BERNSTEIN
SOCIETE GENERALE GROUP

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Americas Energy & Transition

Americas Power and Energy Transition: Solid-State Transformers: 800V, 0 Windings

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Solid-state transformers (SSTs) replace the copper-and-iron magnetic transformer with semiconductor power electronics (SiC or GaN), converting medium-voltage AC to usable low-voltage DC through a highly integrated power-electronic architecture, eliminating several conventional conversion stages. That collapse in conversion stages is what is pushing for commercialization of SSTs.

The forcing function is rack power density. Today's AI racks draw roughly 60-100 kW; next-generation designs are being discussed at up to ~1 MW per rack within a similar footprint. The legacy AC-coupled chain — transformer, switchgear, UPS, rack power supply — was never engineered for that, and industry commentary points to system efficiency climbing from an 84–91% AC baseline toward ~96–98% in a fully DC-native, SST-based architecture, meaning less overall losses.

Solid-state transformers (SST) are:

1.Faster – a normal transformer works at 60Hz, SSTs work ~ 1Mhz

2.Smaller – ~50-70% smaller in size and weight

3.Smarter – monitors voltage, circuit breaker, detects inconsistencies

4.AC/DC compatible – can work with solar panels, EVs, batteries

…than traditional transformers

This note does a quick TAM on SSTs, explains what they are, why they are important, and who is doing what. GE Vernova is leading the charge with two different SSTs, a 5MW indoor application, and a 6MW outdoor application with two different hyperscalers.

Published third-party TAMs for SST are still small,~$1B for the data-center-specific slice through 2030, likely modeled on revenue recognition with a 2028 commercial date. We use a bottom-up build using data center capacity growth scenarios, an adoption S-curve, and a range of $/MW cost which implies a materially larger long-run TAM once SST becomes an architecture choice.

BERNSTEIN TICKER TABLE

Ticker	Rating	Cur	18 Aug 2026 Closing Price	Price Target	TTM Rel. Perf.	Cur	Adjusted EPS 2025A	2026E	2027E	Adjusted P/E (x) 2025A	2026E	2027E
ENPH (Enphase Energy)	M	USD	37.58	56.00	(14.2)%	USD	1.29	0.58	1.22	29.2	64.3	30.9
GEV (GE Vernova)	O	USD	1,004.53	1,298.00	41.5%	USD	17.70	28.30	29.49	56.8	35.5	34.1
ETN (Eaton)	O	USD	431.33	534.00	2.7%	USD	12.07	13.45	16.37	35.7	32.1	26.3
IFX.GR (Infineon)	O	EUR	57.61	102.00	40.0%	EUR	1.38	1.77	2.98	41.6	32.6	19.4
6723.JP (Renesas)	O	JPY	3,807.00	6,300.00	76.2%	JPY	181.61	261.36	302.64	21.0	14.6	12.6
VRT (Vertiv)	O	USD	272.54	368.00	81.6%	USD	4.20	6.60	9.06	64.9	41.3	30.1
ENR.GR (Siemens Energy)	O	EUR	154.60	210.00	42.7%	EUR	1.63	4.24	5.94	37.4	20.8	14.9
SIE.GR (Siemens)	O	EUR	275.95	330.00	0.9%	EUR	12.23	11.29	11.64	27.7	23.8	22.4
ABBN.SW (ABB)	M	CHF	80.56	80.00	32.7%	USD	2.56	3.02	3.63	38.8	32.8	27.3
SU.FP (Schneider)	O	EUR	295.10	350.00	17.8%	EUR	8.43	10.42	13.24	35.0	28.3	22.3
SPX			7,691.76									
EDME			1,618.61									
JPL			2,693.61									

O - Outperform, M - Market-Perform, U - Underperform, NR - Not Rated, CS - Coverage Suspended

ENPH, GEV, ENR.GR, SIE.GR estimate is Reported EPS; ENPH, GEV valuation is Reported P/E (x); ENR.GR valuation is EV/EBITDA (x);

Source: Bloomberg, Bernstein estimates and analysis.

INVESTMENT IMPLICATIONS

We rate GEV Outperform with a price target of $1298/sh, and ENPH as Market-Perform, with a price target of $56/sh.

We rate Eaton (ETN) Outperform with a $534 price target.

We rate Infineon **Outperform** with PT = **€102.00**.

We rate Renesas **Outperform** with PT = **¥6,300.00**.

We rate Vertiv (PT $368) Outperform

We rate Schneider (PT €350), Siemens (PT €330), and Siemens Energy (PT €210) Outperform, and ABB (PT CHF 80) Market-Perform.

DETAILS

1. WHAT IS A SOLID STATE TRANSFORMER?

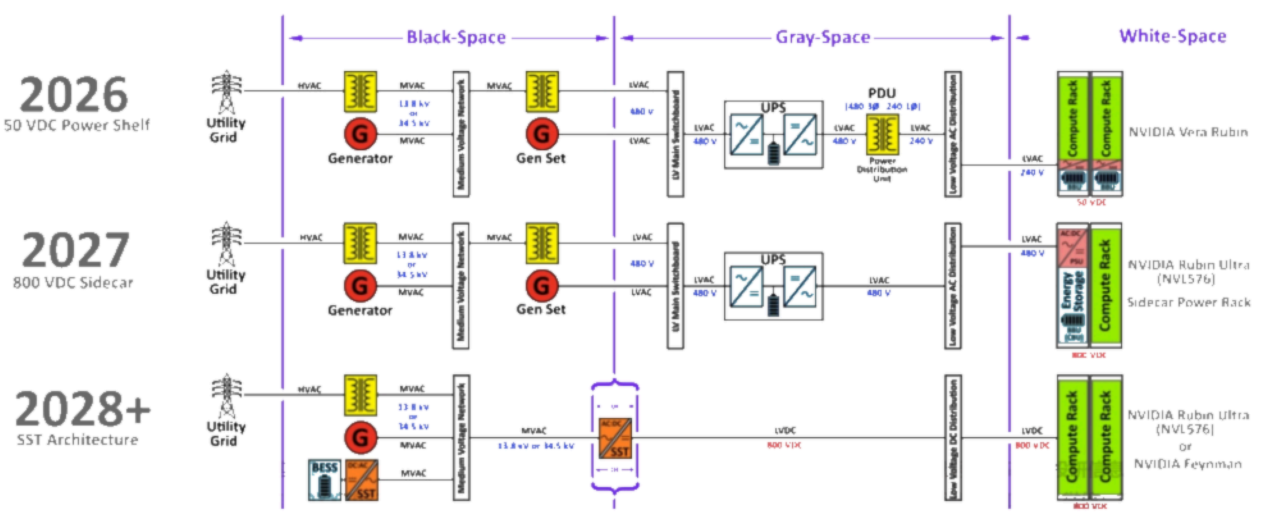
Solid-state transformers are smaller, faster, and more efficient than the equipment they intend to replace.

A conventional transformer is a passive electromagnetic device: copper windings around an iron core that step voltage up or down at line frequency (50/60Hz), with no active control. It is simple, durable, and largely unchanged in principle since the 19th century — but it is also bulky, cannot convert AC to DC on its own, and offers no inherent intelligence about power quality, fault response, or bidirectional flow.

A solid-state transformer performs the same voltage-transformation function using power semiconductors — predominantly silicon carbide (SiC) or gallium nitride (GaN) devices today — arranged in a high-frequency power-electronic circuit rather than a low-frequency magnetic core. Because it is switching electronically rather than relying on core saturation at line frequency, an SST can:

- Convert medium-voltage AC (commonly 10–35kV in data-center-relevant designs) directly to low-voltage DC (400V, 800V) in a single integrated unit, eliminating the separate step-down transformer, rectifier, and UPS stages.
- Provide bidirectional power flow — relevant for battery energy storage integration, EV charging co-location, and participation in grid services/demand-response markets.
- Offer software-defined control of power quality, fault isolation, and voltage regulation, with sub-millisecond response times cited by several vendors.
- Be built as smaller, modular, often hot-swappable units — vendor products described in current trade coverage range from roughly 1.2MW to 4–5MW per unit or cabinet, arrayed in "supercluster" configurations of dozens to hundreds of modules for larger loads.

EXHIBIT 1: **NVIDIA's 800 VDC power distribution**



Source: NVIDIA white paper

Most electricity that is used in households and businesses is produced centrally and transported through wires over long distances to the end consumers. Electric power can be represented as the product of voltage and current (P = VI). Since a higher current creates larger energy losses, electricity is transported at very high voltages (and low current) to maintain overall power. It is produced and consumed at different voltages. Therefore, transformers are used across the power system to "step up" and "step down" voltage as needed.

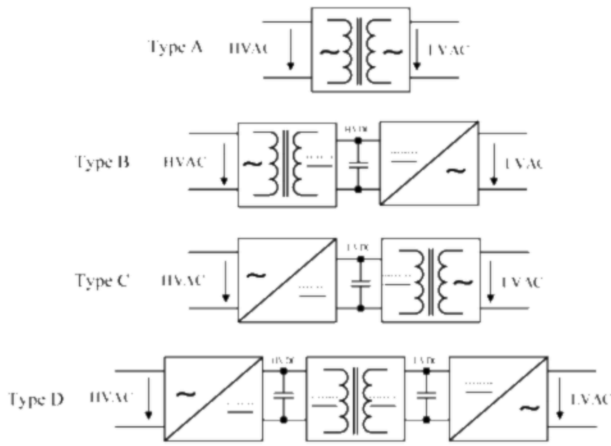
Traditional transformers use electromagnetic induction and coils of copper wire to create output power of a desired voltage. Traditional transformers have a number of limitations - they can only perform voltage conversions of alternating current (AC →

AC), they are large and clunky, and slow to upgrade.

A **solid-state transformer (SST)** does the voltage-conversion and electrical-isolation job of a conventional transformer, but uses power semiconductors, high-frequency magnetics, and digital controls. That lets it actively manage electricity rather than simply passively stepping voltage up or down.

Solid-state transformers are currently being developed to address some of these shortcomings. Solid-state transformers use semiconductors (generally silicon carbide or gallium nitride) along with power electronics to perform power conversion at high frequencies. They are therefore programmable and highly flexible. Crucially, they are also able to convert between alternating current and direct current (AC → DC or vice versa), in addition to voltage conversion. They are therefore able to perform any kind of power conversion. They also allow bidirectional power flow.

EXHIBIT 2: **Example SST configurations - SSTs can perform AC/ DC conversions and voltage transformation**



Source: Santos et. al.

2. THE 800V TRANSITION

Server components — GPUs, CPUs, memory — run on DC internally regardless of how power arrives at the building. The legacy chain converts AC to DC, then often back to AC, then back to DC again across the transformer/UPS/PSU stack, with real energy lost at every conversion. The industry is converging on 800VDC (±400VDC) as the next-generation rack- and row-level distribution standard, mirroring architecture already proven in EV fast-charging and utility-scale solar, which is precisely why solar power-electronics companies (Enphase, SolarEdge) are among the new entrants - SSTs are essentially microinverter adjacent.

3. BENEFITS OF SSTS

The flexibility and programmability is what makes them so desirable in a power grid that has a high share of variable renewable power generation that produces DC power, has a higher share of EV chargers and distributed energy resources to integrate, and serves large load demand from data centers, all of which have specific and variable power conversion needs. SSTs are also smaller, quicker to upgrade, and can be more efficient overall.

For AI data centers in particular, the compactness offered by SSTs relative to traditional power systems could free up white space where more compute racks could be added to increase compute capacity.

EXHIBIT 3: **SSTs have been demonstrated to have lower weight and volume than conventional transformers. SST efficiencis have been improving and are now understood to exceed those of most conventional transformers.**

TABLE II
PERFORMANCE CHARACTERISTICS OVERVIEW (TWO 500 kVA UNITS ARE CONSIDERED FOR THE LV SIDE).

	SST MV	SST LV	SST	LFT
Efficiency [%]	98.3	98.0	96.3	98.7
Volume [m^3]	1.57	1.10	2.67	3.43
Weight [kg]	1270	1330	2600	2590
Mat. cost [kUSD]	34.1	18.6	52.7	11.4

ETH Zurich power electronic systems lab

The compactness and efficiency of SSTs also enable significantly lower use of copper. According to the USGS, the U.S. imported ~45% of total copper consumption in 2024 (primarily Chile, which accounted for 65% of refined copper imports). Lower copper use means lower trade risk.

EXHIBIT 4: **SSTs can use less copper than conventional transformers**

TABLE IV
SPECIFIC RESSOURCE USAGE.

	SST MV	SST LV	AC/AC SST	LFT (est.)
kg Cu/kVA	0.15	0.32	0.47	0.6
kg Fe/kVA	0.32	0.63	0.95	1.2
mm^2 Si/kVA	85	22	107	0

LFT = Low Frequency Transformer
Source: ETH Zurich power electronic systems lab

4. A SIMPLE TAM ANALYSIS

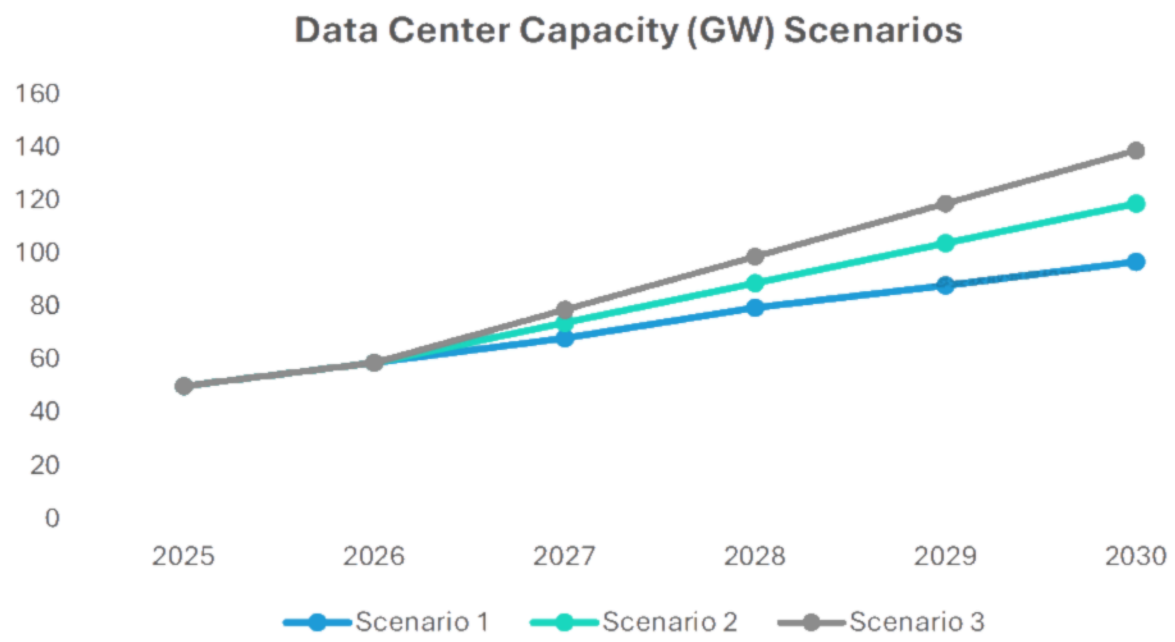
Since SSTs perform a range of power conversions with relevance across applications they can replace a number of power electronics devices beyond just conventional transformers; such as voltage regulators, rectifiers, inverters and reactive power compensation equipment.

The generally expected TAM for SSTs actually deployed by 2030 is on the order of ~$1B. However, when considering the potential total opportunity for SSTs - in a hypothetical scenario where they are they commercially adopted starting today - we see possibilities for a higher TAM.

The TAM methodology is simply: (AI capacity added that year, GW) x (SST penetration of that year's new capacity) x ($M per MW) cumulatively added till 2030.

Since there are various assumptions out there on data center assumptions, we thought it's best to use scenarios to represent data center adds till 2030. Scenario 1 is closest to the base case in our current power model and implies approximately 3% CAGR in overall power demand through 2030.

EXHIBIT 5: **Data Center Capacity Additions Scenarios**



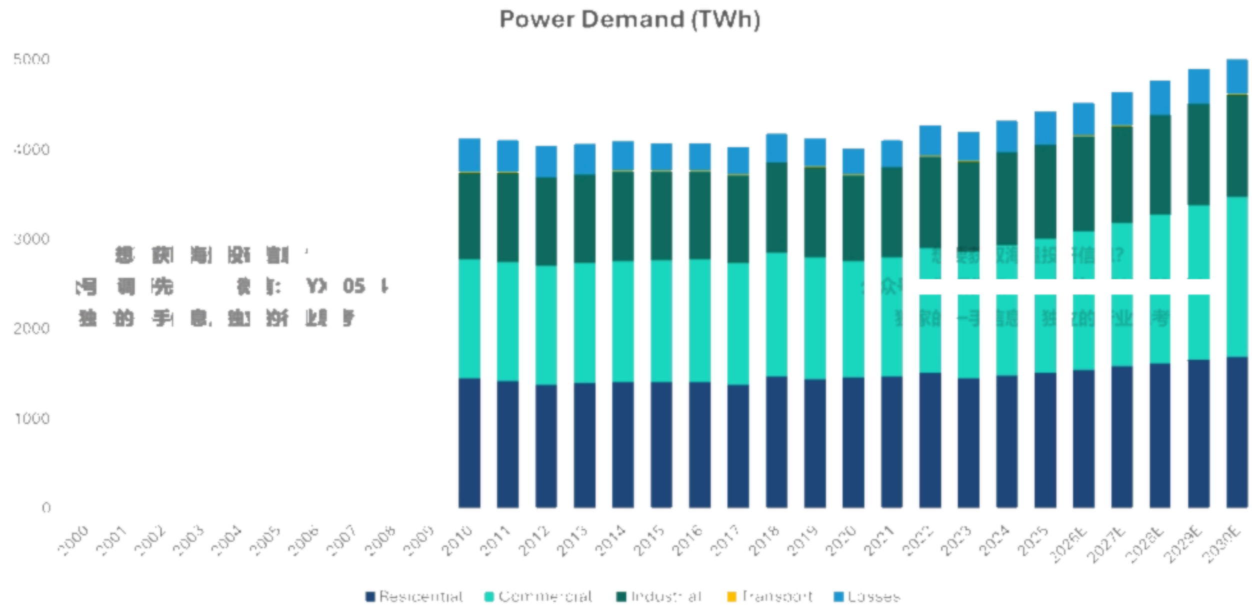
Source: Bernstein US Power Model

EXHIBIT 6: **Incremental additions of capacity by scenario by year**

Incremental GW adds	2026	2027	2028	2029	2030
Scenario 1	9	9	11	8	9
Scenario 2	9	15	15	15	15
Scenario 3	9	20	20	20	20

Source: Bernstein Power Model

EXHIBIT 7: **After flat demand for nearly two decades, we see ~3% CAGR in power demand growth until 2030, or ~80GW of incremental power adds**



Source: EIA, Bernstein Analysis and Estimates

Vendor roadmaps disclosed to date indicate full system demonstrations in late 2026, customer pilots in 2027, and volume shipments beginning in 2028. Broader adoption seems like a 2028–2030 phenomenon, with SST becoming a dominant architecture choice through the 2030s as costs decline and the supply chain (SiC/GaN device supply, magnetics, systems integration talent drawn from solar and EV charging) matures.

Three milestones that we are tracking for evidence of adoption:

(1) whether the 2026 pilots occur on schedule (GEV is on track to pilot a 5MW and a 6MW configuration with two different hyperscalers in the fall)

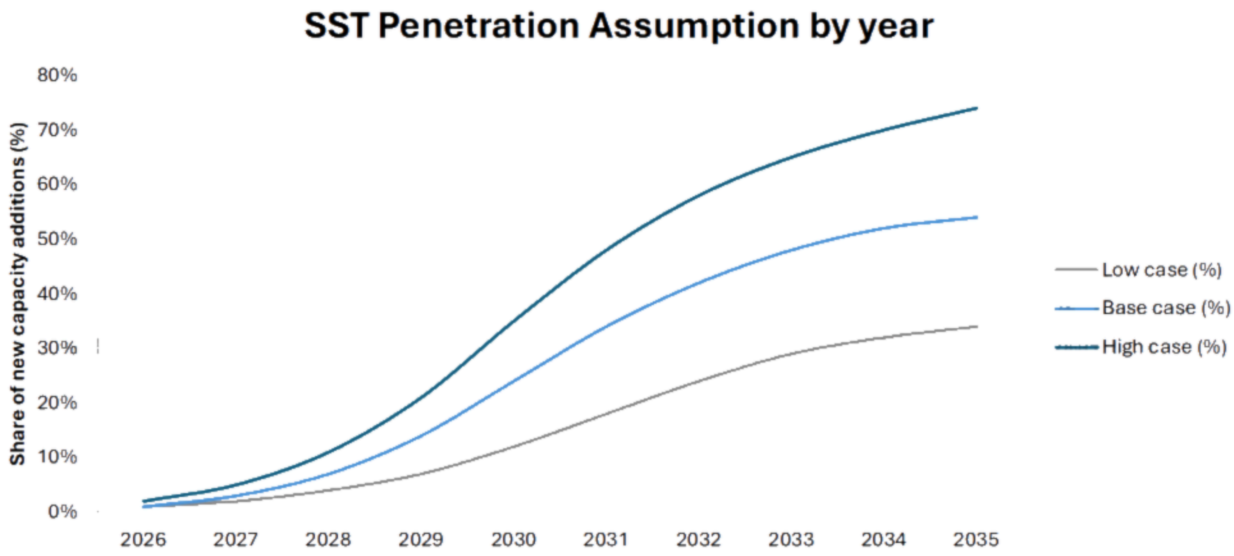
(2) announcements of which hyperscaler(s) commit to named 2027 pilot deployments or orders

(3) whether 2028 volume-shipment guidance holds or slips, this is what drives our adoption curve

Our assumption around adoption of SSTs is following the announcements of pilots in 2027, with volume shipments beginning in 2028. We build low base and high penetration curves of solid-state transformers based on this.

We assume gradually getting to ~35%, 55%, 75% by 2035 in the low, base, high case. See Adoption s-curve assumption below.

EXHIBIT 8: **Assumption of SST adoption by year based on vendor announcements**



Source: Bernstein Analysis

For pricing, we want to note that this is explicitly a scenario exercise, not a forecast - **the $/MW figure in particular is not yet observable at scale, since no vendor has disclosed list pricing for volume production, and early units carry a premium that should compress as SiC/GaN costs fall and competition intensifies.** We deliberately use a wide range for the pricing - it blends the SST hardware itself with a share of the switchgear/UPS/PDU equipment it is designed to displace, using data center electrical-infrastructure cost intensity as an outer bound and current vendor unit specifications (1.2–5MW modules) as a cross-check on plausible unit economics.

$/MW	**Low**	**Base**	**High**
Installed SST Layer	$0.55	$1.00	$1.65

Demand for equipment to serve the grid will be driven by 1) this unprecedented level of power demand growth that will need new capacity to be integrated and 2) replacement demand from the existing buildout.

EXHIBIT 9: **Cumulative TAM 2026 - 2030 Low to High**

Year	AI capacity added (GW)	Low pen. %	Base pen. %	High pen. %	Low $B added	Base $B added	High $B added
2026	9	1%	1%	2%	$0.05	$0.09	$0.29
2027	20	2%	3%	5%	$0.22	$0.60	$1.65
2028	20	4%	7%	11%	$0.44	$1.40	$3.63
2029	20	7%	14%	21%	$0.77	$2.80	$6.93
2030	20	12%	24%	35%	$1.32	$4.80	$11.55
Cumulative 2026-2030					$2.80	$9.69	$24.05

Source: Bernstein Analysis

Overall, we see a U.S. SST TAM of $3-20B from with further upside if data center power demand surpasses our expectations, or if adoption is faster than we assumed. Our upside case assumes a pretty fast penetration of 35% adoption by 2030.

5. CHALLENGES TO COMMERCIAL ADOPTION

Cost - Production cost remains the primary hurdle for large-scale SST adoption. The biggest cost driver is the semiconductor system (Si-C or GaN), and semiconductor costs need to fall for SSTs to take off. The technology would also benefit from economies of scale as production grows.

In addition to production cost, large parts of the electrical system that currently run on conventional transformers would need to be reconfigured to accommodate new high frequency SST architecture. This will require costly capital investment upfront, to enable higher efficiency and savings long term.

Reliability - SSTs are still being tested for long-term reliability under grid conditions. Grid equipment need to perform for decades after installation and factors like semiconductor stress levels under operating conditions need to be worked out.

Efficiency - On the technology side, the high frequencies that SSTs utilize create a number of efficiency losses such as hysteresis losses and eddy current losses that need to be minimized through further innovation.

6. COMPETITIVE LANDSCAPE

The field splits into three groups: venture-backed pure-plays racing to commercialize purpose-built SST hardware, public companies extending an existing product architecture (inverters, DC-DC conversion) into a new end market, and diversified incumbents either acquiring their way in or from an adjacent, much larger installed base of conventional transformers and switchgear.

EXHIBIT 10: **SST Competitive Landscape**

Company	Category	Data-center-relevant status (as of mid-2026)
GE Vernova (GEV)	Public — covered name	Furthest along with SSTs. Testing two SSTs - a 5MW and 6MW with two different hyperscalers, Electrification segment (grid transformers, switchgear, HVDC) is the incumbent-equipment analog most exposed to a data-center power-architecture shift; a natural extension candidate and/or partner path.
Heron	VC-backed startup	Heron Link converts 34.5kV AC to 800VDC at >98.5% claimed efficiency; $140M Series B (Feb-26, a16z American Dynamism + Breakthrough Energy) brings funding to ~$178M; founded by ex-Tesla Energy exec.
DG Matrix	VC-backed startup	Interport platform emphasizes port density (multiple DC/AC ports per unit); $60M Series A (Feb-26, Engine Ventures); Infineon SiC supply partnership (Mar-26); also building UL-certified BESS-SST integration with Ampace.
Amperesand	VC-backed startup	MV, SiC-based SST targeting utility-scale and data center loads; $80M Series A (Nov-25, Walden Catalyst + Temasek); targeting ~30MW of commercial deployments in 2026, with a Southeast Asia/Singapore angle via Temasek.
Enphase Energy (ENPH)	Public — covered name	Announced IQ Solid-State Transformer (Apr-26): distributed 1.25MW 'supercluster' built from 342 hot-swappable modules at 800VDC (±400VDC). Demos late-2026, pilots 2027, volume shipments 2028.
SolarEdge/ Infineon	Public, solar heritage entrant	Entered via Nov-25 Infineon collaboration; targeting a modular 2–5MW SST building block for AI data centers; positioning around the 800VDC transition expected ~2027.
Eaton	Public — covered name	Acquired Austin-based Resilient Power Systems (Aug-25), bringing medium-voltage SST technology in-house.
ABB / Hitachi Energy / Siemens Energy / Mitsubishi Electric / Toshiba	Diversified incumbents	Named as key players across most third-party SST market reports; primarily grid- and traction-oriented today, with data center-specific product lines still nascent relative to the startups above.
VRT	Public — covered name	Currently under product development, seems to be lagging Tier 1 players.
Siemens AG	Public – covered name	Currently under product development. Announced a partnership to develop and industrialise their SST with Reinhausen (MR), a German voltage regulation technology manufacturer with expertise in MV power electronics.
Schneider Electric	Public – covered name	Currently under product development. They are leveraging Schneider's China R&D hubs for development, and global partners to provide the full solutions to customers. Targeting readiness by 2028/29 as part of their 800 VDC Power Block.
Renesas	Public – covered name	Developing GaN bidirectional switches and reference architectures designed for SSTs.

Source: Company Filings, Bernstein Analysis

Capital formation has been notable for a nascent category: three startups alone (Heron Power, DG Matrix, Amperesand) raised a combined ~$280 million over the twelve months to mid-2026, while Eaton's acquisition of Resilient Power Systems marks the first meaningful incumbent M&A entry. We read that as a bullish signal for SSTs with VCs underwriting a data-center-specific SST thesis well ahead of the revenue booked to date, consistent with the gap between published market sizing and the scale of the underlying capacity buildout. (We have more details for certain companies based on what they've published below)

7. THE MECHANICS: 800V DC - EDISON TO TESLA BACK TO EDISON AGAIN

Maybe Edison had it right all along? Direct current is becoming the current of choice again; it's clean, it's safe, and it's efficient.

Typically, data centers support 48V power distribution systems that could power 15KW racks. Now data centers are aiming for high density, liquid cooled 1MW racks. Powering a 1MW rack with 48V power supply would take an enormous amount of current. Let's go back to basics - Ohm's law:

Power (watts) = Current (Amperes) x Voltage (Volts)

15 kilowatts = 15,000 Watts

15,000 Watts needs ~312 Amperes of current with a 48 V power supply. Powering a 1 MW or 1000,000 Watts rack with a 48 V power supply would need more than 66X that current at ~ 20,833 Amperes...or an impractical amount of copper - pushing the need for higher DC - voila - we have 800V DC.

Traditional enterprise architecture 15kW rack:

Grid 13.8kV AC → Step-down transformer → 480V AC → AC UPS (AC→DC→AC internally, batteries on DC link) → 208V AC → PDU (power distribution unit) → 208V AC at each server → Server PSU inside every server (AC→DC) → 12V DC → Motherboard VRM → ~1V DC → CPU / GPU chip

Conversion stages: More stages; Efficiency: 85%

Current hyperscaler architecture 30 kW rack:

Grid 13.8kV AC → Step-down transformer → 480V AC → Rectifier (AC→DC, batteries connect directly here) → 48V DC → 48V DC bus runs throughout building → 48V DC at rack → On-board DC-DC converter inside server → 12V DC → Motherboard VRM → ~1V DC → CPU / GPU chip

Conversion stages: Fewer stages; Efficiency: 93%

Future 800V DC architecture 1MW rack:

Grid 13.8kV AC → Step-down transformer → 480V AC → Rectifier (AC→DC, batteries connect directly here) → 800V DC → 800V DC bus runs throughout building → 800V DC at rack → DC-DC converter at rack level → 48V DC (last few feet only) → On-board VRM → ~1V DC → GPU chip

Conversion stages: fewer stages; Efficiency: 96%

Simply put

Problem	**Solution**
AI chips need 10-15X more power than traditional servers	Rack power must go up from 15kW to ~100kW -1MW
High power at low voltage (for long distances) is unmanageable	Raise distribution system voltage to 800 V DC
Multiple AC to DC conversions waste energy as heat	Convert AC to DC once at building entry - then stays DC

SUMMARY

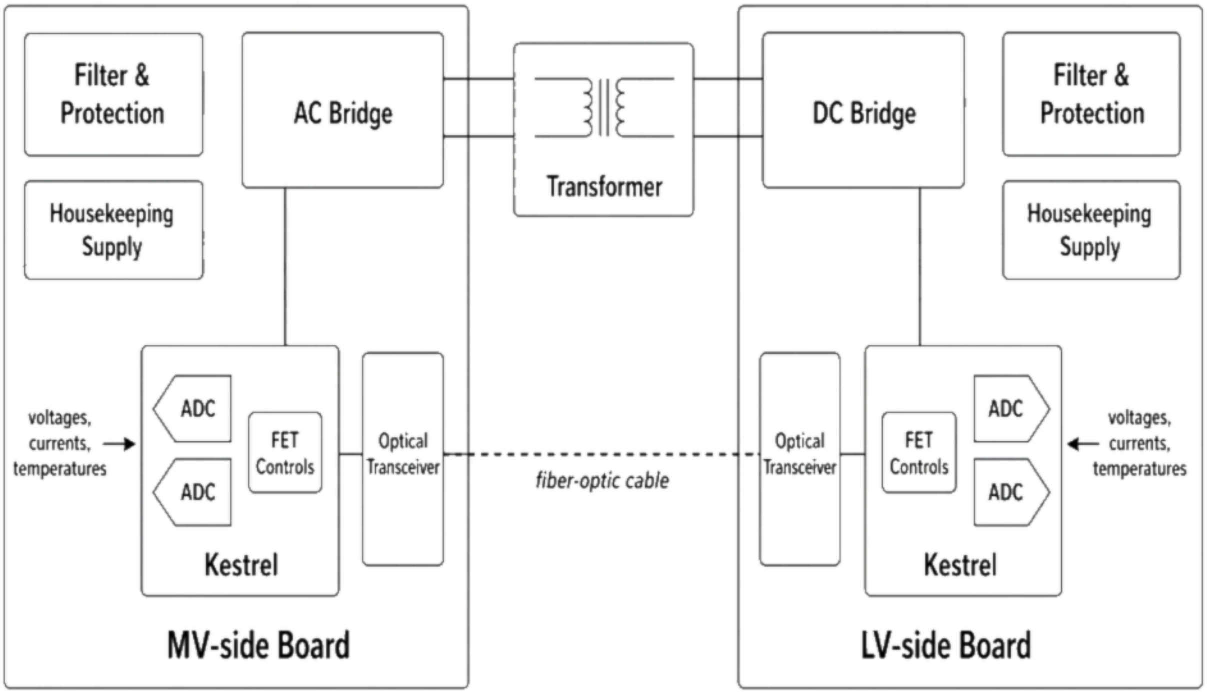
We think SSTs will be a sizable portion of the 800V DC architecture, but will likely take time to get to commercial scale adoption. GE Vernova seems the furthest along in testing and piloting two of their designs with hyperscalers, and the next milestone is order booking in 2027 after a six month test with hyperscalers. The simplistic TAM indicates higher than the widely publicized $1billion by 2030 number, but depends largely on the configuration adopted, which will drive the $/MW assumption.

APPENDIX

ENPH (FROM ENPHASE WHITE PAPER)

The first Enphase IQ SST product in development will support operation from both 35 kV-Class Medium Voltage (MV) utility connections (33 kV and 34.5 kV) as well as 15 kV-Class MV utility connections (11 kV, 13.2 kV, and 13.8 kV). The DC output voltage will support both the NVIDIA 800 VDC as well as the Open Compute Project (OCP) ±400 VDC standards. The IQ SST single rack product will have a nominal power rating of 1.25 MW with the ability to connect multiple racks together on a skid to accommodate up to 5 MW with additional rack level redundancy, as required (N+1, N+2, 2N, etc.). This will be achieved through a rack of 342 power modules connected in a delta configuration of 3x114 modules for 34.5 kV operation.

EXHIBIT 11: **Enphase Kestrel control ASIC supports an IQ SST specific 'tandem' function that links two ASICs via a fiber-optic interface to function as a single control ASIC.**



Source: Enphase White Paper on SST

INFINEON - KEY BENEFICIARY WITH ONE-STOP SHOP SOLUTIONS

Infineon is the only company offering a complete SST semiconductor stack across power switches, gate drivers, MCUs, security ICs, and sensors in one portfolio (Exhibit 12).

Infineon estimates the global semiconductor SAM for SSTs could reach USD1bn+ within 5 years, although we believe this outlook is conservative. Management has subsequently indicated a more bullish view but has yet to provide updated guidance. The company has disclosed early involvement with leading electronics OEMs and hyperscalers across Europe, U.S., and Asia on architecture and design work, though named accounts remain undisclosed at this stage. 2 landmark partnerships announced in 2H CY2025-1H CY2026 confirm the commercial pipeline is beginning to crystallize. In November 2025, Infineon entered a joint development agreement with SolarEdge Technologies to co-design and validate a modular 2-5 MW SST building block targeting direct medium-voltage (13.8-34.5 kV) to 800-1,500 V DC conversion for AI data centers, with a target efficiency of 99+%. In March 2026, Infineon announced a supply and co-development partnership with DG Matrix, a global SST solutions firm that counts AI data centers and industrial microgrids as its core markets, selecting Infineon's latest-generation SiC devices as the semiconductor foundation for DG Matrix's Interport multi-port SST platform, which is already deployed globally. Both companies have signalled continued roadmap alignment as DG Matrix scales toward higher-voltage platforms and larger production volumes.

Key Product Offerings:

CoolSiC EasyPACK .XT Modules - Power Switching Core

These silicon carbide power modules are the primary switching devices in Infineon's SST designs, with advanced packaging that delivers more than 20× improvement in power-cycling lifetime versus standard alternatives. Production variants at 1,200 V and 2,000 V are available today, with higher-voltage (2,300 V and 3,300 V) versions on the roadmap for larger-scale SST deployments (Exhibit 13).

EiceDRIVER Gate Drivers - Switch Control Interface

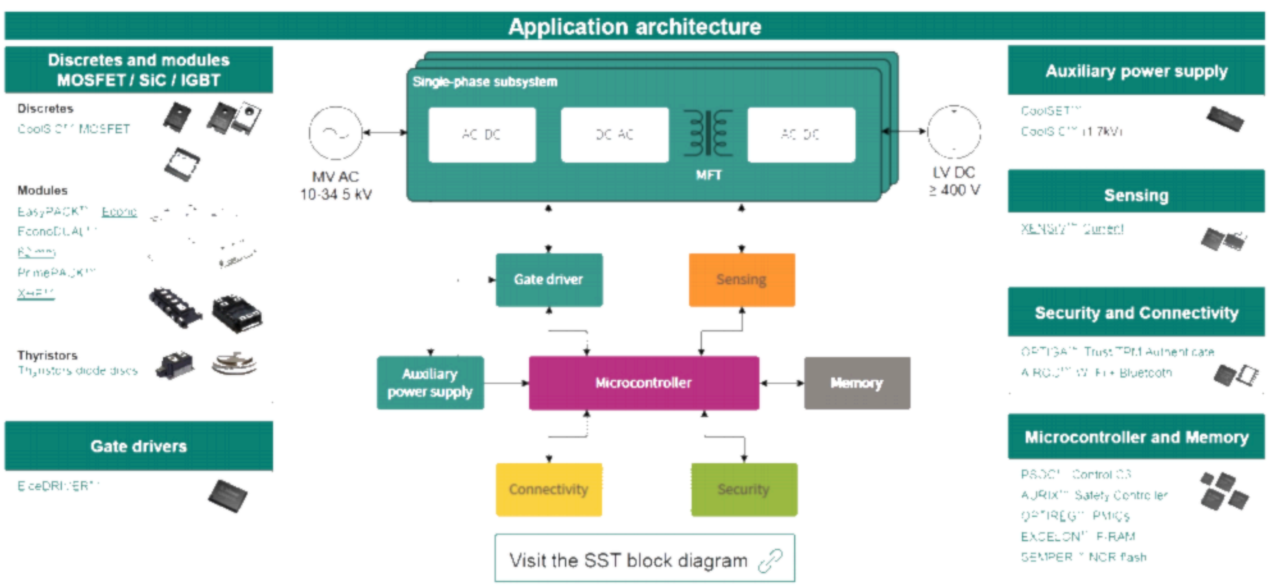
Gate drivers act as the interface between the digital controller and the high-voltage power switches, converting low-voltage logic signals into precise drive pulses that switch SiC and GaN devices safely and reliably (Exhibit 14). Infineon's family covers all major wide-bandgap switch types and integrates built-in fault protections including short-circuit detection and over-current shutoff.

AURIX and PSoC Microcontrollers - Digital Control
These microcontrollers serve as the brain of the SST, managing real-time power conversion, fault detection, and grid communications. Infineon offers two tiers: AURIX for complex industrial-grade platforms qualified to functional safety standard IEC 61508, and PSoC for simpler, more cost-sensitive SST designs.

CoolSiC JFET for Solid-State Circuit Breakers - Grid Protection
This device enables solid-state circuit breakers to isolate grid faults in under 500 microseconds, roughly 1,000× faster than a mechanical breaker, while maintaining the lowest energy losses in its class at 1.5 mΩ on-resistance. Volume production of 750 V and 1,200 V variants commences in 2026, targeting a semiconductor market Infineon estimates at USD800mn+ by 2030.

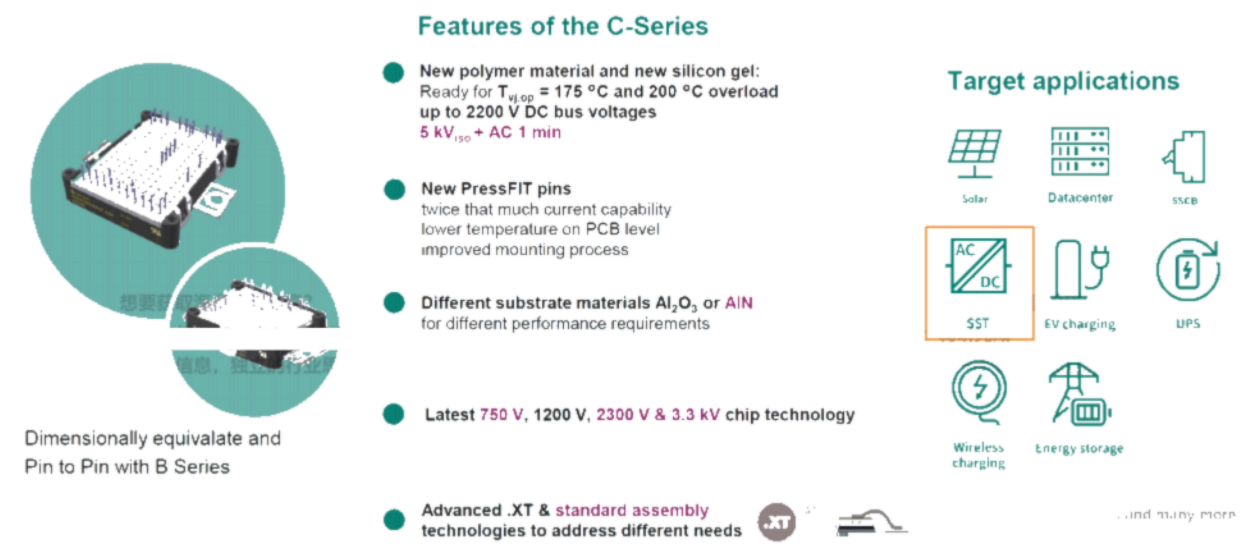
OPTIGA Security ICs and XENSIV Current Sensors - Auxiliary Functions
OPTIGA chips provide hardware-level cybersecurity for grid-connected SST platforms, protecting firmware and authentication credentials in line with modern utility security requirements. XENSIV current sensors deliver high-precision, electrically isolated current measurement for the closed-loop power control functions inside the SST.

EXHIBIT 12: **Infineon's One-Stop Shop Solutons for SSTs**



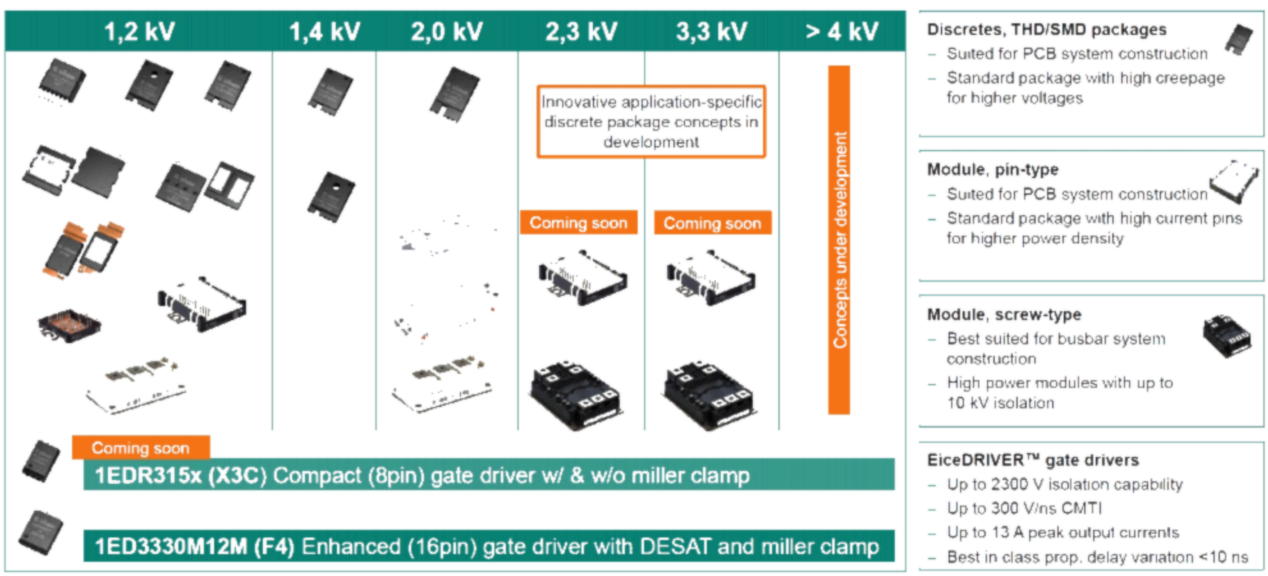
Source: Infineon

EXHIBIT 13: **Infineon's EasyPACK C-Series also targets SST applications**



Source: Infineon

EXHIBIT 14: **Infineon's CoolSiC & EiceDRIVER extensive offering for SSTs**



Source: Infineon

RENESAS - ANOTHER KEY BENEFICIARY IN ASIA

Renesas presented its Grid-to-Core strategy at Capital Market Day (CMD; refer to Renesas CMD 2026: AI infra to drive revenue doubling) with HV GaN for SST front-end is a mid-term roadmap item (Exhibit 15). The strategy maps Renesas products to every conversion stage between the utility grid and the GPU core voltage, with SST occupying the grid-interface layer alongside the UPS/ESS system. Renesas' current commercial strength is concentrated in the Rack and Core layers, where its digital multiphase controllers, smart power stages, Power Tower modules, and GaN FETs for 800 V intermediate bus converters are already designed into leading AI server platforms — rather than at the SST front-end layer, where the company's product offering is still maturing.

Key Product Offerings:

Bidirectional 650 V GaN Switch (SST Front-End) - TP65B110HRU

Launched in March 2026 and claimed as the industry's first bidirectional 650 V GaN switch, this device handles the AC/DC conversion at the grid-facing input of an SST using a single component where conventional designs require four, achieving greater than 97.5% efficiency in an 8 kW reference design. The device is rated for ±650 V continuous and ±800 V transient operation and is available in volume production today.

SuperGaN Platform - High-Power DC/DC

Inherited from the Transphorm acquisition, SuperGaN provides the underlying GaN technology for both the bidirectional switch and a broader family of transistors optimised for high-power applications above 15 kW. The architecture offers lower energy losses and better thermal behaviour at high power versus competing GaN designs, while the bidirectional switch integration halves component count in front-end circuits.

800 V-to-50 V Reference Design - DC/DC Conversion Stage

This reference circuit demonstrates Renesas' GaN capability in the isolated DC/DC conversion stage within a multi-stage SST, achieving 98% full-load efficiency at a power density of 2,600 W per cubic inch. An 800 V-to-12 V variant is also available, offering flexibility across different data center rack voltage standards.

Digital Multiphase Controllers - RAA228xxx Series

These digital power management controllers, supporting up to 20 phases, regulate the final voltage conversion stages supplying power directly to AI processors inside the server rack, where Renesas holds a leading design-win position with major hyperscalers and AI server manufacturers. While not SST-specific today, this commercial footprint provides the customer access Renesas intends to leverage as rack architectures migrate to higher bus voltages.

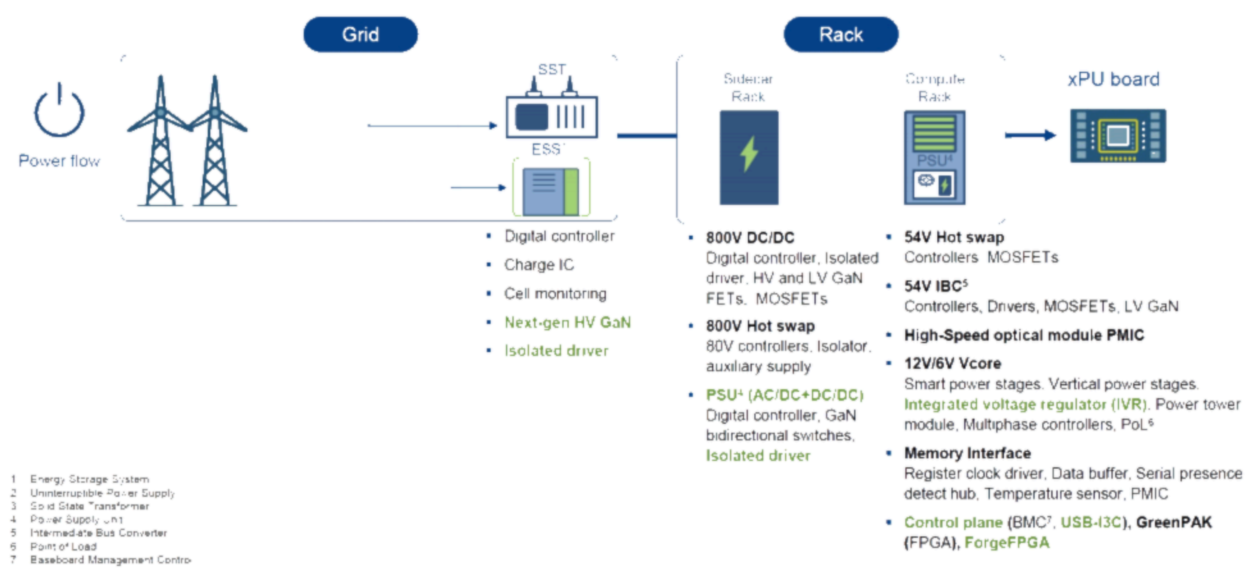
Power Tower Quad-Phase Module - High-Value VRM

The Power Tower is a high-density integrated power delivery module commanding a greater than 8× price premium over a standard smart power stage, addressing the challenge of delivering currents above 1,000 A to next-generation AI processors. It reflects Renesas' strategy of moving up the value chain through integration, an approach the company plans to replicate at the grid layer as SST adoption scales.

Next-gen HV GaN + Isolated Driver - SST Roadmap

Renesas' CMD 2026 roadmap identifies a next-generation high-voltage GaN device and a matching isolated gate driver as the 2 remaining components needed to complete its SST front-end offering, expected to enter the portfolio by 2027-2028. Supporting manufacturing investments are underway with AIXTRON (AIXA.GR, not covered) on production equipment (May 2026) and Polar Semiconductor (private) on 200 mm GaN wafer production.

EXHIBIT 15: **Renesas' AI Infrastructure and Compute Portfolio: SST in Mid-to-Long Term**



Source: Renesas