

Next Generation Data Center Cooling: Unlocking Efficiency, Enablement, and Savings



Case study data:

Advanced cooling technologies in data centers can generate up to¹



17%

lower energy consumption²



16%

reductions in capital expenditure²



88%

reduction in facility-related operational costs²



40%

lower Total Cost of Ownership²

In a world driven by AI and high-performance computing, data centers face increasing challenges in cooling demands from **next-generation processing chips and operational efficiency.**



Industry leaders in data center cooling have collaborated on a new **Total Cost of Ownership (TCO) tool** to evaluate next-generation cooling technologies that have shown promise in addressing industry challenges.

These advanced cooling technologies significantly **lower energy and water usage**, optimizing cost and space across diverse climates.

The TCO tool uses a foundation of established data, ensuring transparency and reliability in every calculation.

A joint study applied data center design best practice for cooling systems **including individual design requirements by technology.**

Two-Phase Immersion Cooling (2-PIC)	Single-Phase Immersion Cooling (1-PIC)	Direct-to-Chip (DTC)
Fluid Coolers Chillers Facility Water Pumps Immersion Tanks	Fluid Coolers Chillers Facility Water Pumps Tech. Fluid Pumps Immersion Tanks	Fluid Coolers Chillers Facility Water Pumps Tech. Fluid Pumps Computer Room Air Handler Server Fans

The **TCO tool was used to analyze impacts on energy, water, and costs** to assess efficiency in a range of climates.

In the US location study results 2-PIC demonstrate a lower:

- **Power Usage Effectiveness (PUE)** Up to around **12%** lower energy consumption
- **CAPEX** Reductions of up to **16%** in capital expenditure
- **OPEX 74%** in facility-related operational costs



Two-Phase Immersion Cooling emerges clearly as the optimal solution, **offering unrivaled energy efficiency plus power, water usage effectiveness and the lowest total cost of ownership across global climates.**²

Learn about optimizing Data Center efficiency

Access the full report and explore how these insights can drive your operations toward efficiency and sustainability.



Opteon™ 2P50 a Developmental Dielectric Fluid*

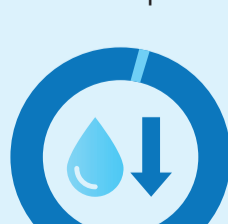
by Chemours

*Pending regulatory approval

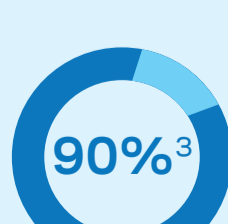
A breakthrough high-performing fluid for Two-Phase Immersion Cooling



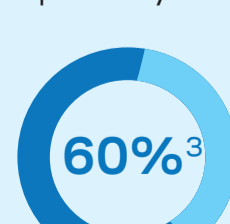
Nearly eliminates cooling-related water consumption.²



Reduces cooling energy use by more than



Reduces data center physical footprint by nearly



¹ When compared to single phase immersion and single phase direct to chip.

² Analysis results in 4 global locations; US, UAE, Denmark and Singapore from the study *Comparison of Server Liquid-Cooling Technologies*, Syska Hennessy Group, Inc. March 2024

³ Compared to traditional air-cooling technologies.