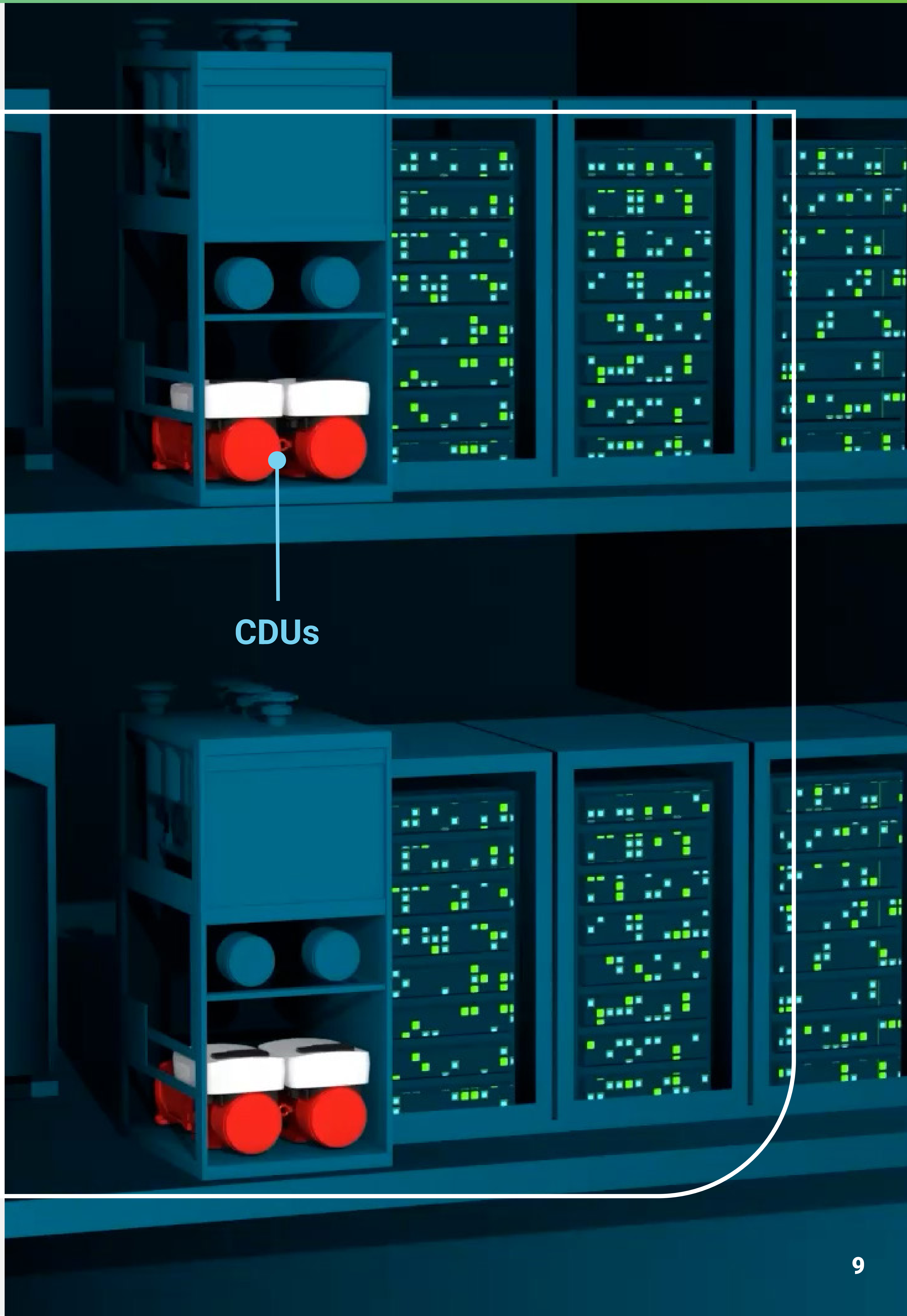


Liquid cooling optimizes data center efficiency by leveraging fluids that transfer heat up to 1,000 times more effectively than air, supporting high-density AI workloads while reducing energy and water usage.

> "With data centers decentralizing geographically, consistency in cooling performance is critical to maintaining operational stability,"
>
> said Johnson.

By capturing heat directly from high-power components like **CPUs and GPUs** into a liquid medium, liquid cooling systems generate higher-grade, recoverable heat that's much easier to reuse.

That recovered heat can be fed into **district heating networks**, where centralized systems distribute thermal energy to nearby buildings and campuses, using efficient pumping and advanced controls. Paired with high-temperature liquid transport and circular water systems, data centers can manage cooling, heat recovery, reuse and discharge as one integrated ecosystem, reducing total water withdrawals, cutting emissions and improving energy resilience.



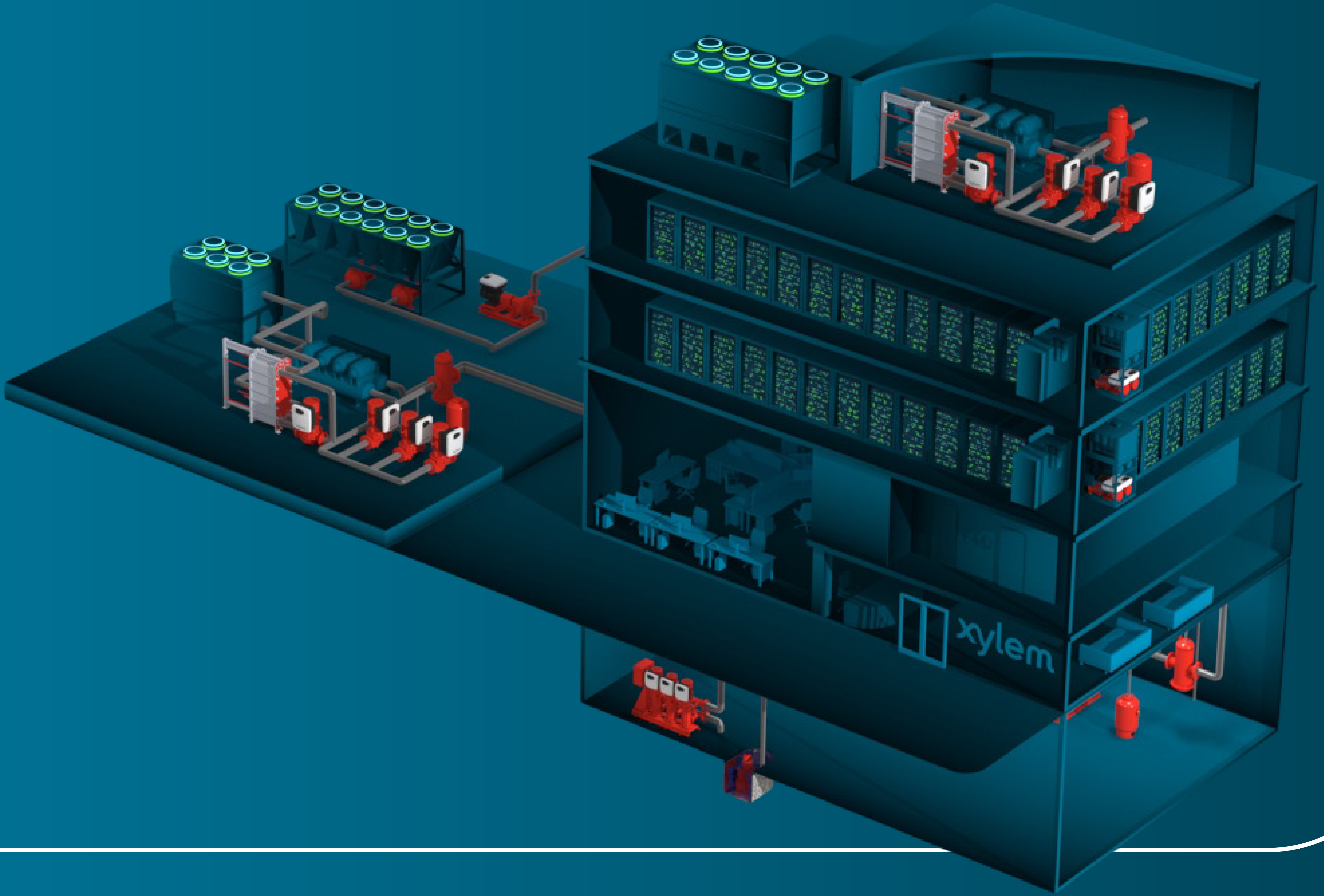
Cooling that delivers more: Why a system-level approach is key

Liquid cooling represents a **system-level opportunity** to rethink water use in data centers. By moving from energy- and water-intensive air cooling to closed-loop liquid systems, operators can measurably improve WUE, turning water efficiency gains into stronger operations, greater resilience and tangible benefits for local communities.

Beyond this, complementing liquid cooling strategies and hydronic intelligence with other solutions like **heat exchangers, water metering, water treatment and filtration systems, and modular pumps** elevates component solution thinking to whole system thinking. Ultimately, it starts with metrics, but metrics mean nothing without making deliberate equipment choices that unify the broader data center build and design.

See how liquid cooling systems use water more efficiently.

Visit our Liquid Logic data center tour to explore our system-level approach.



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