

Advancing Energy Tech



Cool, Dense, Green

The Liquid Cooling revolution in DCs

Claudia Cantarello

Business Developer Liquid Cooling Europe

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The speaker



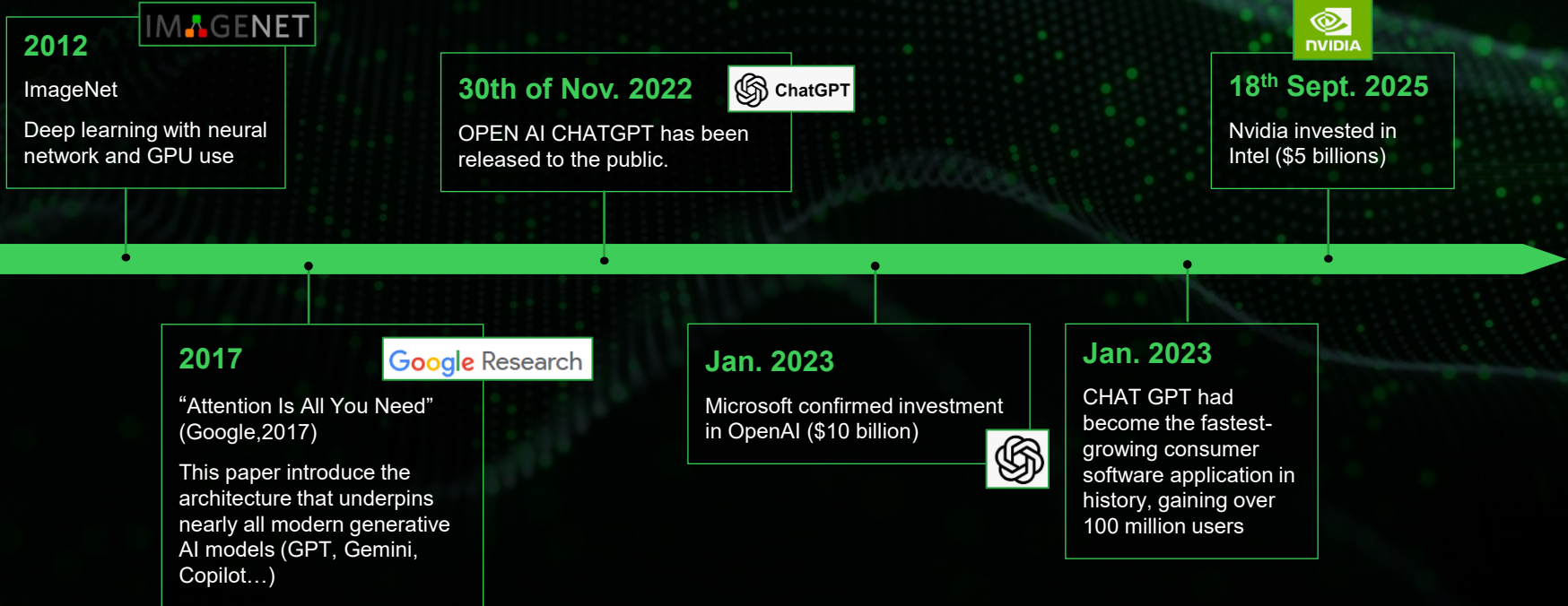
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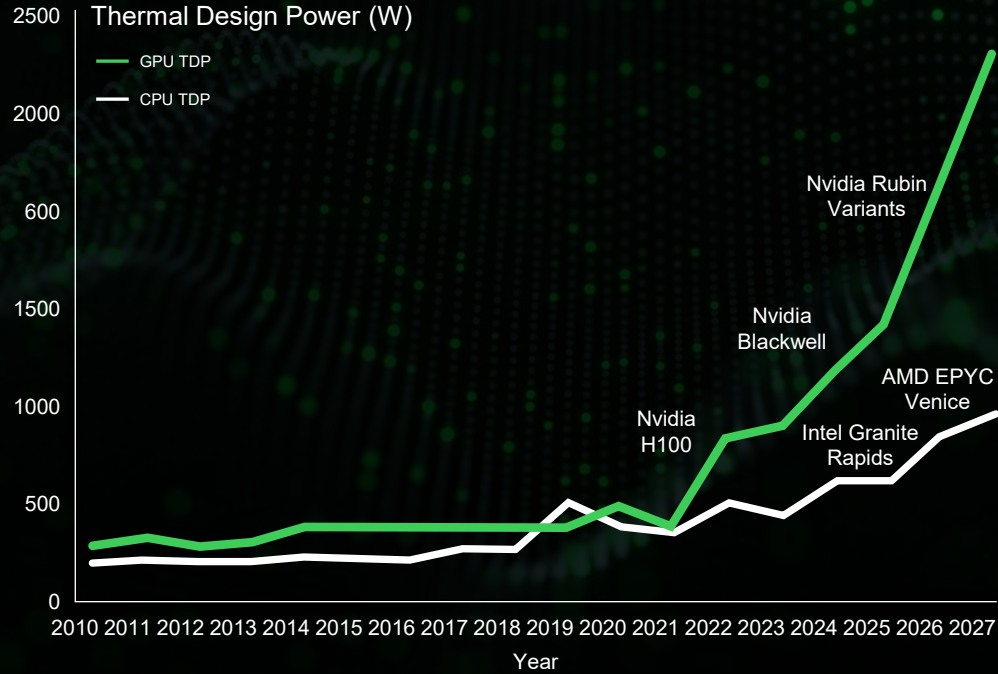
Schneider Electric

AI is boosting both Liquid & Air Cooling

Why is this happening?



The GPU disrupted the way data centers are built & cooled



From:
IT Rack
(White Space) Dominant



To:
Facility
(Gray Space) Dominant


TDP **4X**
In two years

700W (H100)
2700W (GB200)

Source: Data based on Schneider internal sources and market analysis.

GPU based servers are driving rack densities towards 1MW – equivalent to 200 standard ovens



 The Register

Google details plans for 1 MW IT racks exploiting electric vehicle supply chain

Google is planning for datacenter racks supporting 1 MW of IT hardware loads, plus the cooling infrastructure to cope, as AI processing...

1 day ago

AI servers of the future: 'rack density' of 1000kW+ with NVIDIA's next-gen Rubin Ultra AI GPUs

AI servers are projected to consume over 1000 kW of power due to NVIDIA's upcoming Rubin Ultra AI GPU and HBM4 memory.

Nov 24, 2024



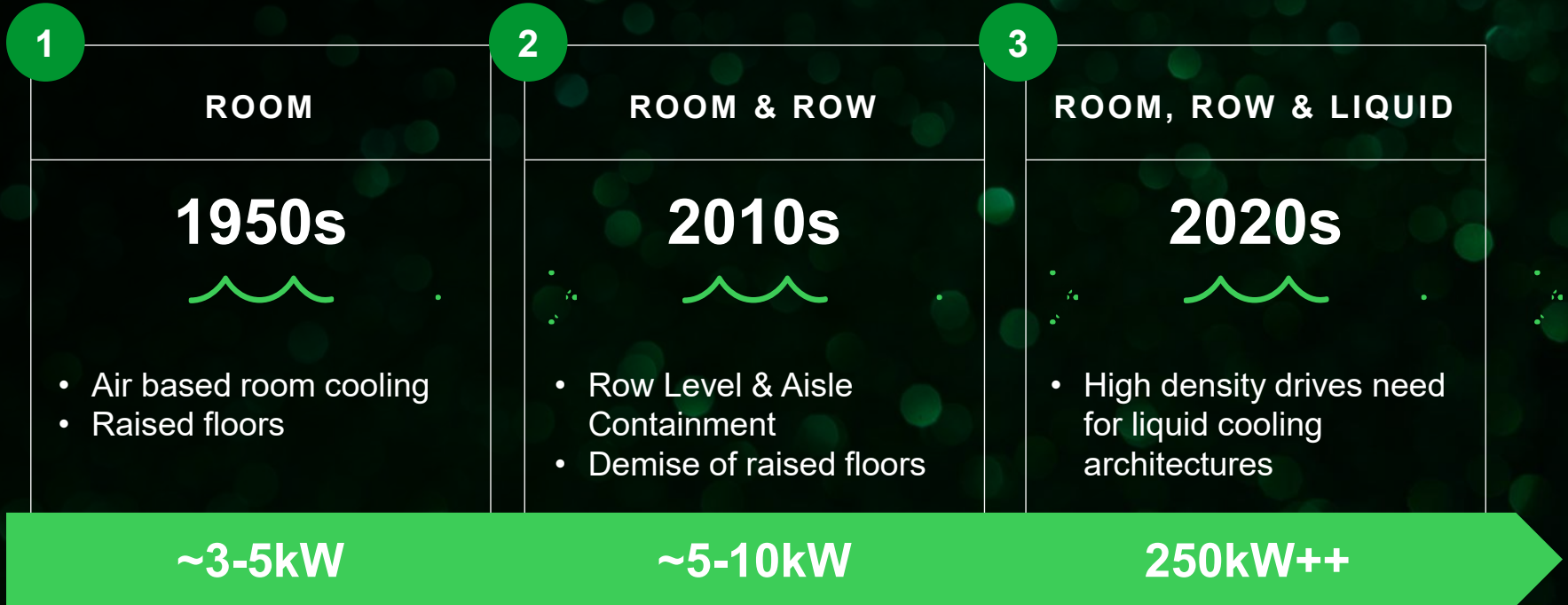
Data Center Dynamics

<https://www.datacenterdynamics.com/news/hypersca...>

Hyperscalers prepare for 1MW racks at OCP EMEA

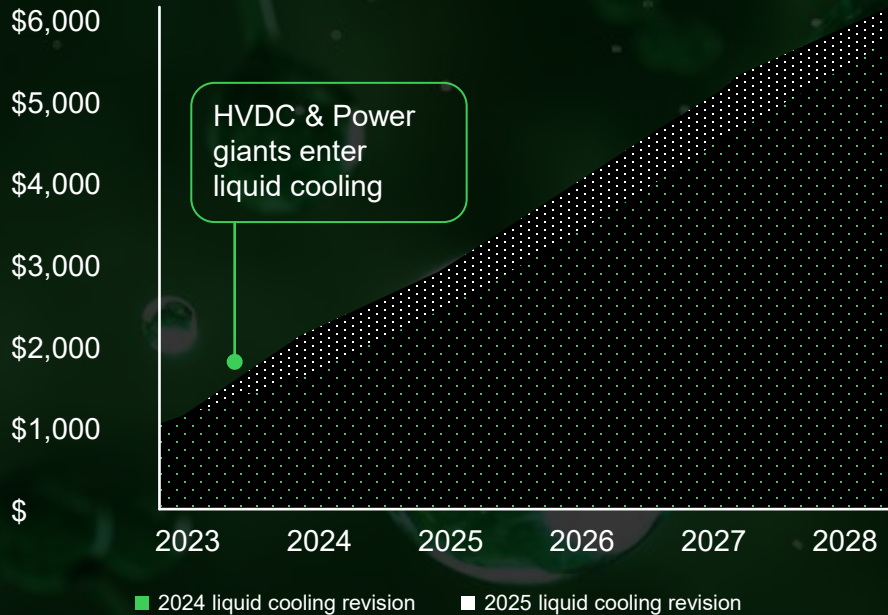
7 days ago — Google has joined Meta and Microsoft's collaboration project on a power rack the companies hope will help them reach rack densities of 1MW.

The third wave is liquid cooling for the AI-powered future



Deploying Liquid cooling at scale is NEW

Liquid Cooling Market Forecast Update



Our global footprint and experience in liquid cooling, deliver on a large scale to meet the current demands of AI and what's coming next.

6X in 5 Years

\$1B (2023)



\$6B (2028)

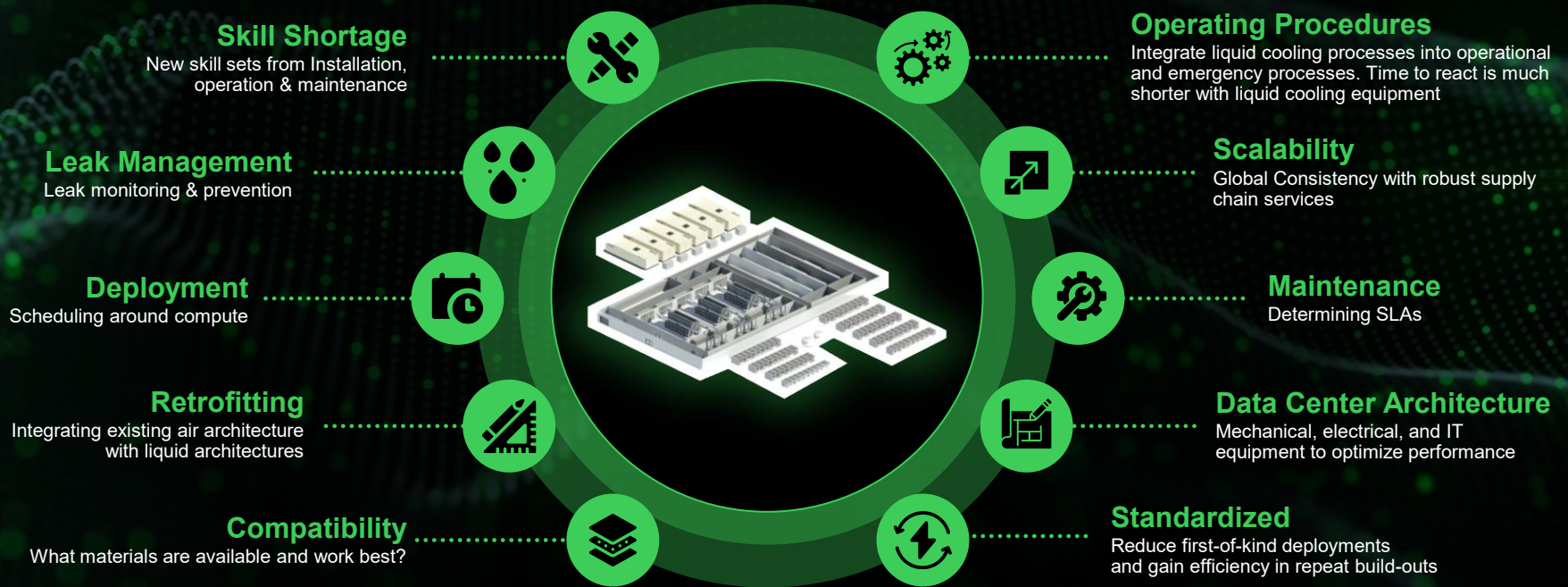
Air cooling will not disappear, in fact the need for air cooling increases...

Direct-to-chip liquid cooling still requires **air cooling for 10 to 30 percent** of the heat load



A 130kW rack requires **10-40 kilowatts** of air cooling

The unprecedented change in cooling architecture has created unique challenges



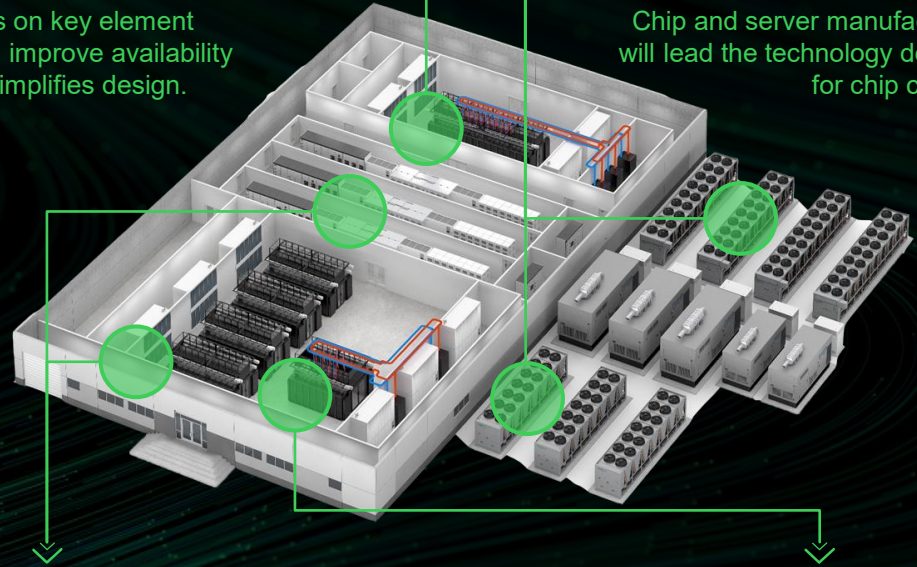
Liquid cooling requires an end-to-end understanding, whether you are retrofitting an existing building, constructing a new one, or considering any stage of the lifecycle.

Transition to liquid cooling requires site-specific designs based on density, efficiency and location.

Innovative heat rejection systems are essential for efficient liquid cooling solutions.

Focus on key element which improve availability and simplifies design.

Chip and server manufacturers will lead the technology decision for chip cooling.



Heat rejection systems must balance efficiency & flexibility while accommodating direct liquid cooling, hybrid air cooling, and support space cooling.

Hybrid environments need a complete and broad cooling portfolio adaptable to greenfield and brownfield data centers.

Questions are being asked.. and we are answering them...

How to scale and move fast?

Needed ops/management changes?

Best service practices?

Infrastructure Management software needs?

Most efficient, sustainable cooling?

How to support hybrid cooling?

Right CDU/pod size?

Best architecture for application?

Liquid cooling risks (e.g., black water & filtration)?

How to upskill team?

Can I retrofit my air-cooled data center with liquid cooling?

Life Is On | Schneider
Electric

Direct Liquid Cooling System
Challenges in Data Centers

White Paper 210
Version 1

Life Is On | Schneider
Electric

Navigating Liquid Cooling
Architectures for Data Centers
with AI Workloads

White Paper 133
Version 1

Life Is On | Schneider
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Liquid Cooling Technologies for
Data Centers and Edge Applications

White Paper 265
Revision 0

Liquid cooling provides several sustainability benefits...

- 🍃 Liquid cooling can **reduce energy consumption**
- 🍃 CDUs with dedicated high-temperature air-cooled chillers will **maximize efficiency**
- 🍃 Increasing the operating temperatures **reduces energy use**
- 🍃 Savings in energy and water directly translate into **carbon footprint savings**
- 🍃 Liquid cooling allows for much **smaller server footprint** and therefore greater rack density
- 🍃 Liquid-cooled data centers make **heat re-use feasible** and practical

Life Is On

Schneider
Electric

10 Ways to Harness the Energy and Water Efficiencies of Direct Liquid Cooling

White Paper 211

Version 1

Data Center Research & Strategy



Scan to read!

Engineered Experience



2012

Motivair releases first line of HPC CDU



2016

Cray partnership design for exascale class CDU



2017

DOE awards \$258M for 3-year contract of Exascale development



2022

ORNL Frontier is first to break the exascale barrier

A wide liquid Cooling portfolio

Floor-Mounted Heat
Dissipation Unit
(HDU™)

Coolant Distribution Units
CDU
(Floor Mounted and In-rack)

The
ChilledDoor®

Manifold and hoses



Power up your AI data center infrastructure with comprehensive and ready-to-deploy Reference Design

SCHNEIDER – FULL ARCHITECTURE & ANALYSIS SINCE 2013



Explore our latest Data Center Reference Designs



Reference Designs
NVIDIA GB200& GB300

7392 kW, Tier III, NAM, Chilled Water, Liquid-Cooled AI Clusters

Introduction

The Reference Design (RD) is a comprehensive design for a 7392 kW, Tier III, NAM, Chilled Water, Liquid-Cooled AI Clusters. It is designed to support a high-density AI workload with a power density of up to 10 kW per rack. The design includes a detailed architecture, component specifications, and a Bill of Materials (BOM).

Design Overview

- Power: 7392 kW
- Tier: Tier III
- Location: NAM
- Cooling: Chilled Water
- AI Clusters: Liquid-Cooled

Key Features

- High-density AI workload support
- Advanced power distribution
- Efficient cooling system
- Scalable architecture
- Comprehensive BOM

About this Design

- Designed for high-density AI workloads
- Supports a power density of up to 10 kW per rack
- Includes a detailed architecture and component specifications
- Provides a comprehensive Bill of Materials (BOM)

Design Options

- Change the number of racks
- Change the power density
- Change the cooling system
- Change the location
- Change the tier

Document Number: RD10000

Facility Power

Facility Power Block Diagram

Design Overview

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Facility Cooling

Facility Cooling Block Diagram

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Design Options

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Document Number: RD10000

IT Room

IT Room Block Diagram

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- Scalable architecture
- Comprehensive BOM

Design Options

- Change the number of racks
- Change the power density
- Change the cooling system
- Change the location
- Change the tier

Document Number: RD10000

Lifecycle Software

Design Attributes

Attribute	Value	Unit
Power	7392	kW
Number of Racks	174	
Power Density	42.5	kW/rack
Number of AI Clusters	174	
Number of Servers	174	
Number of Network Switches	174	
Number of Storage Devices	174	
Number of PDU's	174	
Number of UPS's	174	
Number of Chilled Water Pumps	174	
Number of Cooling Towers	174	
Number of Air Conditioning Units	174	
Number of Fire Alarm Systems	174	
Number of Security Systems	174	
Number of Environmental Monitoring Systems	174	
Number of Access Control Systems	174	
Number of Video Surveillance Systems	174	
Number of Time Access Control Systems	174	
Number of Fire Extinguishers	174	
Number of First Aid Kits	174	
Number of Emergency Exit Signs	174	
Number of Emergency Lighting	174	
Number of Fire Alarm Control Panels	174	
Number of Fire Alarm Sounders	174	
Number of Fire Alarm Call Points	174	
Number of Fire Alarm Control Units	174	
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Document Number: RD10000

Design Attributes continued

Attribute	Value	Unit
Number of AI Clusters	174	
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Number of PDU's	174	
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Document Number: RD10000

Schneider Electric Life-Cycle Services

Life Cycle Services

1. **Design & Construction** - From design to construction, ensuring every detail is covered.
2. **Commissioning, Testing & Validation** - Ensuring the system is ready for operation.
3. **Operational Support & Maintenance** - Providing ongoing support and maintenance to ensure optimal performance.

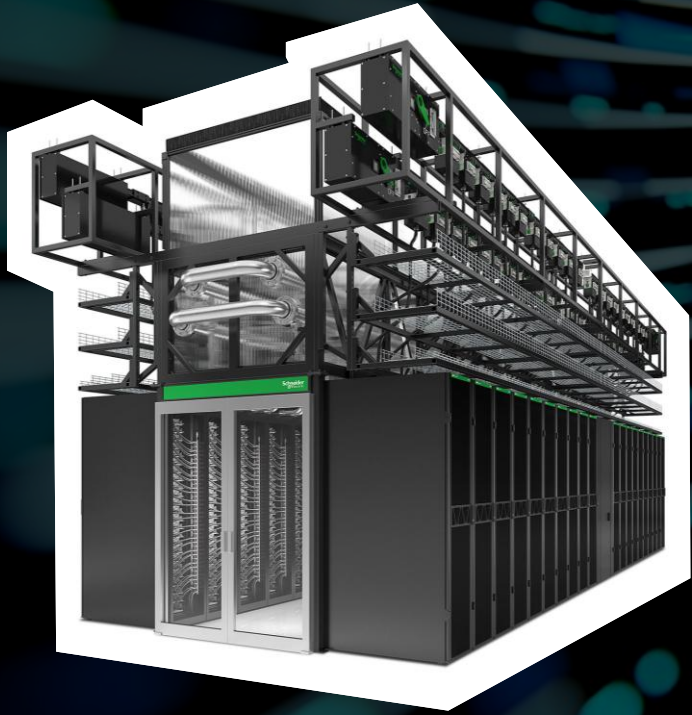
Get more information for this design:

Engineering Package

Full Reference Design (RD) and Bill of Materials (BOM) available for download. The Reference Design (RD) is a comprehensive design for a 7392 kW, Tier III, NAM, Chilled Water, Liquid-Cooled AI Clusters. It is designed to support a high-density AI workload with a power density of up to 10 kW per rack. The design includes a detailed architecture, component specifications, and a Bill of Materials (BOM).

Document Number: RD10000

Prefabricated Modular EcoStruxure™ Pod Data Center



Pre-configured for speed, it supports 40+ high-density racks with hybrid cooling - delivering fast, scalable, and cost-efficient performance for AI and cloud.



Seamlessly integrate with hyperscale and colocation infrastructure



Streamlined Rack Solutions

Robust CDUs

CDUs with high pressure & flow capabilities, in an N+1 configuration, accommodate a large range of liquid cooled server deployments.



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