

FLASH REPORT: IMMERSION COOLING FLUIDS IN DIGITAL INFRASTRUCTURE: FUNDAMENTALS OF THE GROWTH SEGMENT

Emerging Opportunities Series

WHAT'S NEW?



It is not often traditional products face the prospect of a **new outlet well-aligned with a mega-trend like Digitalization**, creating a promising new playing field.

Correctly estimating the opportunity based on **where-to-play and right-to-win** requires several steps, starting with a **pragmatic view of the fundamentals of the opportunity** to make go/no-go decisions.

This is the purpose of our Flash Report on ***Immersion cooling fluids in Digital infrastructure***.

WHAT'S IT ABOUT?



Global electronic cooling technology is driven by **new performance requirements**.

As society's data processing needs grow with the rise of the data economy, there is a need for **higher-performance, smarter, more energy/cost-efficient, and sustainable data centers**. Immersion cooling can help solve these challenges.

This report is focused on digital applications. It expands and complements our existing body of work on EV cooling evolution and will be a part of our ***Emerging Opportunity tracking program***.

WHY LOOK INTO THIS SPACE?



Immersion cooling technology offers superior performance compared with other technologies, pointing to **value potential**.

Fluid manufacturers developing products for emerging EV thermal management applications could uncover **synergies in the emerging data server (cloud computing, cryptocurrency) applications**.

Taking advantage of this growing space will require a sector-specific and compelling value proposition balancing the key needs: **Performance, Cost, Sustainability**.

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IMMERSION COOLING TECHNOLOGY OVERVIEW → TECHNOLOGY LANDSCAPE

- What is the technology?
- What does it entail?
- What are its advantages and drawbacks compared to other routes of thermal management?



IMMERSION COOLING FLUID MARKET LANDSCAPE → INTER-PRODUCT COMPETITION LENS

- What are the various immersion cooling fluids being offered?
- How do they vary in terms of chemistry; thermal and electrical properties; fluid life and maintenance practices; sustainability (carbon footprint and recycling potential); and fluid cost?
- Who are the key suppliers of these fluids? What are the fluids that they offer?



THERMAL MANAGEMENT IN DIGITAL INFRASTRUCTURE → CUSTOMER NEEDS LENS

- What are the key customer segments?
- What are the current thermal management practices in various digital infrastructure segments – cloud computing, cryptocurrency mining, and other applications?
- What are the performance requirements from the thermal management process in terms of heat removal / reuse, thermal fluid life, recycling, sustainability, and operating costs?
- How do immersion cooling fluids compare with other thermal management technologies vis-à-vis the key customer needs?
- What are commercial considerations when choosing cooling fluids?



MARKET DRIVERS AND OUTLOOK → PARAMETERS OF THE OPPORTUNITY

- What is the overall thermal fluid demand in volume and value terms? What is the share of immersion cooling fluids?
- Geographic demand heatmap & customer footprint (key regions)
- 5- and 10-year outlook for immersion coolants; key drivers and restraints for growth in immersion cooling technology
- Key developments/activity, regulatory updates in the market impacting the demand for these fluids
- Kline view: key take-aways on market assessment and opportunities

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