INDUSTRY PERSPECTIVE

AI is Rewriting the Data Center Cooling Playbook

Technology shifts, competitive moves and growth opportunities for equipment suppliers

October 2026

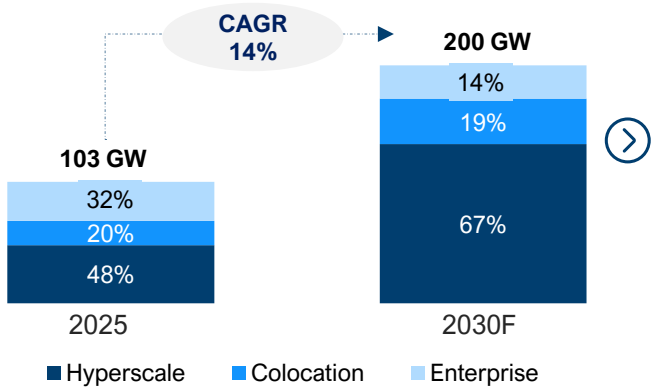


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Why data-center demand is accelerating

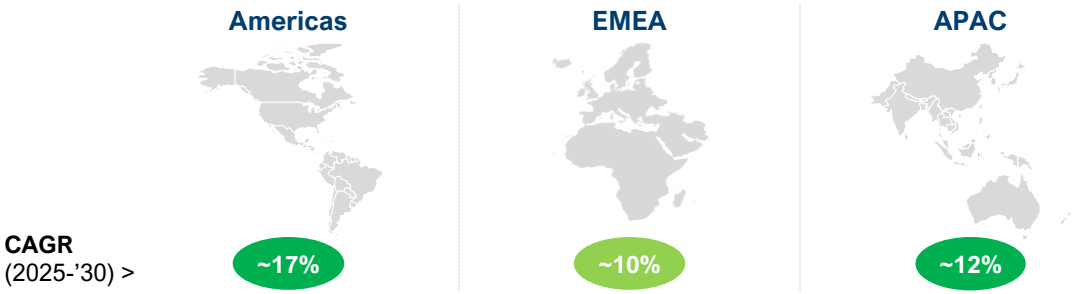
Data-center capacity is expanding rapidly, with AI emerging as a major growth driver alongside cloud migration and digitalization

Global Data Center Capacity (GW)[1]



The capacity split reflects data-center operating models rather than end-user demand; hyperscalers increasingly lease capacity from colocation providers, creating overlap between the two segments.

Data Center Capacity Growth Through 2030 By Region[1]



Key Demand Drivers Behind the Growth

AI & Generative AI

- Fastest growing driver of data center demand
- Increasing compute intensity and rack densities
- Driving next-generation infrastructure requirements

Digitalization

- Rising data volumes from streaming, e-commerce, fintech and online services
- Increasing storage and processing requirements
- Greater data movement and interconnectivity

Connectivity (5G/ IoT)

Expansion of 5G networks

Growing IoT devices and data generation

Higher bandwidth and processing needs

Cloud & Hyperscale Expansion

- Public-cloud migration across industries
- Continued hyperscaler capacity expansion
- New multi-GW data center deployments

Enterprise & Edge Compute

- Growing enterprise IT modernization
- Increase in edge and distributed compute
- Support for real-time and latency-sensitive applications

Data Sovereignty & Localization

- Stricter data regulations across regions
- Investment in local data-center infrastructure
- Growth in sovereign and government – backed projects

AI is reshaping data center deployment, driving hyperscale and colocation expansion as enterprises increasingly shift workloads to cloud platforms. As AI also raises rack power density & thermal intensity, the resulting opportunity extends beyond new-build capacity to retrofits and upgrades of the existing installed base, with the US leading the transition.

Sources: Industry reports, News articles, Aranca Research, Aranca Analysis

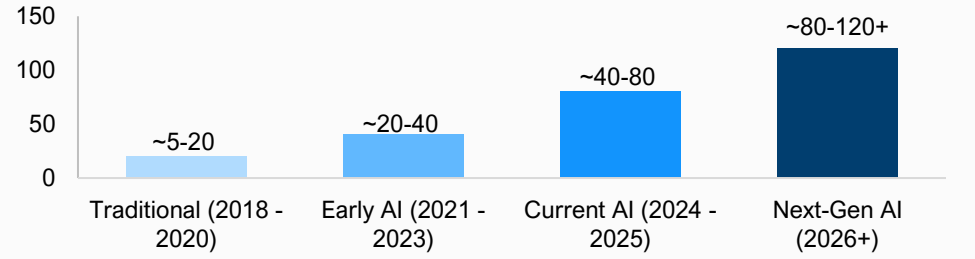
Note: 1.Market outlook and regional CAGR estimates are indicative and may vary by market

Why AI is creating new cooling requirements

As AI workloads scale, higher GPU density is driving up rack power and heat generation, pushing conventional air-cooling systems toward their limits

01. AI-DRIVEN DENSITY SHIFT | AI workloads are significantly increasing rack power densities, transforming data-center infrastructure

Evolution of High-Density AI Racks (Rack Power Density, kW/rack)

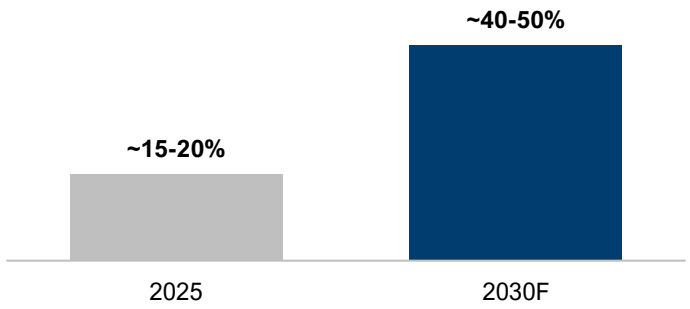


Conventional vs. AI Rack Density

Conventional Rack	AI Rack (Current/ Next-Gen)
5 -20 kW	**40 -120+ kW**
 ▪ CPU-based servers ▪ General purpose workloads ▪ Air cooling sufficient for most deployments	 ▪ GPU/ accelerator-based servers ▪ High-performance AI training/ inference ▪ Requires liquid cooling at higher densities

02. IMPLICATION FOR COOLING ARCHITECTURE | Increasing AI penetration is driving adoption of liquid cooling technologies

AI Share of Global Installed Data-center Capacity (%)



Challenges from Rising Rack Density

Challenges	Why it matters for cooling
More GPUs per rack *AI drives higher power needs*	• AI training and inference use increasing numbers of GPUs and accelerators • More chips packed into each rack - more power consumed & more heat generated
More heat per chip *Harder to keep cool*	• Newer AI chips generate more heat in a smaller space • This creates hot spots that are harder to manage with air cooling
Higher rack power *More heat to remove*	• Rack power is moving from conventional 5–20 kW toward 40–120+ kW • Higher-power racks require cooling systems to remove much more heat continuously
Air cooling faces increasing constraints	• Higher-density racks require much more airflow and fan power • Air cooling becomes difficult to scale efficiently as rack power continues to rise

As AI drives higher rack power and heat generation, conventional air cooling is becoming increasingly constrained — accelerating the shift toward liquid-cooling solutions

Sources: Industry reports, News articles, Aranca Research, Aranca Analysis

The shift from air to liquid cooling is reshaping data-center architecture, introducing new requirements for fluid distribution and heat rejection from the server rack to the facility

COOLING ADOPTION OUTLOOK | Hyperscalers are leading liquid-cooling adoption, with uptake gradually expanding to colocation & enterprise

	Low density →	High density →	Very High density
Data Center Segment	**Air Cooling**	**Direct Liquid Cooling**	**Immersion Cooling**
Hyperscale *Cloud & AI Providers*	↓ ***Declining Share*** *(Remain for non-AI/ legacy)*	↑ ***Rapid adoption*** *(Default for AI racks)*	→ ***Emerging/ Selective*** *(Used in select ultra-high-density)*
Colocation *Multi-tenant centers*	→ ***Predominant, declining share*** *(Near-term for most deployments)*	↑ ***Growing adoption*** *(New builds and retrofits)*	↓ ***Very Selective*** *(Limited to specific deployments)*
Enterprise *On –premise*	● ***Predominant*** *(Most deployments)*	→ ***Selective adoption*** *(Specific high-density use cases)*	↓ ***Niche/ Limited*** *(Early stage)*

COOLING ARCHITECTURE SHIFT | Liquid cooling changes how heat is captured, distributed and rejected - from the server rack to the facility

Data Center Level	Air Cooling Uses ambient air to remove heat via fans and heat exchangers`	Direct Liquid Cooling Circulates liquid to remove heat directly from chips via cold plates	Immersion Cooling Submerges servers in dielectric fluid to remove heat
Server/ Rack *Heat capture at the chip & rack level*	 ▪ Fans and heat sinks ▪ Rear-door heat exchangers (optional)	 ▪ Cold plates ▪ Manifolds and quick disconnect	 ▪ Immersion tank ▪ Dielectric fluid ▪ Internal fluid circulation
Room/ Row *Fluid distribution, control & monitoring*	 ▪ CRAC / CRAH units ▪ Containment systems	 ▪ Coolant Distribution Units (CDUs) ▪ Pumps ▪ Piping, valves and controls	 ▪ Fluid circulation units ▪ Filtration & fluid management
Facility *Heat rejection & thermal management*	 ▪ Chillers ▪ Cooling towers	 ▪ Chillers / dry coolers ▪ Heat exchangers ▪ Facility distribution loop	 ▪ Dry coolers / cooling towers ▪ Heat rejection loop ▪ Fluid storage & treatment

Key Highlights

- **Hyperscale leads liquid-cooling adoption**
  AI-driven deployments are making direct liquid cooling (DLC) the default architecture, with early adoption of immersion for ultra-high-density racks
- **Colocation is a key growth segment**
  Colocation remains predominantly air-cooled in the near term, but is increasingly adopting DLC for new builds and retrofits to support AI customers and higher-density racks
- **Enterprise adoption remains selective**
  Most enterprise data centers continue to rely on air cooling, with liquid cooling limited to specific high-performance computing or AI use cases

Sources: Aranca Research, Aranca Analysis

↑ **Growing** Adoption → **Selective /** Emerging ● **Predominant /** Established ↓ **Declining /** Limited

The move to liquid cooling is broadening the supplier landscape, with players expanding beyond individual components to build broader, integrated solutions across the cooling value chain

Liquid-Cooling Ecosystem Across Data Center Levels

1. Server/ Rack Level

Cold Plates



Manifolds



Quick Disconnects (QDs)



Immersion Tanks



Hoses/ Tubing



2. Room/ Row Level

CDU (Thermal Mgmt.)



Heat Exchangers



Pumps, valves and controls



Fluid distribution



Filtration & fluid mgmt.



3. Facility Level

Facility Loop



Heat Exchangers



Dry/ Adiabatic Coolers



Chillers



Key Stakeholders	Key Players	Primary Role	Presence Across Levels			Key AI-Driven Requirement Shift	What They Are Doing to Capture AI Demand
			Server/ Rack	Room/ Row	Facility		
Chip / Server OEMs & Hyperscalers	NVIDIA, Supermicro, DELL, aws, AMD	Define computing architectures and cooling requirements, driving liquid-cooling adoption	✓	-	-	▲ Rack density ▲ Thermal load ▲ Liquid adoption	***Co-designing liquid-cooled racks*** *and setting interface specifications (OCP)* *e.g., NVIDIA Rubin racks are 100% liquid-cooled at 45°C supply*
Cooling Component Manufacturers	CoolIT systems, BOYD THERMAL by EATON, motivair by Schneider Electric	Supply specialized components for liquid-cooling systems	✓	✓	-	▲ Flow ▼ Pressure drop ▲ Reliability	***Launching higher-flow, leak-tight quick disconnects*** *and microchannel cold plates; specialists being acquired by industrials* *e.g., Danfoss MQD/ MQDB leak-tight couplings*
Fluid Handling & Mechanical Component Suppliers	GRUNDFOS, xylem, FLOWSERVE, ALFA LAVAL	Supply fluid-circulation, flow-control and heat-transfer equipment	✓	✓	✓	▲ Flow / pressure ▲ Efficiency ▲ Fluid compatibility	***Adapting pump ranges for CDU duty*** *(variable speed, redundancy)* *e.g., Xylem widening its AI cooling portfolio; Alfa Laval entering with FreeWaterLoop*
Cooling Infrastructure Providers	VERTIV., Schneider Electric, ACCELSIUS	Provide integrated liquid-cooling systems and distribution infrastructure	✓	✓	✓	▲ CDU capacity ▲ Redundancy ▲ Integration	***Scaling CDUs from ~1 MW to 14 MW****; launching architecture-agnostic and rack-integrated units* *e.g., Buying specialists to offer chip-to-chiller stacks*
Facility Cooling Providers	VERTIV., Schneider Electric, Johnson Controls, TRANE	Provide facility-level cooling and heat-rejection solutions	-	✓	✓	▲ Heat rejection ▲ Water efficiency ▲ Warm-water cooling	***Shifting to dry coolers and warm-water free cooling*** *as supply temperatures rise* *e.g., Vertiv acquired ThermoKey (dry coolers, heat exchangers)*
Coolant & Water-Treatment Suppliers	Chemours, ECOLAB, Shell	Supply cooling fluids and fluid-treatment solutions	✓	✓	✓	▲ Thermal stress ▲ Compatibility ▲ Reliability	***Qualifying new dielectric and coolant fluids****; bundling water treatment and monitoring with DLC* *e.g., 3M exits two-phase fluids (end-2025)*

Sources: Aranca Research, Aranca Analysis

As the liquid-cooling market evolves, partnerships and M&A are accelerating capability expansion, complementing organic product development and enabling broader thermal portfolios

Liquid-Cooling Industry Transformation

Pre-2024: Early build — *Organic led + Few partnerships*

Initial Product Development And Ecosystem Formation

- **Specialists emerge:** CoolIT, ZutaCore, GRC, Submer and LiquidStack build DLC and immersion; OCP sets common interfaces
- **Partner first, then buy:** Vertiv–CoolTera (Dec 2023)

2025: Scale-up — *Organic-led + Increasing M&A*

Broader Product Launches And Strategic Platform Moves

- **Component launches:** Higher-flow, OCP-aligned products expand liquid-cooling options (Danfoss quick-disconnect couplings)
- **Platform plays:** Schneider takes control of Motivair; Eaton announces to buy Boyd Thermal ($9.5B)

2026: Consolidation — *M&A-led + Continued organic development*

Accelerating M&A To Build End-to-end Thermal Capabilities

- **Deals close:** Eaton–Boyd, Trane–LiquidStack, Ecolab–CoolIT expand integrated cooling capabilities
- **What Next :** Further thermal consolidation and expansion into adjacent AI infrastructure, as illustrated by Vertiv's UIG acquisition

Organic: Product And Portfolio Development

In-house innovation targets larger, integrated and architecture-agnostic systems, and higher-flow components for AI racks

Company	Initiative	Focus Area
Trane	Released CDU 2.X, architecture-agnostic	Flexible CDUs for DLC and immersion
Mitsubishi	Launched a 1.2 MW CDU	High-capacity cooling for AI halls
Accelsius	NeuCool IR150 integrated rack system	Two-phase CDU, manifolds, up to 150 kW
Danfoss	MQD / MQDB quick-disconnect couplings	Leak-tight single-phase DLC connections
Alfa Laval	Entered data centers with FreeWaterLoop	Heat exchange and liquid cooling loops
xylem	Expanded its AI data-center cooling portfolio	Closed-loop flow and water solutions

Inorganic: Partnerships And M&A

Deals capture CDU, cold-plate, heat-exchange and fluid capabilities faster than building; partnerships (Vertiv with GRC, ZutaCore, Compass, NVIDIA) de-risk technology first

Acquirer	Target	Capability Acquired
Vertiv	CoolTera (Dec 2023)	CDUs, secondary fluid networks, manifolds
Schneider Electric	Motivair (control, Feb 2025)	Direct liquid cooling and CDU portfolio
Eaton	Boyd Thermal ($9.5B; Mar 2026)	Liquid-cooling thermal systems
Trane	LiquidStack (Mar 2026)	Immersion and CDU technology
Vertiv	ThermoKey (Mar 2026)	Dry coolers, microchannel heat exchangers
Ecolab	CoolIT ($4.75B; Jul 2026)	DLC cooling added to water and monitoring offer

- *Organic development established the technology base, while partnerships and M&A are accelerating capability expansion*
- *As the market moves toward integrated thermal portfolios, OEMs face strategic choices on where to compete, what to build, and when to partner or acquire*

Sources: Aranca research, Company announcements and 10K reports, Aranca Analysis

The evolving cooling landscape is creating new growth opportunities for OEMs, while requiring strategic choices on where to compete and how to build the right capabilities to win

Key questions that must be addressed aranca

Strategic Initiatives

- Where will the highest-value liquid-cooling opportunities emerge across the server, room & facility levels?
- How will pump, valve & heat-exchanger requirements change as chip power reaches ~2 kW & supply temperatures reach 45°C?
- Which segments and geographies will adopt fastest, and how big is retrofits vs new build?
- Which strategic moves should anchor our short & long-term plan, and what is the case for investment?

Market Opportunity

- Which accounts should we prioritize, and what customer insights will win them?
- Which components face the biggest AI-driven specification shift, and which are only incremental upgrades?
- Which OEMs, hyperscalers and integrators set specifications, and how do we get designed in?
- How are competitors evolving across products, integration & go-to-market?

Partnerships & M&A

- After recent deals, how is the fluid-handling and cooling ecosystem evolving, and who is likely to partner or acquire next?
- Which specialists are worth partnering with or acquiring before others do?
- Should we build, partner or buy to enter CDUs, quick disconnects or cold plates?
- How should we respond as adjacent industrials enter with integrated systems?

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