

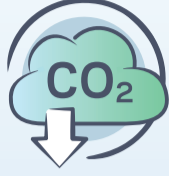
A New Standard for Data Center Energy Efficiency

Two-Phase Immersion Cooling Using Opteon™ 2P50 Developmental Fluid*

Two-phase immersion cooling (2-PIC) technology, when combined with new low GWP fluid, has the potential to be the most sustainable data center cooling solution.¹



Lowest energy consumption



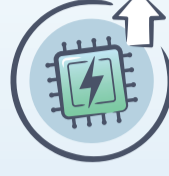
Lowest CO₂ equivalent emissions



Lowest water usage




Lower cost of ownership than air-cooled systems²



Best cooling capability for ever-increasing TDP

A GROWING CHALLENGE

Worldwide, data centers consume:

~300 
terawatt-hours (TWh) of electricity³

While producing nearly: **1%**

of energy-related carbon emissions⁴

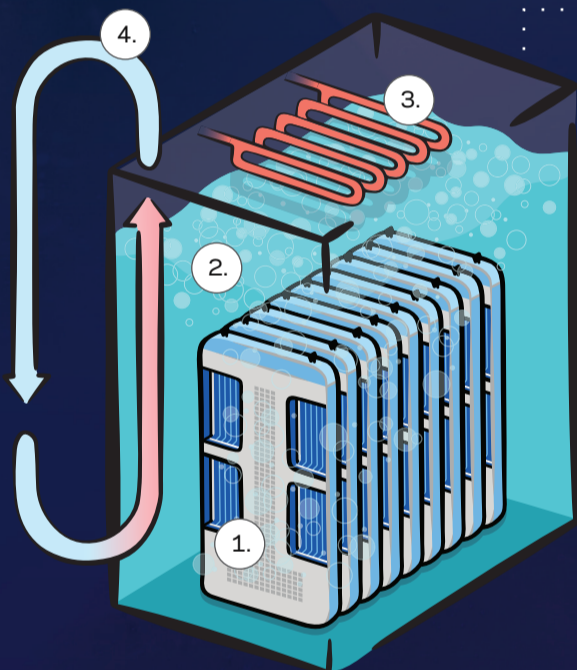
The global data infrastructure market is projected to grow at a CAGR of

12%

through 2030⁵








THE SOLUTION



How 2-PIC works

- 1 Electronic equipment is placed inside a sealed tank filled with Opteon™ dielectric fluid.
- 2 The heat from the electronic equipment causes the fluid (thanks to its ideal boiling point) to boil.
- 3 Vapor rises and condenses back to a liquid when it makes contact with the condenser coils.
- 4 The fluid returns to the pool.

Benefits vs. Conventional Air/Water Cooling

-  **Lower energy usage**
Boosts data center energy efficiency by as much as 40%.
Reduces the energy consumption of the cooling system by more than 90%.
-  **Improved system reliability**
Fewer mechanical components (fittings, added filters, pumps, etc.) versus other cooling technologies, including cold plate and single-phase immersion systems. Also reduces space requirements by 60%.
-  **Negligible water usage**
Reduces water consumption by 99%.
-  **Longer hardware life**
Doubles the lifespan of IT equipment vs. air cooling.
-  **Higher power density**
Can increase potential power density by a factor of 10 while keeping overall temperatures lower.

Two-phase immersion cooling using dielectric fluids is critical technology for:

Advancing next-generation computing speeds

Competing cooling technologies simply lack the necessary heat-transfer capabilities required to enable high-powered computing and ever-faster processing speeds.

Realizing circularity

Two-phase immersion cooling fluids can operate with minimal leaks and enable the reprocessing/reuse of existing fluid—reducing environmental impacts and maximizing circularity.

Achieving climate goals

Realizing the aims of the EU Green New Deal, REPowerEU, and green data center initiatives requires a move away from competing cooling technologies, which consume far too much energy and water.

Attaining industry growth targets

Two-phase immersion cooling technology dramatically reduces the square footage, cooling infrastructure, and water required to operate a data center, reducing operating expenses and maximizing capital investments.

¹ "Two-Phase vs. Single-Phase Immersion Cooling Fluids: Deconstructing Myths with Science," LiquidStack in association with Chemours, liquidstack.com, May 2022, pg. 2.

² Ibid., pg. 16.

³ "Data Centres & Data Transmission Networks," IEA, <https://www.iea.org/energy-system/buildings/data-centres-and-data-transmission-networks>.

⁴ Ibid.

⁵ "Global Data Center Infrastructure Market Size, Share to Grow \$120B by 2030," Spherical Insights, <https://www.globenewswire.com/en/news-release/2023/02/14/2607416/0/en/Global-Data-Center-Infrastructure-Market-Size-Share-To-Grow-120-Billion-By-2030-CAGR-12.html>.

(*) pending regulatory approval

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