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**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.**

**How 2-PIC works**

Electronic equipment is placed inside a sealed tank filled with Opteon™ dielectric fluid.

The heat from the electronic equipment causes the fluid (thanks to its ideal boiling point) to boil.

Vapor rises and condenses back to a liquid when it makes contact with the condenser coils.

The fluid returns to the pool.

**Worldwide, data centers consume: ~300 terawatt-hours (TWh) of electricity.**

**While producing nearly: 1% of energy-related carbon emissions.**

**The global data infrastructure market is projected to grow at a CAGR of 12% through 2030.**

**The SOLUTION**

**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.

**Benefits vs. Conventional Air/Water Cooling**

- Lower energy usage: Boosts data center energy efficiency by as much as 40%.
- Improved system reliability: Fewer mechanical components (fitting, added filters, pumps, etc.) versus other cooling technologies, including cold plate and single-phase immersion systems. Also reduces space requirements by 60%.
- Higher power density: Can increase potential power density by a factor of 1.0 while keeping overall temperatures lower.
- Negligible water usage: Reduces water consumption by 99%.
- Longer hardware life: Doubles the lifespan of IT equipment vs. air cooling.
- Lower energy consumption: Boosts data center energy efficiency by as much as 40%.
- Lowest energy consumption
- Lowest CO2 equivalent emissions
- Lowest water usage
- Lower cost of ownership than air-cooled systems
- Best cooling capability for ever-increasing TDP
- Lowest energy consumption
- Lowest CO2 equivalent emissions
- Lowest water usage
- Lower cost of ownership than air-cooled systems
- Best cooling capability for ever-increasing TDP

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

- Advancing next-generation computing speeds
- Achieving climate goals
- Attaining industry growth targets

**Real Data Center Infrastructure Market Size: Shows How to Strike 2030 with 2020 Data**


(*) pending regulatory approval

2 Ibid., pg. 16.
3 Data Center & Data Transmission Networks, "G.A. Alts, "How to engineer energy systems that use water and data transmission networks.
4 Ibid.
5 "Global Data Center Infrastructure Market Size: Shows How to Strike 2030 with 2020 Data," Globenewswire, 02-14-2023. CAGR 12.1%.
6 One-Pic Electron, 2023: "The Global Data Center Infrastructure Market Size: Shows How to Strike 2030 with 2020 Data." CAGR 12.1%.