

Powering Up for AI: Key Success Factors for Higher-Voltage MV Systems in AI Data Centers

The power density and scale of AI computing deployments are changing every aspect of how data centers are designed and operated. For decades, data centers had total IT loads measured in MWs and were built to support IT environments operating at less than 30 kW per rack. But GPUs have dramatically changed that. NVIDIA's Vera Rubin GPU will have a power density of 250+ kW per rack, and future models are projected to have a density of more than 1 MW. Power density this high is pushing facility IT loads into the GW range – something previously unthinkable.

To support this unprecedented power density and scale, shifting to higher-voltage power distribution equipment is rapidly becoming a necessity. However, this is not a trivial change for data center infrastructure. Deploying higher-voltage switchgear and UPS equipment requires the right strategy in order to meet the needs of AI environments while also ensuring rapid deployment, reliability, safety, and sustainability. Through our extensive work with data center companies deploying AI data centers at scale, ABB has identified a number of success factors for all companies moving to higher-voltage MV power architecture:

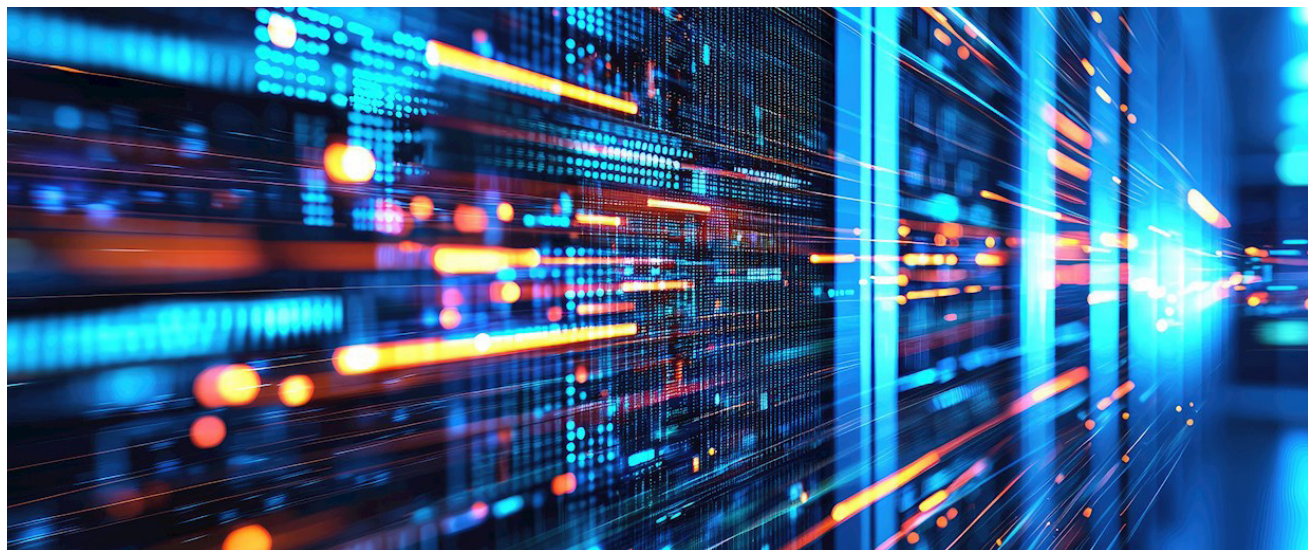
- **Focus on Scalability:** Scalability of power systems is critical for meeting the power needs of AI data centers whose total IT load can be hundreds of MW or more than 1 GW in scale. The traditional building blocks for breakers and UPS systems have been 3 MW. That may have been

adequate for traditional IT environments, but those are inefficient building blocks for facilities supporting AI workloads. ABB is helping data center companies solve this scalability challenge with solutions that can be deployed in much larger blocks, driving other major benefits in the process. For example, our MV UPS is scalable up to 25 MW blocks while also delivering high reliability with several layers of redundancy and reduced total cost of ownership.

- **Demand Speed of Implementation:** Not only is the scale of AI facilities increasing, but the speed at which they need to be built is accelerating as well. The traditional installation and commissioning process for traditional MV switchgear and UPS equipment is complex and slow, requiring a large team of electricians and technicians to work in a confined space on steps that have an escalated risk of human error. The commissioning process is equally arduous and can cause delays. This simply does not work for the speed at which AI data centers are being built. Accelerating installation and commissioning is a critical success factor for MV switchgear and UPS systems. ABB has designed MV solutions to dramatically reduce the complexity of installation, wiring, and commissioning, allowing data center companies to accelerate time-to-ready for new facilities. These designs also reduce the opportunity for human error, which significantly reduces setbacks that can delay installations.

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- **Maximize Power Efficiency:** Moving to higher-voltage equipment increases energy efficiency by eliminating the power loss inherent to stepping power down to lower voltages. However, there are other ways data center companies can further improve energy-efficiency gains. ABB has been at the forefront of amplifying the energy efficiency of MV power systems with innovations that use power more wisely, such as designing MV products to replace point-to-point copper wiring with an Ethernet-based communication bus, significantly lowering lifetime energy usage while also delivering excellent reliability, as an example.
- **Look for Innovation that Drives Reliability:** The rigorous operational needs of GPUs make the reliability of power systems more important than ever. This makes reliability-focused innovation an important area for data center companies to examine as they look at MV equipment. ABB's recent innovations in this area have been game changers for MV reliability and performance. ABB was the first company to introduce digital switchgear, a milestone for MV power equipment designed for the needs of AI. Another example is ABB's AMVAC circuit breaker, which offers magnetic-actuated design that enhances reliability while requiring less maintenance.
- **Ensure a Redundant, Resilient Supply Chain:** Given the scale and speed of AI data center development, the strength of the supply chain matters for higher-voltage switchgear and UPS equipment. Supply chain interruptions for higher-voltage MV systems are a massive setback for these large builds. ABB has eliminated these risks with a supply chain built with redundancy and resiliency. We build global solutions that are customized locally, which gives customers scalability without sacrificing the level of support that ensures successful buildouts. ABB has fully redundant manufacturing facilities as well as at least two suppliers for all components in every geography. This enables data center companies to scale with the confidence their supply chain can keep pace.
- **Be Ready for the Transition to DC Power:** Another important success strategy for data center companies is ensuring the decisions they make about higher-voltage MV power equipment today will align with the Direct Current

(DC) power decisions they make tomorrow. ABB has simplified this for customers by designing solutions that allow you to meet your MV power needs today, with confidence that these systems will not only fully support the DC strategy you embrace but also provide a foundation for DC success.

Each of these are critical success factors for shifting to higher-voltage power systems in ways that accelerate deployments, ensure scalability, maximize energy efficiency, and achieve other critical goals. ABB's expertise in customizing higher-voltage MV switchgear and UPS systems for each customer's specific needs also enables companies to optimize performance, availability, and reliability in ways that align with their AI strategy.

For more information about ABB's medium voltage offerings, explore [ABB's product portfolio](#) or visit our [Data Center solutions site](#).

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