

Efficient | Adaptable | Profitable

LiquidRack

Spray-Based Liquid Cooling for Next-Gen Data Centers



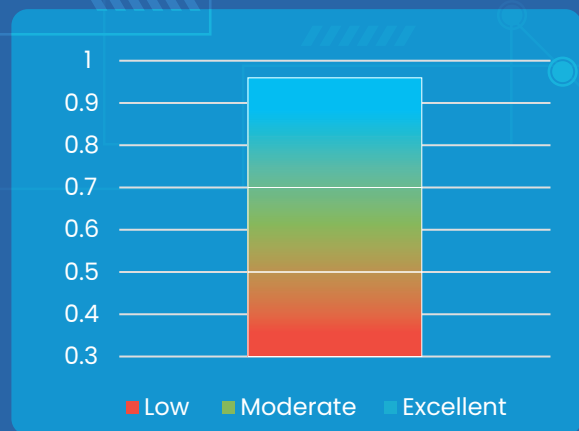
The New Imperative

—Introducing a new metric for the AI era

As compute demand explodes, power—not space—has become the ultimate bottleneck. In many legacy facilities, up to half of the provisioned power is allocated on cooling. That means less capacity for computing, fewer deployed servers, and lost revenue.

How much of your power is computing?
Introducing Power Compute Effectiveness — or **PCE** — a new metric that quantifies how effectively your electrical capacity is turned into IT output.

$$\text{PCE} = \frac{\text{IT Load (kW)}}{\text{Total Data Center Power (kW)}}$$



PCE Benchmark Zones

PCE answers the critical question: Can you deploy more servers without upgrading your power infrastructure? The higher your PCE, the more of your power budget is generating revenue.

PUE drives efficiency. PCE drives profitability.

Metric	PUE	PCE
Measures	Facility overhead	Power utilization
Good When...	Cooling is primary challenge	Power capacity is the bottleneck

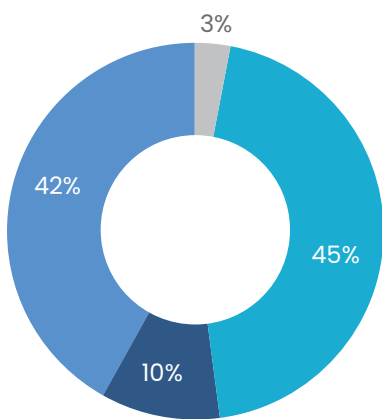
Redefining Cooling as a Growth Engine

- LiquidRack Boosts PCE from ~0.4 to 0.9+

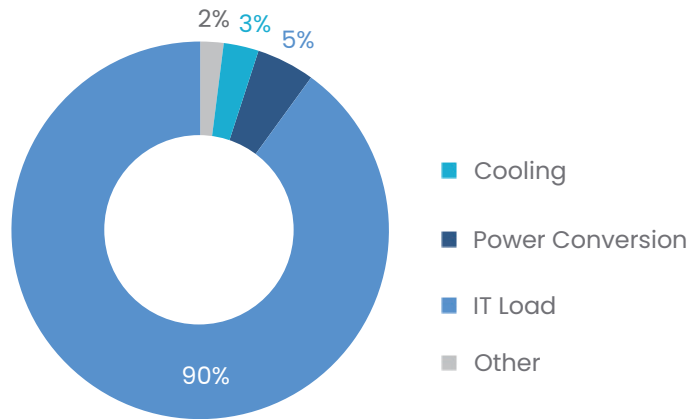
In the past, cooling used to be just a cost. But today, it's a catalyst for growth. **LiquidRack Reclaims Power for Compute.**

By eliminating the use of mechanical cooling, LiquidRack unlocks at least 50% more IT load within the same power capacity envelope. This translates into a substantial PCE boost from ~0.4 to 0.9+, cutting TCO and accelerating ROI. In an existing 10 MW IT load site, LiquidRack will unlock ~2-5MW more for IT equipment.

Conventional Air Cooling DC



LiquidRack Cooling DC



The Change in the Fraction of Data Center Electricity Use

More Computing Power, More Customers Served, More Revenue Generated.



What Is LiquidRack ?

— Features & Benefits

LiquidRack is the **world's first server-level spray liquid cooling solution** with **patented "Jet Impingement"** technology, designed to deliver chip-level precision, modular scalability, and deployment efficiency for both conventional and high-density data center environments.

Below is how each of its core features translates into real-world value for DC operators.

Precision Cooling & Thermal Efficiency

Feature	Benefit
Chip-level Dielectric Spray	<ul style="list-style-type: none">• Delivers coolant directly to hot chips for pinpoint heat extraction• Minimizes thermal resistance, reduces energy waste, and boosts server performance
3D-Printed Custom Sprayers	<ul style="list-style-type: none">• Optimized sprayer design tailored to specific server heat profiles.• Enables rapid customization and delivery across server models• Mitigate supply chain risk
High-Temp Coolant (70°C/158°F)	<ul style="list-style-type: none">• Free cooling with dry coolers across the globe—no chillers needed• Cuts CAPEX and OPEX, enables potential heat reuse.
Rack-Level Capacity up to 175 kW	<ul style="list-style-type: none">• Supports 0.5–17.5 kW per cassette, scalable to extreme rack densities• Unlocks more revenue-generating IT load per rack

Modular Design & Maintenance Simplicity

Feature	Benefit
Independent Server Cooling Loop (Cassette + Hydraulic Kit)	<ul style="list-style-type: none">• Isolates faults, no thermal interference between servers• Enables hot-swappable service and staged rollout
Slide In-and-out, Concealed Cassette Design	<ul style="list-style-type: none">• Allows fast server replacement with zero downtime• Avoid all the mess from liquid on site, extremely maintenance friendly
Dripless Quick Connectors	<ul style="list-style-type: none">• Clean, fast maintenance without fluid spill
Low Coolant Volume (<20% of immersion)	<ul style="list-style-type: none">• Cuts dielectric fluid costs and pump energy• Lowers environmental impact compared to immersion cooling

Infrastructure Flexibility & Retrofit Readiness

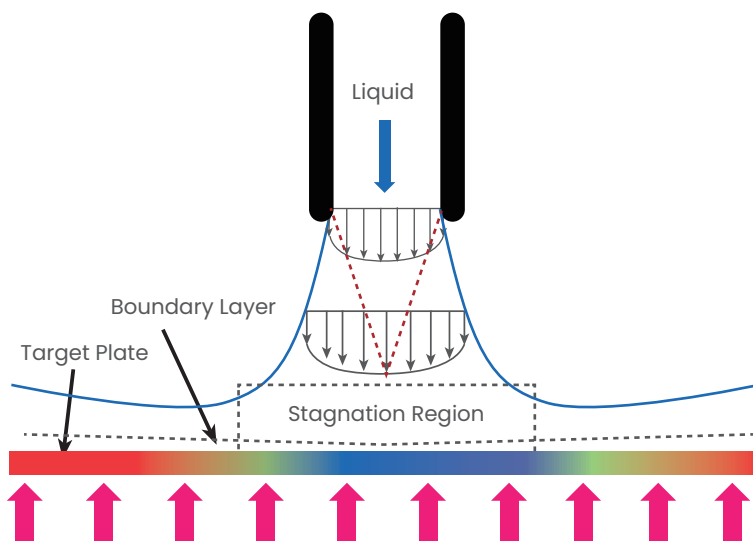
Feature	Benefit
Rack Compatibility	<ul style="list-style-type: none">• Fits directly into legacy or new air-cooled sites• Eliminates the need for complete room redesigns
Built-in CDU	<ul style="list-style-type: none">• Server/Cassette level CDU, save the space for extra CDU and complex plumbing required.• Reduces CAPEX and speeds up deployment

How LiquidRack Works?

—Targeted Jet Impingement Cooling

LiquidRack applies server-level jet impingement cooling to deliver ultra-efficient, chip-targeted thermal management. Each cassette integrates a precision-engineered 3D-printed sprayer that disperses dielectric fluid in intelligently distributed patterns—concentrated directly above the heat source such as CPUs and GPUs, reducing the liquid over low-flux regions while maintaining the high capacity of heat removal.

Jet impingement cooling combines exceptionally low thermal resistance with mechanical simplicity. Liquid jets, formed through straight or a contracting nozzles, are precisely directed onto heat sources. Upon impact, the jet forms a thin stagnation-zone boundary layer with minimal thermal resistance, enabling convective heat transfer coefficients exceeding tens of $\text{kW}/\text{m}^2\cdot\text{K}$.



When paired with 3D-printed sprayer technology, the cooling system enables:

- Precise, high-flux heat removal from critical chip zones.
- Rapid thermal response with minimal temperature fluctuation.
- Custom sprayer geometries optimized for specific server profiles.

Thanks to its high heat transfer efficiency, LiquidRack supports elevated coolant temperatures—up to $70\text{ }^{\circ}\text{C}$ (158°F). This high-temperature operation unlocks system-wide advantages:



~1.03 pPUE



0.9+ PCE



Less Liquid



100% Free Cooling



Heat Recovery

User-Friendly Design

— Fast to Install. Easy to Maintain. Clean to Operate.



01 Open-Rack Concept

LiquidRack is an open, flexible framework.

Standard Cassette is 2U (1U, 3U, 4U or custom size available on request) to match most server profiles. Customer is free to select any type of rack system which fit the most for their application or infrastructure space.

02 Load-Adaptive Design

The cassette is engineered to accommodate various heating loads from 0.5-17.5kW with specific pump and heat exchanger configuration.

03 Any-Server Ready

All kind of servers, air or liquid cooled, legacy and new, could be cooled by LiquidRack. The PSU will be cooled together with the CPU/GPU.

04 Oil Vapor and Leakage Free

The cassettes are designed with a robust sealing system to prevent oil vapor leakage during operation.

No opening of the cassette or handling of liquid on site is required. All service and maintenance will be carried out in the dedicated service area using special tools and equipment

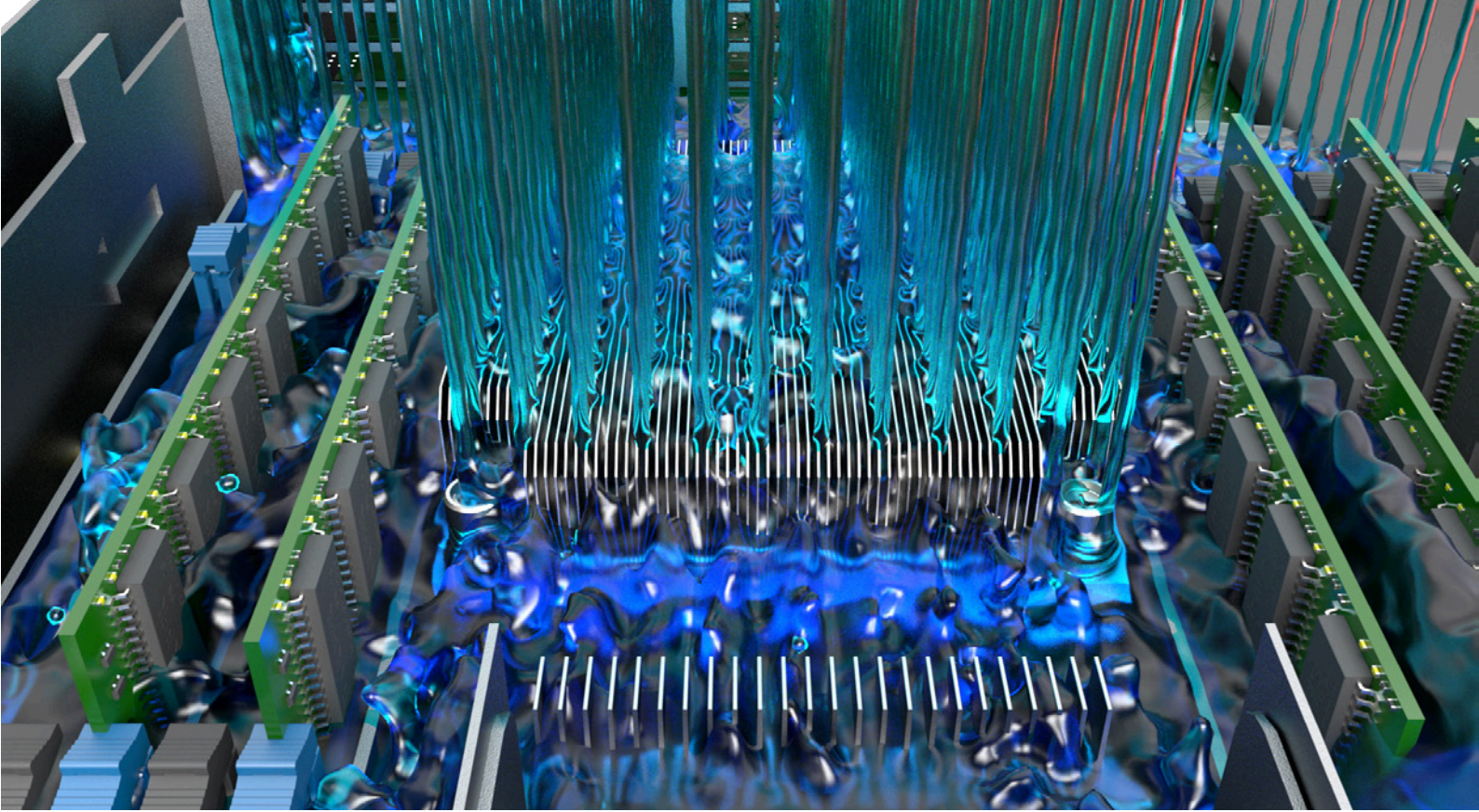
05 Efficient and Reliable Service

RackLift — the motorized trolley engineered for effortless server handling.

Easily lifts cassettes in and out of racks, transports them to the maintenance area, and safeguards operators with a durable, safety-focused design.

06 Control

Touchscreen interface with Modbus/BACnet support, monitoring system conditions (temperature, pressure, flow, pump status, liquid level) and providing local/remote alarms for safe, reliable operation.



Performance Comparison

— Key Metrics. Real Performance.

LiquidRack vs. Immersion Cooling vs. Air Cooling

Feature	LiquidRack	Immersion Cooling	Air Cooling
Cooling Precision	★★★★★ Chip-level spray	★★ Bulk fluid cooling only	★★ Indirect airflow cooling
Server Isolation	★★★★★ Independent cassette loop	★ Shared fluid	★★★★ Server-level separation
Energy Efficiency	★★★★★ Natural cooling, low pump energy	★★★ Low fan power	★★ Limited by ambient Temp
CAPEX	★★★★★ Low, No CDUs & Tanks/ Less oil	★ High, CDUs/Tanks/Oil	★★★★★ Low, standard setup
Cooling Density	★★★★★ 175kW	★★★★ 100~150kW	★ <20kW
Maintainability	★★★★ Oil-free with trolley	★ Oil handling, tank draining	★★★★ Simple
Coolant Volume	★★★★★ ~20% of immersion	★ High volume heavy & costly	★★★★★ None
Retrofitability	★★★★★ No centralized CDU, standard rack	★ Custom tanks required	★★★★ Standardized
Heat Reusability	★★★★ 65°C+/149°F+	★★ 45°C/113°F	★ Very limited

Technical Specifications

Cassette Specification

Server Cassette Space	Specs Basis	2U
	Available Options	1U/3U/4U
Water Specification	Final Heat Rejection Options	<ul style="list-style-type: none"> Chilled water loop Adiabatic/evaporative cooling tower Dry Cooler
	Possible Water Input Temps	15-60°C(59~140°F)
	Recirculating Water Flow Rate	0.43-1.51m ³ /h (1.89-6.65 gpm)
Cooling Capacities	15-30°C/59-86°F Inlet Water, Supplied by Chiller	14 - 17.5 kW
	30-50°C/86-122°F Inlet Water, Supplied by Adiabatic Cooling Tower	8.3 - 14 kW
	50-60°C/122-144°F Inlet Water, Supplied by Dry Cooler	5 - 8.3 kW
Mechanical PUE	/	~1.03
Coolant	Type	Dielectric Oil
	Coolant Volume	~7L (1.85 gal)
Dimensions	Width	535 mm (21 1/16")
	Length	110 mm (4 21/64")
	Hight	940 mm (37 1/64")
Weight	Dry Weight	22 kg (48.5 lbs)
Configurable component	3D Printed Sprayer	1 set
	Plate Heat Exchangers	1 pcs
	Pump	1 pcs
	Dripless Quick Connector	2 pcs

Rack Specification

Server Space	20U
Server Cassette Space	1U/2U/3U/4U
Number of Cassette per Rack	10
Max. Cooling Capacity	175kW
Rack Dimensions (L x W x H)	850 mm x 1070 mm x 2445 mm (33 1/2" x 42 1/8" x 96 17/64")
Rack Floor Loading (Dry weight)	990 kg/m ² (218.3 lbs/ft ²)
Water Pipe Connections	G2" female thread or 2" hose barb
PDUs	1+1
Power supply	200~240Vac 1P 50/60Hz
	380~480Vac 3P 50/60Hz
Max. Continuous Current(Pump)	16A
	5.1A

Control and Monitoring

Interface	Touch Screen
Protocols	Modbus, BACnet
Data Measurement	<ul style="list-style-type: none"> Temperature (Water and coolant) Coolant Pressure (Each server) Pump Status (Each) Coolant Flow Rate (Optional, each server) Coolant Liquid Level (Each server)
Alarm	Local, Remote

Practical Cooling Where It Matters Most

Whether you're scaling up computing power, upgrading to high computing density, or pursuing net-zero targets — LiquidRack is your choice.



Colocation Providers

Maximize compute density without rebuilding.



Cloud & Hyperscale Operators

Scale efficiently to support AI and HPC clusters.



HPC & AI Operators

Cool GPU clusters where power and space are tight.



Enterprise Data Centers

Unlock higher density for in-house computing.



Edge & Modular Operators

Enable powerful cooling in space- and power-limited sites.



Research Facilities

Tackle thermal and sustainability challenges in R&D workloads.



Designed to Breakthrough the Barriers

Designed to adapt, LiquidRack eliminates the deployment challenges that often stand in the way of advanced cooling adoption.

Server Compatibility

Works with any server, air cooled or liquid cooled, heat density, sizes, etc.. We can collaborate with the server OEM to get your server verified and approved.

Fluid Compatibility

Supports a wide range of market-available dielectric fluids.

Infrastructure Compatibility

For both new builds and retrofit, LiquidRack can meet most of the weight, footprint, height, hydro and power plant specification of Datacenters.

Hydro System Components

Optional manifolds, piping, and dripless connectors enable fast, clean, and cost-efficient deployment.

Intelligent Control System

Centralized monitoring and leak alerts — to ensure continuous, ease of mind operation.





Global Reach. Local Support.

Backed by 30 years of expertise in data center cooling, AIRSYS delivers LiquidRack through a global manufacturing network across North America, Asia, and Europe — ensuring rapid deployment and localized support wherever you grow.

Beyond being the provider of LiquidRack, AIRSYS proposes the concept of Cooling as a Service (Caas) — a forward-looking vision that redefines cooling as a scalable, collaborative service model. We invite operators, end-users, and OEMs to partner with us in delivering not just infrastructure, but guaranteed performance and peace of mind.

Whether you're an operator, end-user, or OEM partner, our service commitment includes:

- Aligned thermal planning from day one
- On-site deployment guidance
- Extended warranty engagement
- Guaranteed cooling performance



Global Footprint



Local Service



**30 Years of
Innovation**



**Cooling as a
Service**

Choose LiquidRack, Win the Game



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