

Life Is On

**Schneider**  
Electric

# Next-gen AI Clusters

Modular pod and integrated rack infrastructure for AI and accelerated computing

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# Introduction

Imagine a bustling metropolis of AI servers, each acting as a powerhouse of computation, generating immense heat and consuming vast amounts of energy. As the computational power increases, so too does the complex orchestration of power and cooling infrastructure that supports it. This evolution impacts the entire infrastructure, from the smallest chip inside a server to the expansive power grids that support them.

In this new era, achieving higher rack density is essential. More servers are packed into tighter spaces, generating more heat and requiring more power and cooling. At the core of AI operation, the white space is where the intricate interaction of power and cooling systems takes place at the rack and pod levels. Here, space is valuable. It presents a challenging paradox: AI servers need to be densely clustered to maximize the number of GPUs per rack, but with the interior rack space pushed to its limits, organizing power and cooling infrastructure becomes a complex puzzle akin to a high-stakes game of Tetris.

Beyond these design fundamentals, there are advanced challenges to address, such as continuous reliability, speed and ease of scale, and energy efficiency.

This guide will cover design considerations, key elements for success, and the solutions needed to achieve AI-ready white space.

“

At the core of AI operation, the white space is where the intricate interaction of power and cooling systems takes place at the rack and pod levels.

Here, space is valuable.”



A conceptual image featuring a high-voltage power line tower at night. The tower is silhouetted against a dark sky filled with stars. Numerous bright green laser beams originate from the tower and fan out across the upper half of the frame. The lower portion of the image is a dark, solid green area containing white text.

# AI-driven challenges for data centers



# Three big challenges

Rapidly evolving AI needs bring up three clear challenges.



## Space

- More equipment in the rack leads to space and air flow constraints
- Compute, storage, and networking applications have different needs
- Racks must be stronger, deeper, optimized for high-density computing, and flexible for multiple applications



## Complexity

- White space is just as important as the rest of the data center and can't be viewed in isolation
- Engineering silos (power, cooling, services, etc.) lead to inefficiencies and failure risk
- Hybrid cooling and power solutions are often required (such as air and liquid cooling)



## Unpredictability

- AI innovation is happening at unprecedented speeds
- It's difficult to plan for IT needs even one or two years in the future — yet deployments must happen quickly and at scale
- Regulatory changes and sustainability goals are in flux



# Elements for success

The best AI data centers will address space, complexity, and unpredictability with an approach that is...



## Adaptable

- White space infrastructure must evolve to meet the rapidly changing demands of accelerated compute
- Deployments must be streamlined, modular, and scalable — at the rack and pod levels
- Environmental sustainability must be integrated from the ground up — not as an afterthought



## Collaborative

- No more silos: Design teams implementing compute, power, cooling, and management must work together
- Integrators and design teams must be able to trust that what they order, ship, and implement will arrive safely without damage and function properly



## Data-driven

- Leave nothing to chance: Data-driven modeling, planning, digital remote monitoring, and management optimize data center operations
- Reference designs validated between chip, server, and physical infrastructure vendors take work off your plate





Our solutions

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# EcoStruxure Data Center Solutions deliver

Unlock peak compute density — and scale it — with modular, integrated solutions you know will work. EcoStruxure™ Data Center Solutions are engineered to meet the power and GPU-intensive demands of AI clusters and replace the complexity of onsite construction. Our pod makes deployments in the white space less complex, so you can focus on core business.





# Why customers choose Schneider Electric



## Adaptable

We are always innovating our **industry leading portfolio** of reference designs, prefabricated pods, and rack solutions to support high-density compute and AI. To put it simply, we have the infrastructure to support high-density computing — so you can adapt to a rapidly changing environment.



## Collaborative

We **partner** with chip manufacturers, server manufacturers, and integrators to break design silos and optimize IT infrastructure. Bringing together all the parties required for a successful deployment is complicated. We've already done the legwork so you can rest easy.



## Data-driven

Our unrivaled **reference designs, services, and software** capabilities ensure stress-free deployments and operation. Schneider Electric really is a one-stop-shop for building and optimizing IT infrastructure.

Pictured: Pod infrastructure for small- to mid-size clusters

## Case studies:

**Compass Datacenters deploys IT faster** with Schneider partnership

- [Watch video](#)
- [Read case study](#)

**Scott Data embraces AI transformation** with collaborative effort involving Schneider Electric

- [Read case study](#)



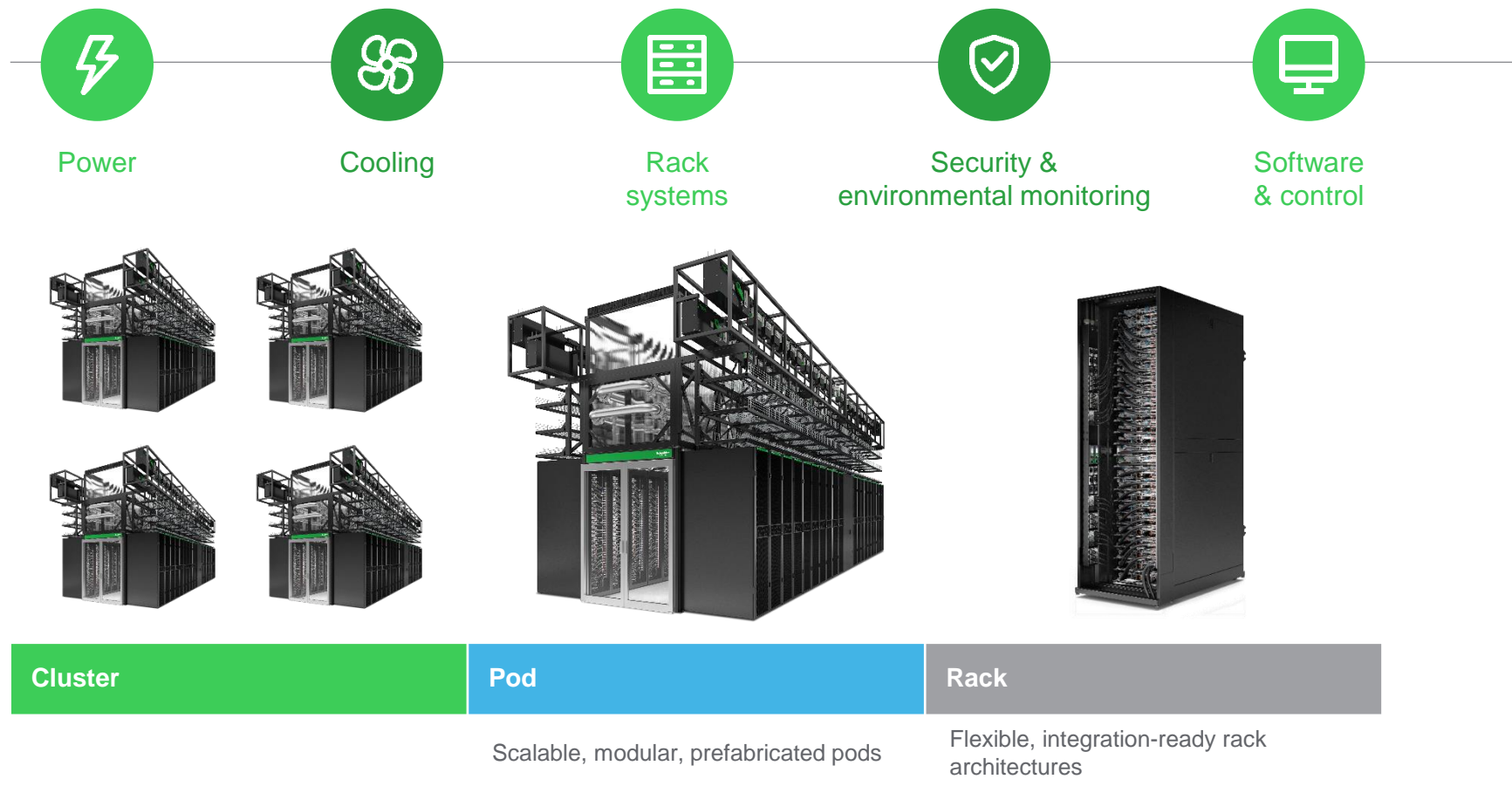


# Our approach is adaptable.

GPU innovation continues to drive the need for more compute and advanced cooling. **The higher the rack density, the more advanced the technology and infrastructure must be to support it.**

Efficient rack and pod architectures are key for:

- Scaling quickly
- Keeping up with the latest cooling technologies
- Adapting to different design needs (ex. AC / DC)
- Reducing your overall IT footprint



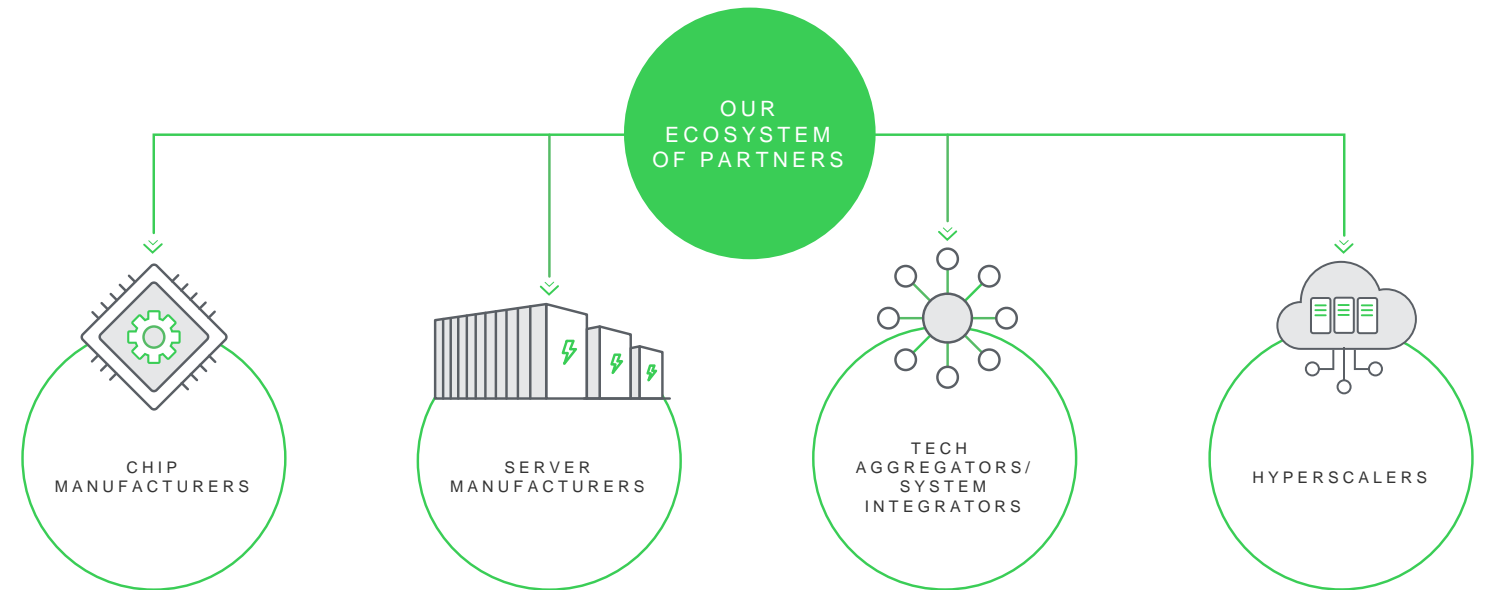


# Our approach is collaborative.

**Design teams and vendors often work in silos**, with different groups focusing on:

- Chips, servers, storage, and networking gear
- Racks, power, and cooling
- Consulting and design to build out infrastructure
- Deployment and installation
- Daily operations and management

Data centers optimized for AI must bring these groups into a cohesive whole where **collaboration is built into the solution from the ground up**.



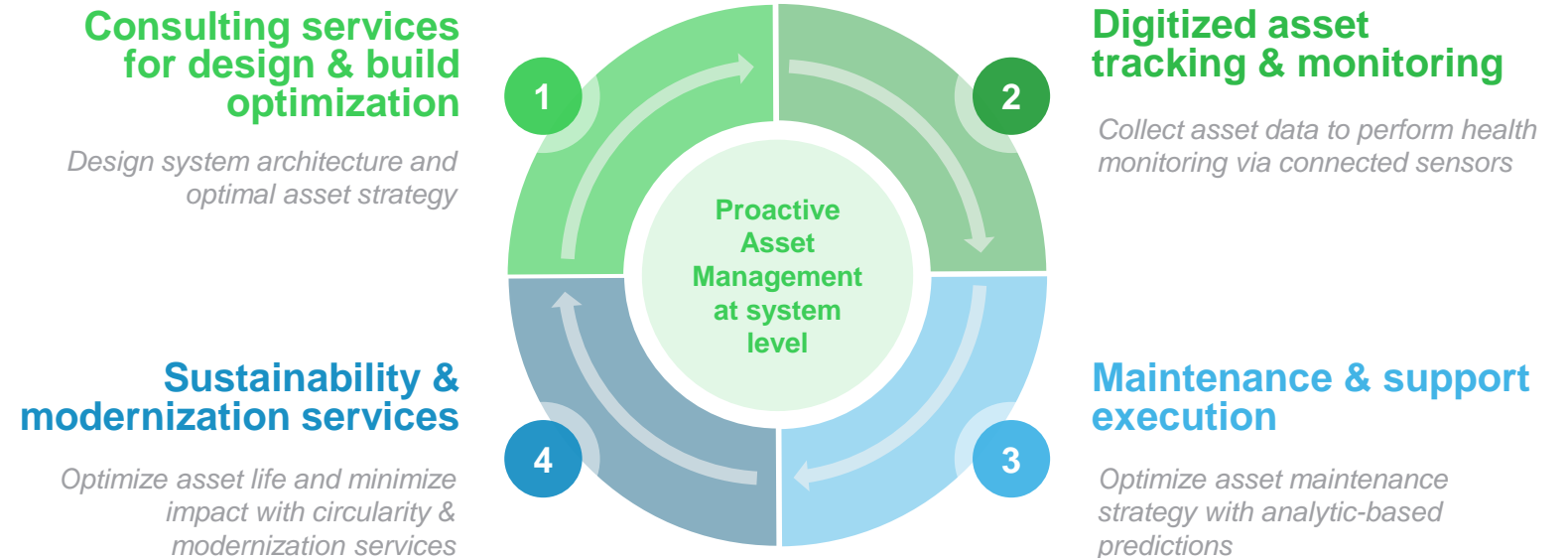


# Our approach is data-driven.

AI infrastructure needs a full end-to-end view from planning to operation:

- **Advanced digital tools** model, analyze, and simulate power and cooling performance
- **Little or no margin for error** requires real-time monitoring in every domain
- **Monitoring rapid power shifts** is key in some applications
- **Sustainability** reporting is becoming mandatory — and IT teams are struggling to do it

Schneider Electric supports you every step of the way with robust software and service offerings.







# Rack infrastructure



# EcoStruxure Rack Solutions deliver

Engineered for demanding AI workloads, our NetShelter™ racks offer flexible, extra-large enclosures with reinforced support for high-power servers and advanced cooling, including integrated Motivair™ liquid cooling options.

Backed by our data-driven design expertise and AI ecosystem validation, these rack solutions maximize compute per rack while ensuring reliable operation and simplified deployment, giving you certainty in your AI infrastructure investment.

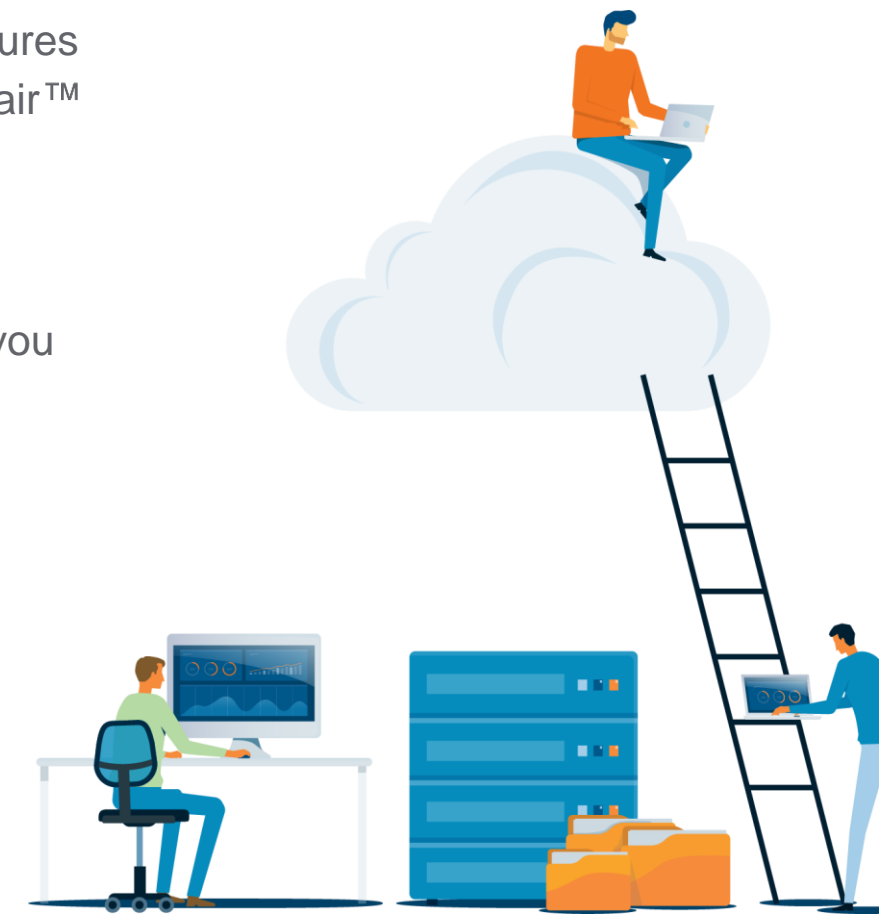
## Reliable, high-density rack solutions

- Maximize compute per rack without compromising operational performance
- Adapt to a wide array of servers, design standards, and power and cooling architectures
- Support rack and stack integration for plug-and-play deployment

## A collaborative, data-driven approach

Tame the complexity and confidently execute build-out backed by:

- Robust, partner-validated reference designs
- Data-driven software and services





# EcoStruxure Rack Solutions

## NetShelter Rack Power

- Reliable, efficient high current rack power for EIA and ORV-inspired architecture
- Maximize compute per rack, reducing costs

## NetShelter Rack Enclosures

- Extra large racks for EIA and ORV-inspired architecture
- Reinforced load ratings for power & liquid cooling
- Rack, stack, and ship-ready for faster deployments

## Motivair Liquid Cooling

- Complete liquid cooling systems for Standard EIA and ORV-inspired architecture ensure extreme heat is removed effectively and efficiently
- Improve cooling performance and protect your investment (and your bottom line)



# Applications

## AI and accelerated compute

- AI training and high-density inference
- AI networking and storage
- High-performance computing (HPC)
- GenAI and machine learning
- AI factories

## Diverse architectures

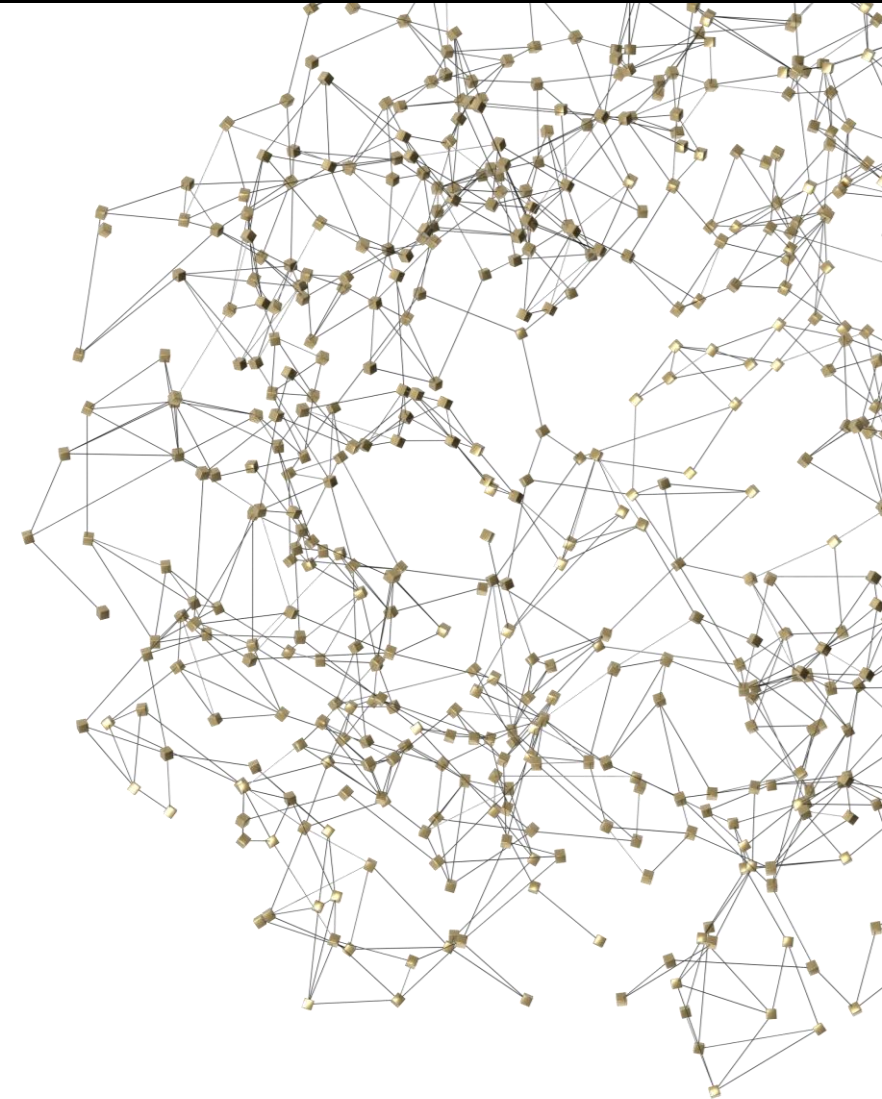
- Standard EIA 19" architecture
- Open AI system architecture
- Superpod architecture
- New builds or retrofit
- Mixed density applications
- Liquid, air, or hybrid cooling
- Mixed EIA and OCP design

## AI server integration

- Ideal for L10 and L11 rack-level integrations
- Liquid- or air-cooled servers
- Rack and stack deployments
- Custom engineering, configuration, and design aesthetics

## Edge computing

- Far edge inference and networking
- Remote applications and non-IT environments
- Commercial and industrial applications
- Geographically dispersed IT portfolios



# Design highlights

Available for **EIA**,  
**MGX**, **OCP-inspired**,  
and **ORV3** high-  
density rack standards

Flexible layouts  
to accommodate  
a wide variety of  
server models

Taller, deeper,  
stronger racks with  
shock-packaged  
options



Liquid, air, or hybrid  
high-density  
cooling

Efficient, high-  
current rack power  
in horizontal,  
vertical, and open  
rack models



# Configured rack frameworks

Flexible rack designs for any application

Our frameworks give you a place to start, whether you're customizing a rack for integrated liquid-cooled servers or designing cluster networking racks. We work with OEMs, end users, and system integrators to tailor a solution, no matter what application you need to support. From custom racks to standard products, we've got you covered.

Edge accelerated compute



Data center accelerated compute



Data center accelerated compute



## Capacity

Up to 20 kW

Up to 160 kW

Up to 300 kW

## Power

Vertical or horizontal  
rack PDU and modular rack UPS

Vertical or horizontal  
standard rack PDU

50V DC ORV3 rack busbar and  
high-density power shelves

## Cooling

Air cooled

Liquid-to-liquid and air cooled

Liquid-to-liquid cooled

## Rack standard

EIA

EIA

ORV3/MGX

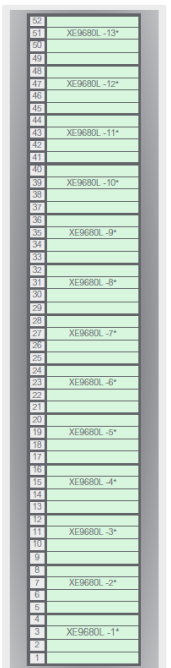
# Server-based rack frameworks

Co-designed with industry-leading server and chip manufacturers

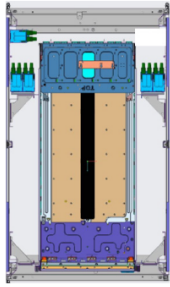
Our server-based frameworks go deeper and show you how to build a rack using your preferred servers.

	Flexible Options
Integration	Level 10 ready Customizable for Level 11
Power	Vertical or horizontal PDUs DC voltage in-rack busbar / power shelves
Cooling	Air or liquid cooling In-rack/room-based architecture
Rack Standard	EIA 19", ORV3, MGX and OCP-inspired

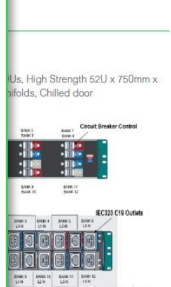
Reference Design



Option 5  
Including 0U Vertical 100A/80A Rack PDUs, High Strength 52U x 750mm x 1470mm Rack, In-rack CDU, Manifolds, Chilled door

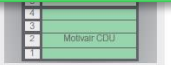


Us, High Strength 52U x 750mm x 1470mm x 1470mm, Chilled door



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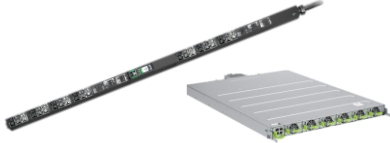








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# What's inside: Hardware

		Standard EIA	OCP-inspired
	<b>Power</b> 	High amperage 3-phase power High quantity of dedicated circuits Compact vertical and horizontal models	High-density power shelves High-voltage DC in-rack busbar
	<b>Cooling</b> 	Rear Door Heat Exchanger (RDHx) In-rack Manifold In-rack CDU	Rear Door Heat Exchanger (ORV3) In-rack Manifold (ORV3) In-rack CDU (ORV3)
	<b>Rack systems</b> 	Standard, large, X-large, XX-large sizes High weight load ratings Secure shock packaging options	ORV3 compatible racks MGX approved racks
	<b>Security and environmental monitoring</b> 	Video surveillance Intelligent access control Temperature and humidity thresholds Spot and rope leak detection	Video surveillance Temperature and humidity thresholds Spot and rope leak detection

# EcoStruxure Rack Solutions: Summary

Keep up with the rapid pace of change driven by AI workloads.

Deploy faster and easier with EcoStruxure Rack Solutions:

- **Engineered for AI and accelerated computing** (more room, more power, more cooling)
- **Flexible for a wide array of applications** — to protect your investment now and in the future
- **Pre-tested and validated reference guides** for leading server and chip brands (including everything needed to configure, integrate, and deploy at the rack level)
- **Combine with pod architecture** for end-to-end data center solutions that scale as needed
- **Built with sustainability in mind** — to maximize IT footprint and optimize energy use



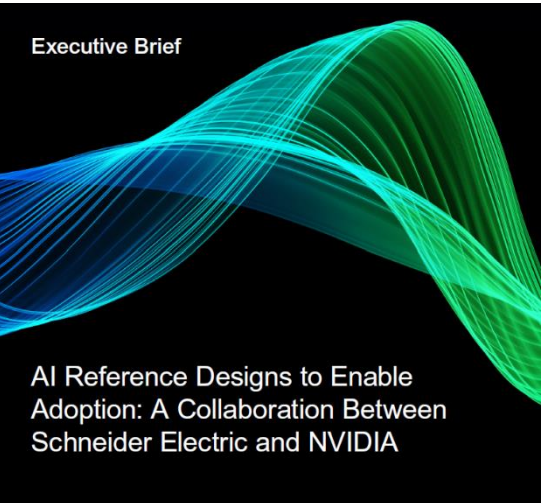


# Pod infrastructure

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# EcoStruxure Pod Data Center delivers

Save time and CapEx when you deploy Schneider Electric pods, whether for traditional data center needs or hyperscaled AI clusters. EcoStruxure Pod Data Center gives you all the flexibility of traditional construction — designed and configured to your needs — but in a highly modular and repeatable package. So you can deploy easier and scale faster.



Executive Brief

AI Reference Designs to Enable Adoption: A Collaboration Between Schneider Electric and NVIDIA

Steven Carlini  
Vice President,  
Innovation and Data Center  
Schneider Electric

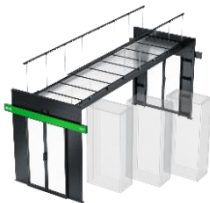
Wendy Torell  
Sr. Research Analyst,  
Energy Management Research Center  
Schneider Electric

June 27, 2024



132 kW/RACK  
REFERENCE  
DESIGN

## PODS



	Mid scale	Mid scale	Hyperscale
Max kW	N/A	73kW per rack 896kW per pod	132kW per rack 1.2 MW per pod
Scale increments	6+ racks	8-12 racks	40+ racks
Application scale	Less than 60 racks	Less than 60 racks	Unlimited
Time Saved	✓	✓ ✓	✓ ✓ ✓ ✓ ✓
CapEX Saved	✓	✓ ✓	✓ ✓ ✓



# EcoStruxure Pod Data Center

## Prefabricated, modular Pod

- Hyper and exascale cluster infrastructure for easy plug-and-play
- Pre-built in a Schneider facility (very little onsite assembly required)
- Drives easier, faster, and more reliable IT roll-outs

## Configurable Pod

- Streamlined infrastructure for small- to mid-sized deployments
- Configured and tested for seamless integration on site
- Efficiently scales IT power and cooling at smaller increments



# Applications

## AI and accelerated compute

- AI training and high-density inference
- AI networking and storage
- High-performance computing (HPC)
- GenAI and machine learning
- AI factories

## Diverse architectures

- Standard EIA 19" architecture
- Open AI system architecture
- Superpod architecture
- New builds or retrofit
- Mixed density applications
- Liquid, air, or hybrid cooling
- Mixed EIA and OCP design

## Configurable pod

- Max 73kW per rack
- Max 896kW per pod
- Pod scale at 8-12 rack increments
- Deployments up to 60 racks
- Large, but not hyperscale rollouts

## Prefabricated pod

- Max 132kW per rack
- Max 1.2MW per pod
- Pod scale at 40+ rack increments
- Hyperscale rollouts



# Design highlights

Prefabricated  
Modular  
EcoStruxure Pod  
Data Center

**Cooling:**  
Supports air- and liquid-cooled architectures  
(InRow, RDHx, and DTC)

**Total capacity:**  
Up to 1.2 MW

**Aisle configuration:**  
Hot or cold

**Power:**  
Compatible with high-current busbar  
or remote power panel

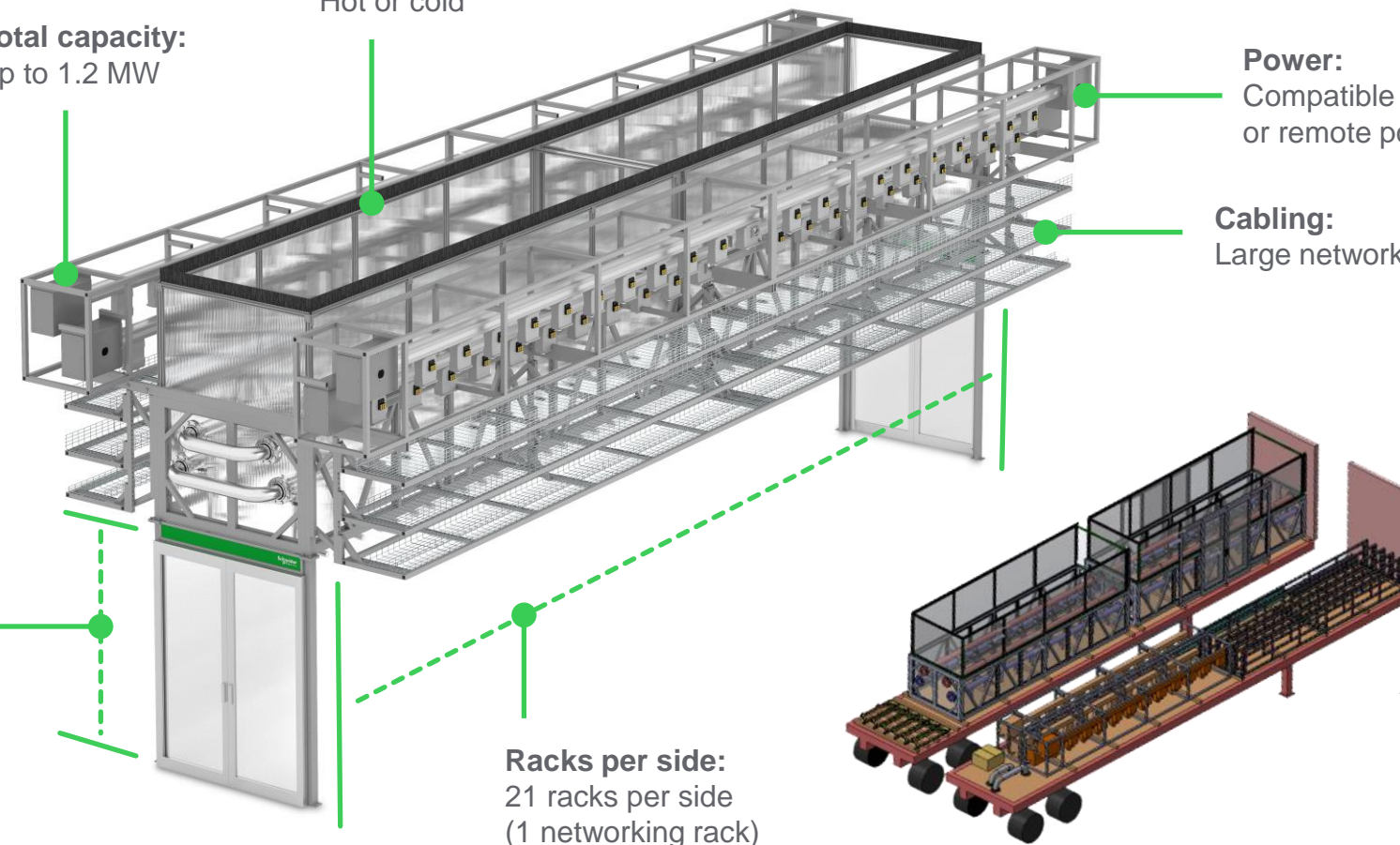
**Cabling:**  
Large networking cable trays

**Rack size:**  
42U–58U


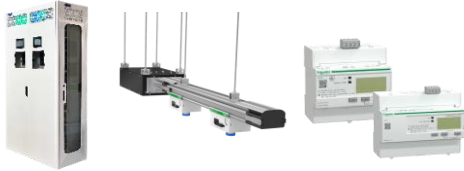






**Racks per side:**  
21 racks per side  
(1 networking rack)

**Assembly and delivery:**

- Prefabricated in Schneider Electric prefab facility
- Transported to site partially assembled



# What's compatible: hardware

		Prefabricated modular pod	Configurable pod
	<b>Power</b> 	Low industrial voltage busway — <i>integrated</i> Low industrial voltage remote power panel Power quality metering	Standard voltage busway — <i>integrated</i> Standard voltage remote power panel Power quality metering
	<b>Cooling</b> 	Liquid to liquid cooling — <i>integrated</i> Rear door heat exchanger In-row and room-based air cooling Hot or cold aisle configuration	Liquid to liquid cooling — <i>non-integrated</i> Rear door heat exchanger In-row and room-based air cooling Hot or cold aisle configuration
	<b>Rack systems</b> 	EIA, ORV3, MGX racks High-performance networking cable management	EIA, ORV3 racks Standard cable management
	<b>Security and environmental monitoring</b> 	Video surveillance Environmental monitoring hub	Video surveillance Environmental monitoring hub



# EcoStruxure Pod Data Center summary

Simplify AI cluster roll-outs and reduce deployment timelines with pod architecture ready-made for AI and accelerated computing.

EcoStruxure Pod Data Center is flexible, adaptable, and scalable:

- **Prefabricated, modular pods for hyper and exascale** — Arrive on site partially-built and factory integrated for premium speed-to-market and reliability.
- **Configured pods for small- to mid-scale** — Pre-tested and validated to streamline onsite integration
- **Save time and CapEx** — Reduce planning, modeling, and testing time; speed up deployment; and gain efficiency
- **Validated reference guides** with complete architecture for power, cooling, and white space, plus software and services
- **Built with sustainability in mind** — to optimize IT footprint and energy use





# Software, services, and sustainability



# Software and services



## Monitoring and management

Cloud-based or on-premise  
Preventative alarming and management  
Proactive, AI-driven insights  
Device monitoring and control  
Security reinforcement



## Proactive monitoring, optimization, and onsite services

Predictive analytics  
Condition-based maintenance  
Expert remote and onsite support



## Planning, modeling, and optimizing

Visualization and simulation  
Capacity tracking and modeling  
Optimized cooling and energy consumption  
Colocation tenant portal

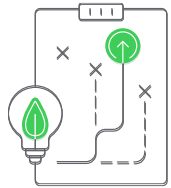


## Consulting and customization services

Audits and analysis  
Optimization recommendations  
Digital twin modeling and simulation  
Automated reports  
Custom dashboards and features  
Third-party integrations

# Sustainability

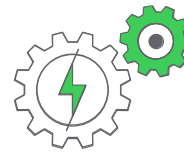
With data center energy consumption projected to grow significantly in the next five years, it is imperative we “bend” the energy growth curve. Our five-point approach to a sustainable data center strategy:



**Setting a bold,  
actionable strategy**



**Implementing sustainable  
data center designs**



**Driving sustainability  
in operations**



**Securing sustainable  
power**



**Decarbonizing  
supply chains**

[Our recent white paper](#) demonstrates that small improvements over currently planned projections in power usage effectiveness (PUE) and compute efficiency from 2026 can potentially “bend” the energy growth curve by 17%, decoupling data growth from compute energy consumption.








# Reference designs


# Not all reference designs are created equal.

Schneider Electric is uniquely positioned to solve the challenges driven by AI. And it takes more than pods and racks.


As rack densities increase, complexities increase, making reference designs **mandatory** for stress-free deployment. The reference design is the blueprint for building a rack, pod, or room using the customer’s preferred servers and meeting their application demands. But many companies skimp on the details (or don’t offer all the necessary components).




Rack and pod solutions



Power and cooling



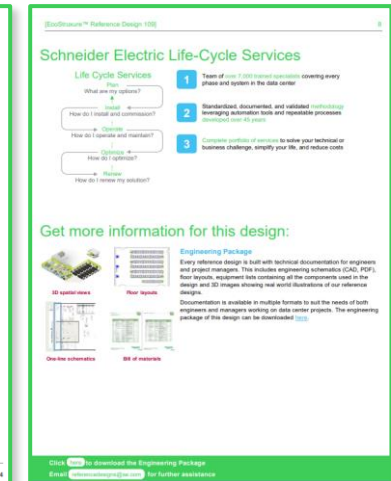
Software and services



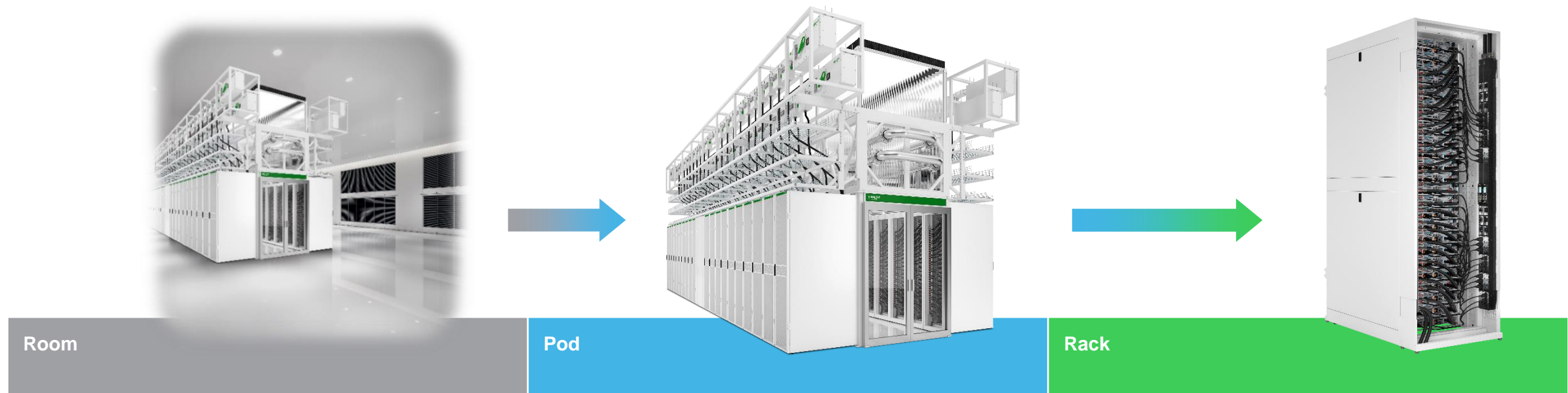
AI ecosystem of partners

Most reference designs	Schneider Electric reference designs
Basic bill of materials	Full architecture and analysis since 2012 Include engineering schematics, floor or rack layouts, complete component list, and more Cover electrical, mechanical, and IT space systems





# Full architecture



## Complete architecture — down to the rack

Schneider Electric reference designs are available for data centers, pods, and even down to the rack level. This is crucial to help data center designers reduce planning time and deploy with confidence.

## Engineered for excellence

We continually partner with leading server and chip manufacturers to create reference designs that support AI workloads at varying densities and different power and cooling architectures.

Learn more about [AI-ready reference designs](#).





To learn more about  
Schneider Electric, visit:

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