

SOLUTION BRIEF

COOLING

TEN REASONS

Rear Door Heat
Exchangers Should be
a Part of Your Liquid
Cooling Strategy

Executive Summary

Artificial intelligence (AI), accelerated computing, and high-performance workloads are driving a fundamental shift in data center design. As rack power densities continue to increase, liquid cooling is becoming an essential component of modern infrastructure. However, while industry attention is increasingly focused on Direct-to-Chip (D2C) cooling, the reality for many operators is that cooling strategies evolve progressively rather than changing overnight.

Most enterprise and colocation facilities continue to support a diverse mix of traditional enterprise applications, cloud services, and emerging AI workloads. As a result, hybrid cooling architectures—combining air cooling, Rear Door Heat Exchangers (RDHx), and D2C cooling—are becoming the most practical approach to balancing performance, operational readiness, and infrastructure investment.

D2C cooling has become the preferred solution for the highest-density AI and HPC platforms, delivering highly efficient heat removal directly at the processor. At the same time, RDHx enable operators to increase rack densities, maximize existing cooling infrastructure, and introduce liquid cooling into refurbishment and brownfield environments without fundamentally changing server architectures or day-to-day IT operations.

Rather than competing technologies, RDHx and D2C increasingly complement one another as part of a phased cooling strategy that allows operators to expand capacity today while preparing for the next generation of AI infrastructure.

This solution brief explores 10 reasons why RDHx should be considered a key component of a modern liquid-cooling strategy.

Key Takeaways

- Cooling modernization is typically a phased journey rather than a single technology decision.
- RDHx provide a practical bridge between traditional air cooling and full liquid cooling.
- D2C cooling is the preferred solution for the highest-density AI and HPC platforms.
- Hybrid cooling architectures are becoming the preferred approach for many enterprise, colocation, and cloud environments.
- Cooling strategies should balance thermal performance, infrastructure readiness, operational maturity, and long-term flexibility.

Cooling Architecture Comparison: D2C vs RDHx

Both technologies play important roles within modern liquid-cooled data centers. The most effective cooling strategies deploy each technology where it delivers the greatest operational and thermal benefit.

Dimension	Direct-to-Chip Liquid Cooling (D2C)	Rear Door Heat Exchangers (RDHx)
<i>Cooling location</i>	At processor / component level	At rack exhaust
<i>Liquid interface</i>	Inside server hardware	External to server
<i>Typical application</i>	High-density AI/HPC platforms	High-density AI/HPC platforms, mixed workloads, enterprise AI, retrofit projects
<i>Operational impact</i>	Requires new service procedures	Minimal IT workflow change
<i>Infrastructure dependency</i>	High	Moderate
<i>Adoption model</i>	Typically platform-specific	Rack-level deployment
<i>Failure domain</i>	Server-level	Rack-level
<i>Deployment speed</i>	Tied to IT refresh cycles	Independent of server refresh
<i>Transition to liquid cooling</i>	Requires direct integration	Controlled introduction

1. RDHx provide a practical entry point into liquid cooling

As organizations introduce D2C and broader liquid cooling infrastructure, they also need to develop new operational procedures, maintenance practices, service expertise, and training. For many enterprise or mixed-use data centers, this represents a significant operational shift.

RDHx allow operators to introduce liquid cooling into the white space gradually, enabling teams to build operational familiarity and confidence before expanding into more extensive liquid-cooled environments.

2. Liquid cooling transitions are typically phased rather than immediate

Cooling architecture is often framed as a choice between air and liquid cooling, but most organizations adopt liquid cooling gradually as their workloads evolve.

RDHx provide an effective transitional technology by removing significant heat at the rack level while continuing to support conventional air-cooled servers. This enables investment, infrastructure, and operational processes to evolve over time rather than requiring wholesale change.

3. RDHx bridge the transition between air and liquid cooling

Many data centers now operate within a transition zone where traditional air cooling alone is no longer sufficient, yet full D2C deployment is neither necessary nor practical across the entire facility.

Most environments support a mix of enterprise applications, cloud services, storage platforms, and increasingly, AI workloads, each with different cooling requirements.

RDHx allow operators to selectively introduce liquid cooling where additional capacity is needed, increasing rack densities without requiring a hall-wide architectural shift. This creates a practical pathway toward future D2C deployments in which the highest-density platforms require direct liquid cooling.

4. Hybrid cooling environments are becoming the new standard

Not every rack requires D2C cooling, and not every application can continue relying solely on traditional air cooling.

Increasingly, operators are deploying hybrid cooling architectures that combine air cooling, RDHx, and D2C cooling according to workload requirements.

RDHx extend the practical operating range of air-cooled infrastructure while complementing D2C deployments for the most thermally demanding systems.

5. RDHx maximize existing cooling infrastructure

Deploying D2C cooling at scale typically requires investment in water treatment, liquid distribution infrastructure, redundancy strategies, and monitoring systems. In refurbishment and brownfield environments, implementing these changes can be substantial and may require phased investment.

RDHx can often be integrated into existing chilled or warm water loops with minimal modification, extending cooling capacity while better utilizing existing assets.

This enables organizations to increase rack densities, defer major infrastructure upgrades, and maximize the return on previous investments.

6. RDHx simplify operational change

Cooling architecture affects people and processes as much as infrastructure.

Introducing liquid cooling influences maintenance procedures, operational governance, supplier relationships, and service models.

RDHx allow organizations to introduce liquid cooling while maintaining familiar server servicing processes, helping reduce operational disruption as they modernize their facilities.

7. RDHx decouple cooling strategy from server refresh cycles

Because D2C cooling is integrated into server hardware, deployment is typically aligned with specific platforms and refresh cycles.

RDHx enable facilities teams to increase cooling capacity independently of IT procurement decisions, allowing infrastructure investment to progress at its own pace while remaining compatible with future server generations.

8. RDHx preserve long-term infrastructure flexibility

Cooling technologies will continue to evolve as AI workloads increase.

Because RDHx operate independently of specific server designs, they allow operators to support multiple hardware generations while retaining the flexibility to introduce D2C cooling selectively as future platforms require it.

This enables a more adaptable long-term infrastructure strategy without limiting future technology choices.

9. RDHx prepare facilities for future D2C deployment

One of the strongest strategic advantages of RDHx is the optionality they provide.

Operators can increase rack densities today, introduce liquid cooling into existing environments, and gain valuable operational experience, while retaining the flexibility to deploy D2C cooling in selected areas as future compute platforms demand higher thermal performance.

Rather than representing competing approaches, RDHx and D2C cooling increasingly work together as complementary technologies within long-term liquid cooling strategies.

10. Building a future-ready liquid cooling strategy

The transition to liquid cooling is well underway, but the path will differ from one organization to another.

Purpose-built AI facilities may adopt D2C cooling extensively from day one. Existing enterprise and colocation facilities are more likely to modernize gradually, combining airflow optimization, RDHx, and D2C cooling based on workload requirements.

Conclusion

Successful cooling strategies will not replace one technology with another; they will integrate complementary technologies to deliver the right cooling solution for each application.

RDHx provide a practical bridge between today's air-cooled environments and tomorrow's AI-ready infrastructure, enabling operators to increase capacity, protect existing investments, and prepare confidently for future liquid cooling requirements.

About Legrand Data Center Solutions

We Go Further.

Legrand Data Center Solutions works with colocation, hyperscale, and enterprise operators across Europe to design and deploy efficient, scalable data center infrastructure for both greenfield and refurbishment environments.

With a broad portfolio spanning critical power, racks and containment, intelligent PDUs, and advanced cooling technologies — including Rear Door Heat Exchangers — Legrand supports operators in addressing the practical challenges of modernizing existing data centers. This includes increasing rack densities, improving energy efficiency, recovering valuable white space, and enabling incremental upgrades with minimal operational disruption.

Legrand's approach focuses on system-level integration and long-term operability rather than point solutions, helping customers extend the life, capacity, and performance of their facilities while preparing for future requirements such as AI, HPC, and liquid cooling.

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We Go Further.

Managing a data center is **complex**. It requires careful consideration of a range of factors to ensure **performance, reliability, scalability, and sustainability**.

To help you **navigate these challenges**, we offer tailored **grey and white space** solutions at scale to meet individual needs through our **specialist brands** that include **Minkels, Raritan, Server Technology, Starline, and USystems**.

Our approach combines **technical expertise** with a deep commitment to **sustainability**, helping you **optimize data center performance** while reducing environmental impact. We build enduring partnerships with our clients grounded in **trust, collaboration, and shared aspirations**. Whether **improving reliability** or **increasing efficiency**, we work to ensure that every detail is correct.

With our support, you can approach the **future with confidence**, knowing that your data center is ready for what's next.

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