CASE STUDY

The Wendell Microgrid

A blueprint for industrial power resilience

SIEMENS

Industrial manufacturing consumes about 24% of the nation's energy annually – a staggering percentage that is driving innovation in renewable energy solutions.

- US Department of Energy, Manufacturing Energy and Carbon Footprints project

Siemens' Electrification and Automation facility in Wendell, NC, will reach a new milestone in energy resilience this year with the completion of a microgrid that can produce 100% of the electricity necessary to power its industrial manufacturing operations. By generating, storing, and managing electricity on-site, Siemens improves resiliency while showcasing the practical application of its industry-leading technology. Coupled with other campus-wide energy-saving initiatives, the facility will achieve a 100% CO2 reduction by 2026 and reduce overall grid energy consumption by 2.5 MWh per year.

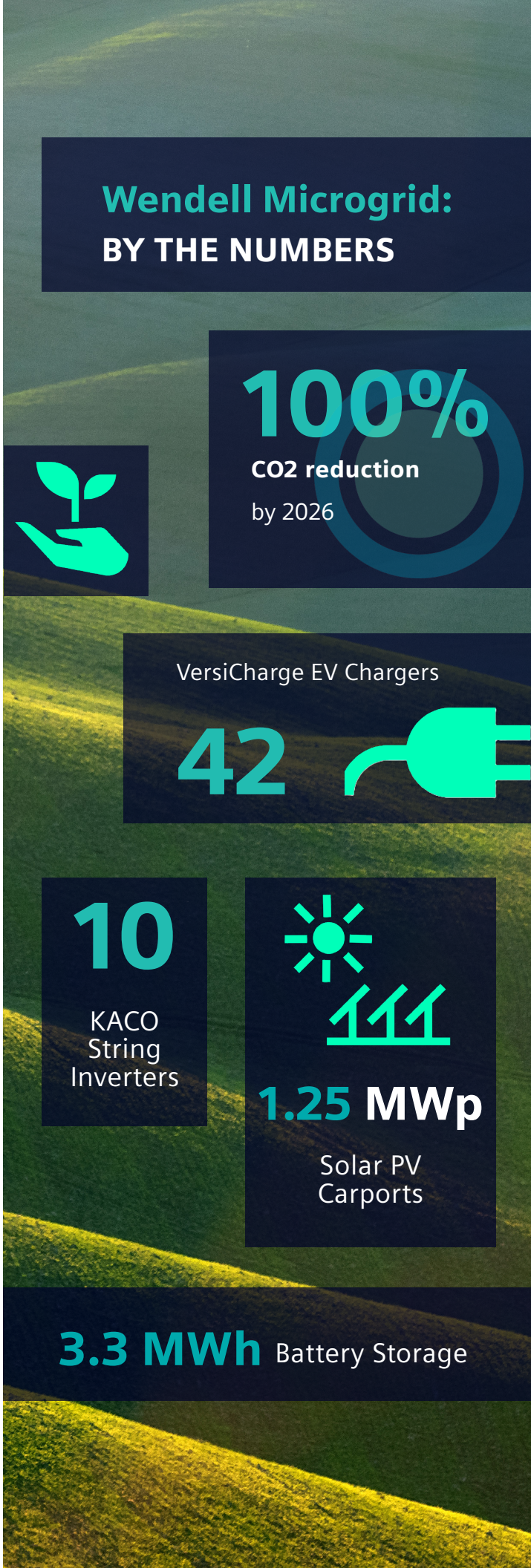
Achieving resilience & energy-independence

The Wendell microgrid demonstrates the power of Siemens' technology in achieving a scalable, secure, and future-ready independent energy system in industrial manufacturing, while offering insights to power producers looking to boost power production and improve overall grid resilience.

Disruptions to an industrial manufacturing facility's power supply can be expensive, resulting in reduced productivity and damage to machinery. From 2020 to 2023 the Wendell facility experienced numerous power outages that shutdown the factory and caused reduced productivity estimated at over $400k annually.

The Wendell microgrid makes downtime from power-grid outages a thing of the past. Now in the event of an outage, the microgrid automatically transitions into island mode, maintaining full power supply and eliminating negative impact to production. This capability is particularly valuable in areas prone to natural disasters or other disruptions.

"At Siemens, we believe energy resilience is not just about keeping the lights on – it's about empowering industries to thrive through uncertainty," said Brian Dula, president of Siemens Electrification and Automation. **"Siemens intelligent microgrid technologies empower manufacturers to maintain uptime, optimize energy use, and unlock new efficiencies. Because when your operations are protected from disruption, your business isn't just surviving – it's scaling and thriving."**



SICAM A8000
The intelligence behind the microgrid

At the heart of Wendell's microgrid is the **SICAM A8000 microgrid controller**, providing comprehensive, centralized energy management. SICAM A8000 facilitates Wendell's integrated approach to energy resilience through dynamic supply and demand-side optimization.

Flexible energy loads like heating and cooling account for a significant portion of the Wendell factory's total energy demand – more than 20% in some scenarios – providing critical flexibility for peak load shaving and grid stability. SICAM A8000 leverages these flexible loads through seamless integration with Siemens software like **Desigo CC** for building automation and **VersiCharge** for EV chargers to enable intelligent load shifting, enhanced ROI and grid responsiveness. Advanced capabilities include:

- **Demand response and load shedding** to manage peak loads
- **Automatic islanding** for uninterrupted operation during grid --disturbances
- **Black-start functionality** for rapid recovery

Cyber security is foundational to the Wendell microgrid's architecture. SICAM A8000 features built-in firewall protection, VPN tunneling, and TLS encryption to ensure secure data transmission across the network. Role-Based Access Control (RBAC) enables precise user permission management, while compliance with IEC 62351-8 and IEC 62443 standards ensures alignment with global cyber security protocols.

KACO String Inverters
The backbone of the microgrid

If SICAM A8000 represents the intelligence of the microgrid, the KACO string inverters comprise the backbone of the solar solution. KACO blueplanet TL3 series string inverters deliver an impressive 99.2% efficiency in energy conversion and outperform many competitors by eliminating the need for DC/DC boosters. Their active cooling systems and high-temperature tolerance make them ideal for rugged industrial environments where uptime and thermal resilience are non-negotiable.

Unlike centralized inverter systems, KACO's virtual central architecture allows for modular deployment across varied site topographies, reducing CAPEX and OPEX, simplifying maintenance, and enabling scalable expansion. The inverters feature remote firmware updates, Silicon Carbide-based switching, and IP66/NEMA 4x-rated enclosures, ensuring long-term reliability and cyber security compliance.

Siemens technology included in the Wendell microgrid includes:

- **SICAM A8000 microgrid controller**
- **KACO string inverters**
- **LV bolted pressure switches**
- **Russelectric switchboard**
- **SIPROTEC universal relays**
- **Electrification X cloud analytics**
- **Ruggedcom network switches**
- **VersiCharge EV Chargers**
- **Low-voltage panelboards**

Siemens technologies work in concert to deliver a scalable, secure and future-ready energy ecosystem.

The Wendell microgrid serves as a blueprint for industrial power resilience and demonstrates how advanced power distribution technologies can make powering 100% of industrial manufacturing with renewable energy a reality. Through the integration of SICAM A8000 controllers, KACO string inverters, and comprehensive protection systems, the Siemens Electrification and Automation facility will achieve a 100% CO2 reduction by 2026.

As manufacturing facilities worldwide face increasing grid instability, the Wendell microgrid stands as tangible proof that technological innovation can deliver both operational reliability and economic value. **This isn't just a power system; it's a framework for manufacturing resilience that will influence industrial power distribution for years to come.**

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