

# CIOReview

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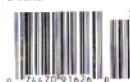
The Navigator for Enterprise Solutions

CIOREVIEW.COM



**LEADING  
AN EVOLUTION  
OF DATA  
CENTER  
COOLING**

**LiquidCool**  
SOLUTIONS





# LiquidCool SOLUTIONS

## LEADING AN EVOLUTION OF DATA CENTER COOLING

For decades data centers have relied on air cooling systems, a technology that's increasingly showing its limitations. As the appetite for high-performance computing and AI-driven applications grows, conventional cooling methods are struggling to manage the heat generated by ever more powerful servers.



Herb Zien,  
Vice Chair

Herb Zien, Vice Chair of LiquidCool Solutions (LCS), vividly recalls encountering this challenge.

"I remember my first visit to a data center years ago. The scene was eye opening. Racks of servers generating immense heat while massive air handlers in the penthouse operating at full speed to pump air. Using air—nature's insulator—to blow heat away? It makes no sense."

But why has this inefficient cooling method remained the standard for so long?

The answer lies in a mix of familiarity, risk aversion and the 'if it ain't broke, don't fix it' mentality. But there is a silver lining because the chips are becoming too hot and air can't do the job anymore. Data centers have begun incorporating various forms of liquid cooling, including rear doors, in-row cooling and direct-to-chip solutions.

"While these represent steps in the right direction, they're not the best solution. Many current liquid cooling solutions are still compromises. They're trying to adapt liquid cooling to existing air-cooled infrastructure, rather than fully embracing the potential of immersion cooling," adds Zien.

LCS's cooling solution overcomes these limitations with its patented total immersion with directed flow (TIDF) technology. This innovative approach uses chassis immersion combined with forced convection, offering an advanced method for heat dissipation. The technology enhances performance while reducing component wear and tear, addressing common concerns about the potential risks of liquid cooling, such as leaks and damage to electronics.

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“Server cooling is just the beginning. We’re working to future-proof digital infrastructure, significantly reduce carbon footprint and lay the groundwork for the next generation of computing power. This transition represents a crucial step forward in data center efficiency and sustainability,” says Zien.

#### HOW TIDF TECHNOLOGY WORKS ITS MAGIC

TIDF technology combines the energy efficiency of total immersion with targeted heat removal capability of cold plates and all heat generated in the server is removed by a non-conductive, non-toxic coolant. The server fits in standard data center racks.

This single-phase immersion process, combining direct-to-chip and total immersion cooling in a vertical rack, offers a groundbreaking solution to the heat management challenges faced by modern data centers.

The effectiveness of this approach is remarkable. LCS technology can support high-density computing up to 4kW per server and recapture input energy in the form of a 60C liquid. This makes it the most energy-efficient, cost-effective and environmentally friendly approach to data center heat management available today.

#### COOLING THE COSTS, HEATING UP THE BENEFITS

LCS offers a compelling alternative for CIOs and data center operators, delivering significant benefits. Substantial cost reductions are a primary advantage. By adopting the cooling system solution, organizations can reduce maintenance costs by

up to 90 percent, lower energy expenses by 40 percent and cut the overall cost of building a data center by half. These savings aren’t just upfront—they continue to deliver financial benefits throughout the facility’s lifecycle.

The system’s energy efficiency significantly lowers CO<sub>2</sub> emissions, addressing the growing concern over the environmental impact of IT infrastructure.

“The National Renewable Energy Lab tested our product in its Colorado data center for two years, declaring it the gold standard for cooling electronics in buildings with connected heating loads due to the ease of heat recapture. NREL also noted that, if U.S. data centers had used our technology instead of air cooling in 2016, it would have saved approximately 13 million tons of CO<sub>2</sub>,” adds Zien.

Space optimization is another key advantage. The solution’s compact design eliminates the need for hot/cold aisles and bulky air-handling equipment, reducing facility square footage by up to 70 percent. This approach cuts real estate costs and maximizes computing power per square foot. Such efficiency is crucial in the era of exponential data growth.

The modular design also allows for seamless scalability, from a single device to hundreds of racks, making it suitable for traditional data centers and edge computing scenarios. This adaptability is essential as organizations strive to bring computing power closer to data sources and end users.

The reliability of submerging electronics in dielectric liquid addresses a major concern in data center operations. This protects against common issues like thermal fluctuations,

oxidation and electrostatic discharge, which often plague air-cooled systems. For CIOs overseeing a migration, this enhanced reliability minimizes the risk of downtime and equipment failure during and after the transition.

Complementing this reliability is the plug-and-play nature of LCS’s solution. Off-the-shelf components from major providers like Intel, Nvidia, AMD and Supermicro ensure ease of implementation while delivering unique solutions to customer problems.

This simplicity stands in stark contrast to the complex upgrades often associated with data center migrations. It significantly reduces the time and resources typically involved in such transitions.

#### MAKING A BIG SPLASH

New ideas often require a steep learning curve, especially in an industry as critical and risk averse as data center management.

“It is a leap and these are big bets—data centers are very expensive—but we’ve created an easy path for CIOs to decide whether they want to move forward with this idea or not,” explains Zien.

Anticipating the challenges, LCS introduced a user-friendly approach—the Small-Scale Solution.

The test rig—Small-Scale Solution—comprises four servers in a compact 24U rack, offering a low-risk, high-reward opportunity for potential clients to experience the benefits of LCS technology firsthand. The turnkey system can be operational within two hours of delivery. It allows users to familiarize themselves with the interface, observe maintenance procedures and monitor efficiency metrics and internal rack temperatures in real-time.

“If you have power and connectivity, you’re good to go,” says Zien.

To further mitigate financial risk, LCS has implemented a buy-back program. Clients can purchase the test rig for \$60,000 and, upon completion of their evaluation, sell it back to LCS for \$50,000. This results in a modest \$10,000 investment for a comprehensive, hands-on assessment of the technology.

A major electric utility demonstrates the small-scale solution’s effectiveness. The client installed the test rig in a challenging environment—a coal-fired power plant’s turbine room with temperatures averaging 30°C and significant dust exposure. Despite these adverse conditions, the system performed exceptionally well, consistently achieving a power usage effectiveness of 1.04, far surpassing the industry standard.

This dramatic improvement in energy efficiency convinced the utility to invest in 40 customized LCS servers, tailored to its specific requirements. The success has led to a ripple effect, with the utility planning to replace its existing servers with LCS technology as they come up for refresh.

#### OUTPACING THE PACK

“The feedback has been positive, as customers have been ordering more products. We’re just getting started, having shifted from science to sales two years ago. Now we have products based on the 64 patents we hold,” says Zien.

The company’s progress stems from its team’s diverse experience, including members with backgrounds from established tech like Dell, IBM and Cray.

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“Our team joined because they wanted to be part of the endgame for cooling electronics,” adds Zien.

This wealth of experience positions LCS at the forefront of addressing challenges that many in the industry haven’t even recognized yet.

Its foresight is evident in its approach to edge computing, where latency and proximity to end-users are becoming critical factors. The miniNODE, capable of being mounted on a light pole, exemplifies LCS’s readiness to meet the evolving demands of the digital landscape. This aligns with industry trends like the proliferation of 5G and future 6G technologies, as the infrastructure for wireless communications shifts toward small towers at the network edge.

Looking ahead, LCS is embarking on a growth phase, seeking funding to expand operations while maintaining its focus on technology development. By partnering with contract manufacturers, it ensures scalability and flexibility in production, ready to meet the increasing demand for innovative cooling solutions.

The future of data center cooling is here and forward-thinking organizations are seizing the opportunity to transform their operations. LCS is a worthy partner in this revolution, offering liquid cooling solutions that significantly enhance performance and environmental responsibility in the data center industry at a much lower cost than any other technology including legacy air cooling. 