



NEWS

STT GDC launches HVDC testbed to address AI's power demands

The FutureGrid Accelerator on Jurong Island will test the use of high-voltage direct current power systems, as traditional alternating current power systems can no longer address the growing energy needs of AI datacentres

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Singapore's ST Telemedia Global Data Centres (STT GDC) has launched a new testbed in the city-state to validate the use of high voltage direct current (HVDC) in powering the next generation of [artificial intelligence \(AI\) infrastructure](#).

Located at the Nanyang Technological University (NTU) Electrification and Power Grids Centre on Jurong Island, the FutureGrid Accelerator is a collaboration between STT GDC, Taiwanese electronics and power management systems supplier Liteon Technology, and NTU deep tech energy spin-off Amperesand.

The facility is Southeast Asia's first live HVDC-powered AI infrastructure testbed, aiming to meet the substantial power and cooling demands of modern AI chips more efficiently than traditional alternating current (AC) systems.

Speaking at the launch of the initiative, Lim Mingcheng, country head for Singapore at STT GDC, noted the growing power demands of AI, with current AI servers already consuming 100 kW per rack, which is five times the amount of power drawn by a traditional server rack.

And by 2030, advances from chipmakers could increase power demands to 1 MW per rack, Lim warned, adding that continued reliance on traditional AC electrical systems would create enormous power infrastructure complexity involving extensive switching, multiple transformers, and heavy copper cabling that consumes valuable floor space.

“We are losing energy as heat at every step,” Lim said, calling for a shift to HVDC to eliminate the need for multiple conversion stages in traditional AC power delivery. “A fundamental redesign of the power systems is needed, or we will lose many of the [efficiency gains](#) that modern AI hardware now makes possible,” he added.

The concept of bringing DC power to the server rack is not new. In 2024, Microsoft and Meta embarked on the [Mount Diablo initiative](#) to standardise a 400V DC architecture for datacentres, but the initiative did not gain a lot of traction, according to Yeo Teong Chuan, head of research and development for technology, projects, operations and environment at STT GDC.

That was because traditional AC architectures were still capable of managing standard workloads, Yeo said. But when Nvidia announced in May 2025 that it was [leading the transition to 800V DC power infrastructure](#) to support 1 MW IT racks and beyond, the industry started looking at DC with a sense of urgency, he added.

Still, the transition from AC to DC power, which is expected to reap up to 30% in overall energy savings and reduce carbon emissions by 400 tonnes per megawatt per year, will take time.

For one thing, the industry currently lacks established standards, including those related to safety, for HVDC deployments in datacentres. “But we’re not going to wait,” Yeo said. “We’ll use whatever knowledge we have to try to understand how the equipment behaves, from the energy supply all the way to the AI server.”

While new greenfield datacentres could adopt HVDC designs, the immediate future will likely be a hybrid of AC and DC power, as operators of existing brownfield facilities cannot easily displace customer workloads to upgrade power infrastructure, more so at the edge where [AI inferencing](#) takes place.

Jason Tsao, chief transformation officer at Liteon Technology, explained that at edge locations, datacentre infrastructure will have to address different power requirements: telecom equipment running on negative 48V DC, new AI servers requiring positive 51V or 800V DC, and building utilities still depending on AC power.

Consequently, Liteon is using the testbed to validate universal power conversion systems that can accept multiple inputs (AC grids or DC renewables, such as solar) and output multiple voltages. This flexibility is vital for edge facilities that may need to incorporate solar or battery storage as traditional [AC grids become increasingly constrained](#).

Beyond infrastructure, the shift to DC power in datacentres will also require talent capable of managing HVDC environments, spurring demand for electrical engineers.

To address this, STT GDC signed memoranda of understanding with four tertiary institutions – the Institute of Technical Education, Singapore Polytechnic, NTU, and National University of Singapore – to upskill over 8,000 Singaporeans on AI infrastructure and sustainable energy systems over five years through specialised courses, mentorship programmes and industry attachments.

“Talent is the decisive enabler,” said Bruno Lopez, group CEO of STT GDC. “These partnerships build a skilled workforce needed to strengthen Singapore as a global hub for advanced digital and energy systems.”

The FutureGrid Accelerator will continue to evolve over the next two years, with plans to introduce [liquid cooling](#) and next-generation AI servers to the testbed as the technology becomes available.

Read more about datacentres in APAC