NexEnergy Solid-State Graphene Energy Storage

Electrostatic. Non-Chemical. Ultra-Sustainable.

Product Overview

NexEnergy's solid-state graphene energy storage platform is a next-generation, electrostatic energy system engineered to eliminate the environmental and safety risks associated with chemical batteries. Unlike lithium-ion or lead-acid systems, NexEnergy stores energy electrostatically, not electrochemically, resulting in no thermal runaway risk, no chemical degradation, and dramatically lower lifecycle environmental impact .

Available in rack, containerized, and utility-scale skid configurations, NexEnergy systems deliver reliable, clean energy for data centers, hospitals, telecom, microgrids, and humanitarian deployments.

Environmental Performance

Biodegradability & Recyclability

Traditional lithium-ion battery production carries significant CO_2 footprint and mining impact; NexEnergy's electrostatic design avoids those chemical supply chains entirely.

Material Composition Advantages

- 70% of product weight: encapsulated electrostatic cell materials
- 25%: casing and structural components
- 5%: electronics & control hardware

Environmental Properties

- Up to 100% recyclable components
- Majority materials are biodegradable or inert
- No lithium, cobalt, nickel, or rare earth mining dependency
- No liquid electrolyte
- No toxic heavy metals

Zero Thermal Runaway Risk

- No flammable electrolyte
- No exothermic chemical reaction
- No dendrite formation
- No combustion cascade failure mode

System protections include module-level and string level hardware disconnects for:

- Over/under-voltage
- Over-current
- Over-temperature
- Short circuit protection

This significantly reduces:

- Fire suppression requirements
- Insurance risk profile
- Environmental contamination from fire events

ESG & Sustainability Alignment

Supports:

- Scope 1 reduction (diesel displacement)
- Scope 2 optimization (high efficiency)
- Scope 3 reduction (no rare earth mining dependency)
- Carbon neutrality initiatives
- LEED / green infrastructure credits
- Humanitarian and off-grid resilience

Technology Foundation

NexEnergy's encapsulated graphene solid-state storage:

- Stores energy electrostatically
- No electrochemical reaction
- No dendrite formation
- No electrolyte degradation
- No chemical aging curve

This fundamental architecture shift is what enables biodegradability, safety, and lifecycle sustainability simultaneously .

Environmental Bottom Line

NexEnergy delivers:

- The safest large-scale energy storage chemistry available
- The lowest lifecycle material turnover in the industry
- Near-total recyclability
- Zero local emissions
- No fire cascade risk
- 25+ year sustainable operation

It is not just a better battery —
it is a post-chemical energy platform designed for environmental permanence.

Extreme Environment Tolerance

Operating temperature range: –30°C to +70°C (–22°F to +158°F)

Environmental benefits:
- No HVAC dependency in many climates
- No heating systems in cold climates
- Reduced auxiliary power consumption
- Lower operational carbon footprint

Compared to lithium systems (typically 0°C–45°C optimal), NexEnergy reduces lifecycle cooling energy by up to 20–30% in warm regions.

Zero Degradation Lifecycle

Lithium systems typically require 2–3 replacements within a 20-year site lifecycle.

- 500,000+ projected cell cycles
- 25-year projected calendar life
- 100% Depth of Discharge capability
- No capacity fade curve

Environmental impact reduction:
- No mid-life battery replacement
- No recurring hazardous material disposal
- Lower material throughput over 25 years

Energy Efficiency & Carbon Reduction

Lower losses = fewer kWh generated upstream = lower Scope 2 emissions.

Environmental benefits:
- 95% round-trip efficiency (cell level)
- PCS efficiency up to ~98.5%
- No parasitic cooling load (HVAC-free capable deployments)

Emissions & Air Quality Impact

When replacing diesel generators:

Avoided emissions per 2 MW / 24 hr event:
- ~34–39 metric tons CO_2
- NOx & particulate elimination
- No fuel transport emissions
- No groundwater contamination risk

NexEnergy enables:
- Diesel elimination in microgrids
- Hybrid solar + storage systems
- Net-zero infrastructure expansion

Comparative Environmental Profile

Attribute	NexEnergy Solid-State	Lithium-Ion	Lead Acid	Diesel Gen
Electrolyte	None	Flammable	Acidic	Fuel combustion
Thermal Runaway	Impossible	Possible	Possible	N/A
Capacity Fade	None	20–40% in <10 yrs	High	N/A
Recyclability	Up to 100%	Limited	Partial	N/A
Operating Temp	–30°C to +70°C	Narrow band	Narrow	Wide
Emissions	Zero	Zero (operational)	Zero	High CO_2, NOx
Service Life	25+ yrs	7–12 yrs	3–7 yrs	20 yrs mech