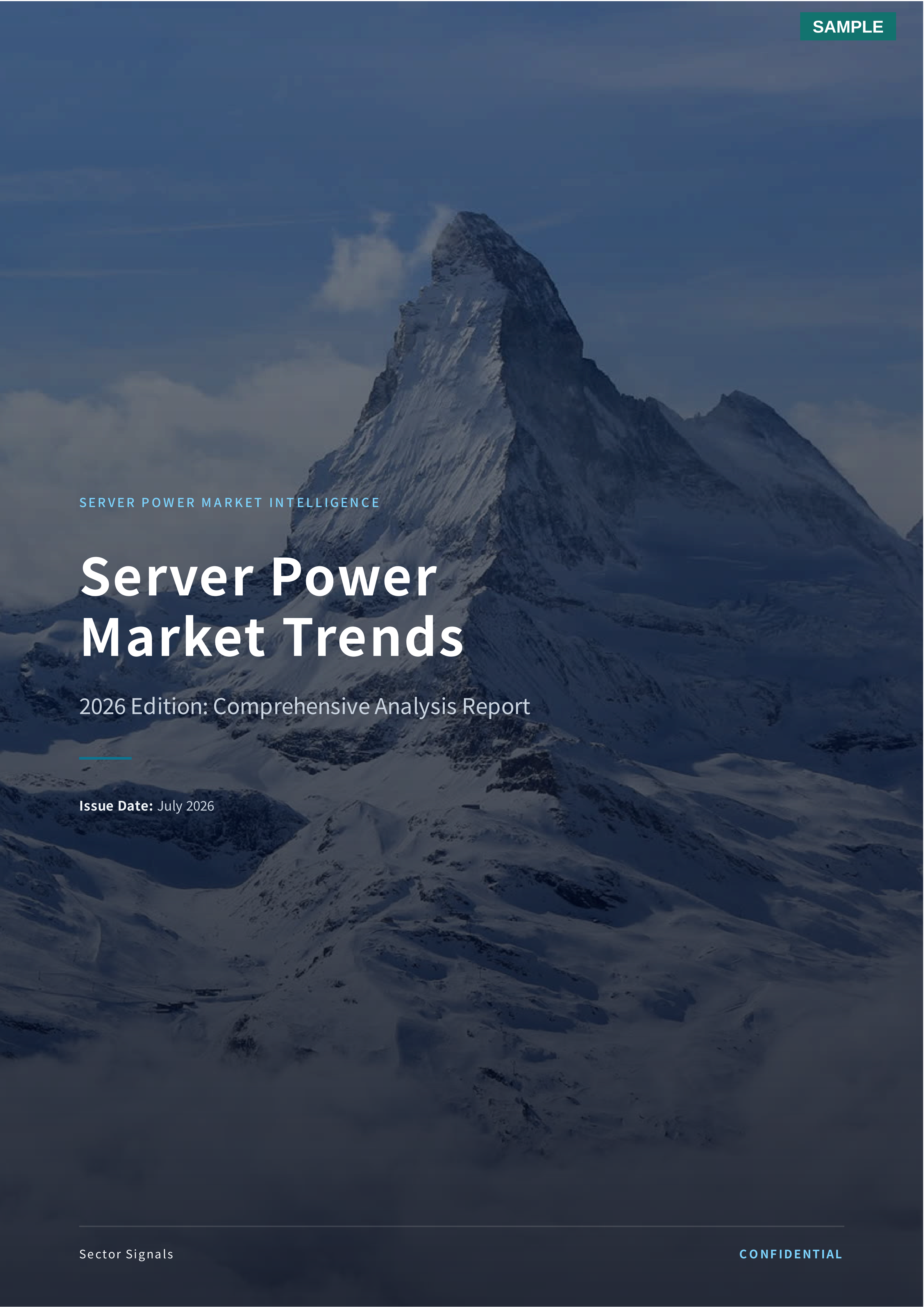

SAMPLE

SERVER POWER MARKET INTELLIGENCE

Server Power Market Trends

2026 Edition: Comprehensive Analysis Report

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4.0 Major Player Landscape

This section provides an overview of suppliers in the AI data center power ecosystem, categorized by functional segment. ● **= Primary Offering /** ○ **= Available** (Our analysis based on official company information; shows positioning of major players, not an exhaustive list). They can be broadly divided into "integrated" providers covering multiple segments (e.g., Vertiv, Eaton, Schneider) and "specialized" players strong in specific areas (e.g., connector and cooling specialists).

Company	Power Shelf/PSU	UPS	PDU/Power Distribution	Connectors/Busbars	Cooling (CDU/Liquid Cooling)
Vertiv	●	●	●	—	●
Eaton	●	●	●	○	●
Schneider Electric	○	●	●	—	●
Delta	●	●	○	—	○
Lite-On	●	—	—	—	○
Advanced Energy / Artesyn	●	—	—	—	—
Flex	●	—	—	—	—
Amphenol	—	—	○	●	—
Astron	—	—	—	●	—
Legrand	—	—	●	○	—
ABB	—	●	●	—	—
Supermicro / Lenovo	○	—	—	—	●
CoolIT / Asetek	—	—	—	—	●

Figure 4-2: Major Player Landscape (Functional Segments vs. Key Suppliers, compiled by Sector Signals)

The following sections compare products in each segment with specific technical specifications.

4.1 Power Shelves: The Race for High kW and High Efficiency

The power shelf is the heart of the rack, converting the incoming AC supply to the DC busbar voltage. As AI racks become denser, the kilowatts per shelf and overall efficiency have become key competitive differentiators.

Product	Output & Density	Efficiency	Features
Delta 18kW 1OU ORv3 Power Shelf	18kW (3kW x 6 slots)	**Over 97.5%**	ORv3 compliant, hot-pluggable PSUs
Eaton ORv3 Power Shelf	Up to 18kW in 1U (15kW in N+1)	High efficiency	Blind-mate connection
Vertiv PowerDirect Rack	**33kW/1U, up to 132kW/rack**	**Up to 97.5%**	New standard for high-density racks
Lite-On (with QCT)	**110kW rack-level power shelf**	—	Supports 800VDC liquid-cooled racks
Vertiv NetSure 731	-48V, 240A DC	Wide input range: 85–300Vac	For telecom/DC power feed applications

Table 4-1: Leading Power Shelves for AI Data Centers (Source: Company official data)

The leap in power density is remarkable. While conventional power shelves delivered a few to a dozen kilowatts, the **Vertiv PowerDirect Rack reaches 33kW in 1U and 132kW per rack**. Efficiency ratings of 97.5% are now standard, a level where even minor differences directly impact cooling loads and electricity costs. Lite-On's 110kW power shelf (800VDC, liquid-cooled), mentioned in Chapter 3, signals that this competition is shifting to the 800VDC generation.

4.2 Busbars and Busways: Toward a More Flexible Power Infrastructure

The DC power generated by the power shelf is delivered to IT equipment via a **busbar** at the rear of the rack. In the ORv3 specification, the power shelf connects to the busbar with a blind-mate connection, eliminating the gPDU required in ORv2 and improving installation efficiency (see Chapter 3).

For upstream power distribution to the racks, **track busways** are becoming mainstream. Legrand's Starline Track Busway, a flexible distribution system that allows **tap-off units to be easily relocated as needed**, is widely adopted in the data center industry. Ancillary features are also becoming more sophisticated, including power monitoring (Starline M70) and plug-in units that can be remotely operated via fiber optics or Bluetooth (Remote Plug-In Actuator), adding a layer of **power distribution visibility and remote control**.

Vertiv provides data to illustrate the rationale for transitioning to rack-level DC distribution. While **average rack power density has doubled in two years and could exceed 30kW by 2027**, **traditional AC architectures lose 10–12% of a data center's total energy across multiple conversion stages**. The shift to DC distribution and high-efficiency conversion is driven by the need to reduce these losses.

Chapter 10: Market Size and Outlook (Proprietary Estimates)

This chapter presents a sense of scale for the AI data center power market. One important caveat must be stated upfront: **all figures in this chapter are proprietary estimates by Sector Signals and are not reproduced from the figures or frameworks of any market research firm**. The estimates are built up from a **primary anchor of electricity demand** published by public agencies and grid operators, with all assumptions made explicit at each conversion step. We disclose our assumptions so that readers can recalibrate the figures using their own inputs.

10.1 The Foundation of Our Estimates — The Primary Anchor (Electricity Demand)

The most reliable primary information for discussing market size is not a dollar-denominated TAM from a market research firm, but rather **electricity demand figures published by public agencies**. We reproduce here the key anchors confirmed in this report.

Anchor	Figure	Source
Data centers' share of U.S. electricity	4–5% (current) → **9–17% (2030)**	EPRI Powering Intelligence 2026
DOE estimate of data center electricity demand	**6.7–12%** of U.S. electricity	DOE (via Mitsubishi Power)
Growth in data center electricity consumption	**~3× by 2028** (AI as primary driver)	DOE
PJM peak load increase (2024→2030)	**+32 GW (of which ~30 GW from data centers)**	PJM 2025 Long-Term Load Forecast
Rack power density	Doubling every two years; **30 kW+ by 2027**	Vertiv

Table 10-1: Primary anchors serving as the starting point for our estimates

10.2 Estimation Logic (Explicit Assumptions)

Converting electricity demand (GW / TWh) into a power equipment market (dollar value) requires the following assumptions. Each assumption is set by Sector Signals and is expressed as a range.

- **Assumption A (U.S. data center electricity volume):** Taking total U.S. electricity at approximately 4,000 TWh/year, a data center share of 4–5% equals **~180 TWh** today; a share of 9–17% in 2030 equals **~360–680 TWh**.
- **Assumption B (electricity volume → installed capacity):** Applying a data center load factor of ~0.75, U.S. data center installed capacity in 2030 is estimated at **~60–110 GW** (roughly 2–3.5× the current ~30

Chapter 11: Decision Framework — Checkpoints for Investment, Procurement, and Power Design

This chapter translates the facts and estimates from the preceding chapters into practical decision-making for investment, procurement, and power design. It presents checklists for three perspectives: investment, procurement, and power design. Before selecting individual products, readers should test their assumptions and options against these axes.

Figure 11-1: Three Perspectives to Check

Investment

Assess power availability, supply constraints, technology generation, regulatory fit, and unit-price trends (11.1)

Procurement

Use standards compliance as the first filter, set efficiency as a numeric target, and treat long-lead items as the critical path (11.2)

Design

Plan dual power architectures, minimize conversion stages, design for transients/protection, and co-design power and cooling (11.3)

11.1 Investment Decision Checkpoints

When evaluating investment, credit, or M&A in AI data centers, the first question should be whether power can be secured and delivered, not how much compute can be purchased.

Checkpoint	Specific questions	Related chapters
Power availability	What is the site's interconnection queue and expected energization date? Are there contracts for on-site power such as fuel cells, nuclear, gas, or storage?	7, 8
Supply constraints	When were transformers and high-voltage equipment ordered, and are multiple sources secured? (80–210 week lead times)	8
Technology generation	Can the design and procurement setup support 800VDC and liquid cooling? What is the obsolescence risk?	3, 6
Regulatory fit	Can the project satisfy large-load rules such as PJM/NERC and local regulations?	8, 9
Unit-price trend	Does the plan reflect price uplift from GaN/SiC replacement and 800VDC upgrades?	5, 10

11.2 Procurement Decision Checkpoints

Power and cooling procurement should be evaluated by standards compliance, supply risk, and integration capability, not by standalone specifications alone.

Role	Metrics to watch	Questions to ask in discussions	How to identify risk
Investors / credit	New GW, interconnection queue, 800VDC adoption rate, power contracts	"What contracts secure power? When is receiving power and energization expected?"	AI investment slowdown / interconnection delay / technology obsolescence
Component makers	High-voltage inquiries, OCP compliance requirements, unit-price trend	"Which version of Diablo 400 / 48V requirements must be supported?"	Standard changes / late entry / price erosion / being locked into subcontracting by integration
Power-supply makers	800VDC and liquid-cooling production plans, efficiency competition, certification status	"Are NVIDIA/OCP certifications secured? What is the efficiency target (Titanium)?"	Timing mismatch in transition / inventory and generation-change risk
Data-center operators	Transformer order timing, large-load rules, PUE/WUE	"What is transformer lead time? Is the project compliant with large-load rules?"	Energization delay / supply bottleneck / connection restrictions
Trading companies / procurement teams	Long-lead items, multiple sourcing, FX, regional regulation	"What alternative sources exist? What are the price and volume terms for long-term contracts?"	Single-source dependency / supply squeeze / regional concentration

Table 11-1: Role-based playbook (metrics, negotiation questions, and risk signals)

Across all roles, the common starting point is to ask whether power can be secured and delivered. Discussions about compute capacity should come after that.

11.5 Chapter Summary

For investment, procurement, and design alike, the starting question is the same: **can power be secured and delivered?** The next questions are technology generation (800VDC readiness), supply constraints (long-lead items), and regulatory fit. The checklists and role-based playbook in this chapter provide a minimum set of practical decision axes.

Chapter 12 discusses specific implications for Japanese companies, and Chapter 13 organizes the risks and leading indicators around this transition. Primary sources for each chapter are listed at the end of the relevant chapter, and market estimates are clearly identified as proprietary estimates in Chapter 10.

Primary Sources for the Overall Report (by Field)

- **Standardization**: OCP (ORv3 / Diablo 400 / 48V requirements) / ASHRAE TC9.9 / 80 PLUS / The Green Grid / Emerge Alliance / TIA-942 / IEEE
- **Demand, grid, and regulation**: EPRI (Powering Intelligence 2026 / DCFlex) / DOE / PJM / NERC / FERC / regional regulators
- **Semiconductors and power equipment**: NVIDIA / Infineon / Texas Instruments / STMicroelectronics / Renesas / Navitas / onsemi / EPC / Nexperia / Vertiv / Eaton / Schneider Electric / Delta / Lite-On /

Appendix B: Procurement and Investment Checklist

Power availability and site selection

- [ ] Have you checked the candidate site's interconnection queue and expected receiving-power / energization date?
- [ ] Have you incorporated transformer and breaker lead times (80–210 weeks) as the critical path in the schedule?
- [ ] Have you confirmed compliance with large-load rules (NERC/FERC/grid operator)?
- [ ] Have you considered an on-site power portfolio of fuel cells, nuclear/SMR, gas, and BESS?

Power design and procurement

- [ ] Have you designed next-generation racks on the premise of 800VDC (±400VDC) support?
- [ ] Have you planned on a dual track for existing assets (54V/48V and ORv3) and 800VDC?
- [ ] Have you specified power-shelf and PSU efficiency (80 PLUS Titanium, 97.5% class) as numeric targets?
- [ ] Have you confirmed ratings and safety mechanisms for high-voltage DC connectors and busbars (1500VDC class and high current)?
- [ ] Can the vendor co-design power and cooling, including liquid cooling for power shelves?
- [ ] Have you selected devices based on the depth of evaluation boards, reference designs, and application notes?

Supply risk

- [ ] Have you multi-sourced long-lead items?
- [ ] Have you avoided dependence on a single architecture or single supplier?

Appendix C: Primary Sources by Field

- **Standardization**: opencompute.org (ORv3, Diablo 400, 48V requirements) / ashrae.org (TC9.9) / clearesult.com (80 PLUS) / thegreengrid.org (PUE/WUE) / emergealliance.org (380VDC) / tiaonline.org (TIA-942) / ieee.org
- **Demand, grid, and regulation**: epri.com (Powering Intelligence / DCFlex) / energy.gov (DOE) / nerc.com / ferc.gov / pjm.com / caiso.com / eia.gov / iea.org / cisa.gov
- **Semiconductors and power equipment**: nvidia.com / infineon.com / ti.com / st.com / renesas.com / navitassemi.com / onsemi.com / epc-co.com / nexperia.com / vertiv.com / eaton.com / se.com / deltaww.com / liteon.com / advancedenergy.com / amphenol.com / legrand.com
- **Cooling**: official sites of Vertiv / Supermicro / Lenovo / CoolIT / Asetek / LiquidStack / Submer
- **Power procurement**: bloomenergy.com / constellationenergy.com / talenenergy.com / vistracorp.com / oklo.com / x-energy.com / nuscalepower.com / cummins.com / tesla.com / fluenceenergy.com / siemens-energy.com / gevernova.com / hitachienergy.com / abb.com

This list summarizes primary information sources referenced in this report by field. Individual sources for each claim are listed at the end of the relevant chapter.

This concludes the report. Market size and other estimates are clearly identified as proprietary estimates in Chapter 10, with assumptions disclosed. Please also review the disclaimer at the end when using this report.