

# Powering the Future: How Higher-Voltage Solar and Storage Drive Efficiency and Growth

Global electricity demand is entering an unprecedented growth phase, driven by rapid digitalization and electrification. In the United States alone, electricity consumption is projected to rise 50% by 2050, with annual growth averaging 2%, according to the National Electrical Manufacturers Association (NEMA). Two major drivers stand out: the explosive expansion of data centers, which are expected to increase energy use by 300% over the next decade, and the electrification of transportation, with e-mobility power consumption forecast to grow by 9,000% through 2050.

Globally, electricity demand is set to grow 3.3% in 2025 and 3.7% in 2026, outpacing overall energy demand, fueled by EV adoption, industrial electrification, and AI-powered computing. This surge underscores why renewables—particularly solar—are becoming indispensable. Historically, power generation has evolved alongside societal needs and technological breakthroughs: from wood in the 18th century, to coal during industrialization, then oil and natural gas in the 20th century, supplemented by nuclear power for baseload capacity. Today, climate imperatives, cost reductions, and policy incentives are accelerating the shift to wind and solar, which have grown from negligible shares to key contributors in the U.S. energy mix. As data centers and EVs reshape demand patterns, renewables offer a scalable, low-carbon solution to meet this new era of electrification.

Now, the solar industry is entering a new era. As utility-scale projects grow in size and complexity, developers, utilities and EPCs are looking for ways to maximize efficiency and reduce costs. One of the most significant advancements driving this evolution is the shift from 1500V DC systems to 2000V DC architectures. For independent electrical contractors, this transition represents more than a technical upgrade—it's a strategic opportunity to differentiate, win bigger projects, and future-proof your business.

For years, 1500V systems have been the standard for large-scale solar installations. They offered a major leap from 1000V systems, reducing wiring and improving efficiency. But as the demand for electricity increases and technology evolves, 1500V no longer needs to be the limit.

## Enter 2000V systems, which deliver:

- Higher power density: Longer strings mean fewer combiner boxes and less cabling.
- Lower Balance-of-System (BOS) costs: Reduced material and labor requirements translate to significant savings.
- Improved Efficiency: Higher voltage reduces current, minimizing resistive losses and improving overall system performance.
- Future-proof design: Developers and utilities are increasingly evaluating 2000V systems for new projects, making this the next industry standard.



One of the biggest hurdles in adopting 2000V systems has been the availability of certified components. The transition from 1000V to 1500V and now to 2000V architectures has been supported by significant updates in industry standards. UL (Underwriters Laboratories) and the National Electrical Code (NEC) have progressively adapted their requirements to accommodate these higher voltages, ensuring safety and reliability in large-scale solar installations. UL standards now include certifications for components rated up to 2000V, addressing isolation, fault protection, and material integrity at elevated voltages. Similarly, NEC revisions have expanded allowable system voltages for photovoltaic circuits, providing clear guidelines for conductor sizing, overcurrent protection, and grounding practices. These changes reflect a broader industry commitment to enabling higher-voltage designs while maintaining compliance with rigorous safety benchmarks.

As solar projects scale, energy storage is becoming an essential component for grid stability and maximizing renewable penetration. Battery Energy Storage Systems (BESS) allow developers and utilities to store excess generation, smooth intermittency, and participate in ancillary services markets. The integration of storage with solar isn't just about resilience—it's about unlocking new revenue streams and operational flexibility.

**Key Benefits of Adding Storage to Solar Deployments are:**

- Grid stability & reliability: Storage mitigates fluctuations in solar output, ensuring consistent power delivery.
- Peak shaving & arbitrage: Operators can store energy during low-demand periods and discharge during peak pricing windows, improving project economics.
- Enhanced project value: Coupled solar-plus-storage projects often qualify for additional incentives and can command higher PPA rates.
- Faster response: Storage systems provide rapid frequency and voltage support, critical for high-renewable grids.

Just as solar arrays are moving from 1500Vdc to 2000Vdc architectures, battery energy storage collection systems are following suit. Higher-voltage designs in BESS reduce conductor sizes, minimize resistive losses, and lower balance-of-system costs—mirroring the advantages seen in solar. This alignment means contractors who prepare for 2000Vdc standards in solar will also be ready for next-generation storage deployments.

The move to 2000V systems isn't just about technical specs—it's about business impact.

**Here's how contractors stand to gain:**

- Faster installations: With fewer components and less wiring, installation times drop significantly.
- Reduced labor costs: Streamlined wiring and fewer terminations cut man-hours, allowing contractors to allocate resources more efficiently.
- Competitive advantage: Offering 2000V expertise positions you as a forward-thinking contractor.
- Scalability: While 2000V systems are ideal for utility-scale projects, they're also adaptable for large commercial installations. Where DC systems are not viable, higher voltage AC collection systems are also evolving.

**Moving to 2000V systems requires preparation.**

**Here are the essentials:**

- Training: Ensure your team understands 2000V safety protocols and installation practices.
- Tools & PPE: Verify that your equipment is rated for 2000V applications, including test instruments and protective gear.
- Design considerations: Longer string lengths impact layout and grounding strategies.
- Partnerships: Work closely with manufacturers like ABB for technical support and certified components.

For contractors, the economics of 2000V systems are compelling. Fewer components mean lower material costs. Reduced labor translates to higher margins. And the ability to deliver cutting-edge systems makes you more attractive to developers and EPCs bidding on large projects.

Consider this: A typical 200MW solar farm using 2000V architecture can cut BOS costs by up to 15% compared to a 1500V system. For contractors, that's a powerful selling point when negotiating contracts.

The solar industry's move to 2000V systems is not a passing trend—it's the next standard. Independent electrical contractors who embrace this technology now will be well-positioned to lead in a market that demands efficiency, scalability, and innovation.

By investing in training, upgrading tools, and partnering with trusted manufacturers like ABB, contractors can turn this transition into a competitive advantage. The future of solar is higher voltage—and the time to prepare is now.