GAIA
TERRANA BIOLOOP

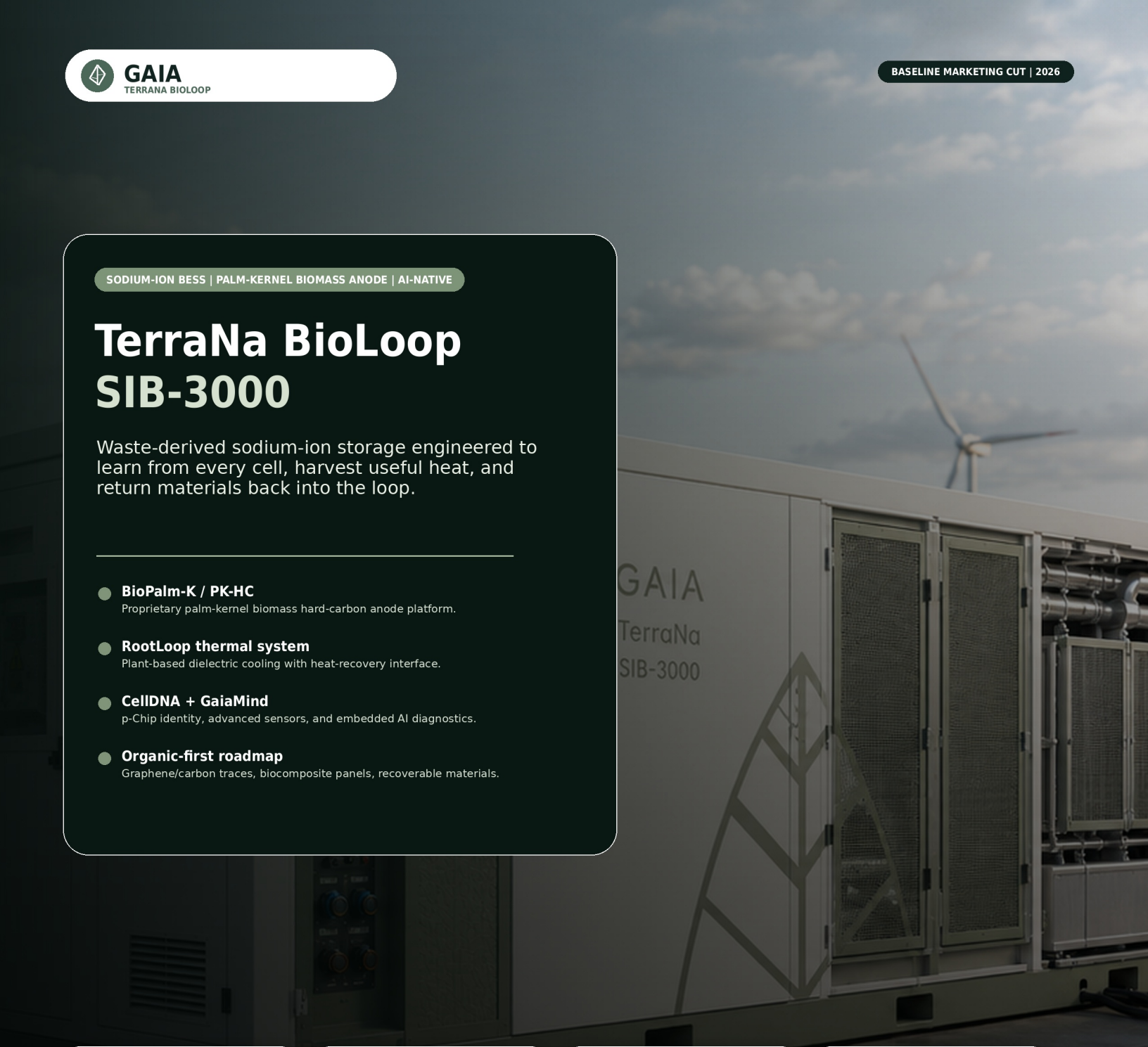
BASELINE MARKETING CUT | 2026

SODIUM-ION BESS | PALM-KERNEL BIOMASS ANODE | AI-NATIVE

TerraNa BioLoop SIB-3000

Waste-derived sodium-ion storage engineered to learn from every cell, harvest useful heat, and return materials back into the loop.

- **BioPalm-K / PK-HC**
  Proprietary palm-kernel biomass hard-carbon anode platform.
- **RootLoop thermal system**
  Plant-based dielectric cooling with heat-recovery interface.
- **CellDNA + GaiaMind**
  p-Chip identity, advanced sensors, and embedded AI diagnostics.
- **Organic-first roadmap**
  Graphene/carbon traces, biocomposite panels, recoverable materials.



NOMINAL ENERGY TARGET

3.05 MWh

20-ft-class container baseline; 2.90 MWh warranted-usable target.

SYSTEM MASS TARGET

<=36 t

Aims to exceed conventional 2.36 MWh / <=38 t sodium BESS benchmark.

CELL INTELLIGENCE

CellDNA

Physical identity + sensor fusion + AI digital twin.

CIRCULAR AMBITION

Landfill diverted

Gaia TakeBack, serviceable modules, recoverable coolant and metals.

Design targets for Gaia implementation baseline. Final performance, warranty, compostability, recyclability, and safety claims require prototype validation, certification, and customer-site conditions.

INSIDE THE BIOLOOP PLATFORM

A circular materials, thermal, sensing and intelligence architecture for sodium-ion storage.

1 BioPalm-K / PK-HC anode

Palm-kernel biomass and qualified agricultural residues are converted into engineered hard carbon. The goal is consistent closed-pore structure, high first-cycle efficiency, and traceable feedstock-to-cell provenance.

2 RootLoop + Heat Harvest Port

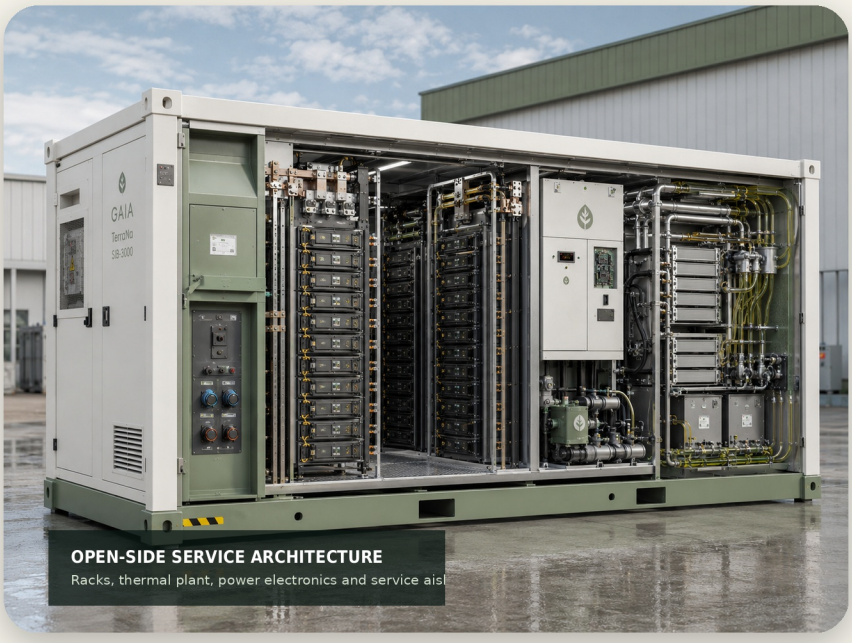
Plant-based dielectric coolant is recovered and monitored as an asset. Heat is managed for cell life and can be routed to preheat, building systems, greenhouse loads, or process water.

3 Organic-first component roadmap

Retains the v1 ambition: graphene/carbon low-current traces, lignocellulose PCB pilots, biocomposite access panels, bio-derived insulation, recyclable aluminum where power physics requires metal.

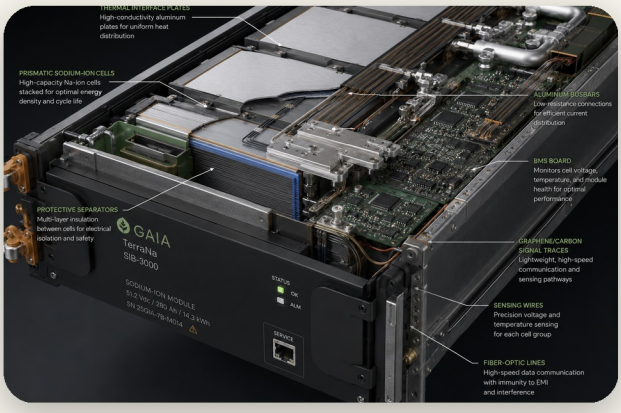
4 CellDNA + GaiaMind AI

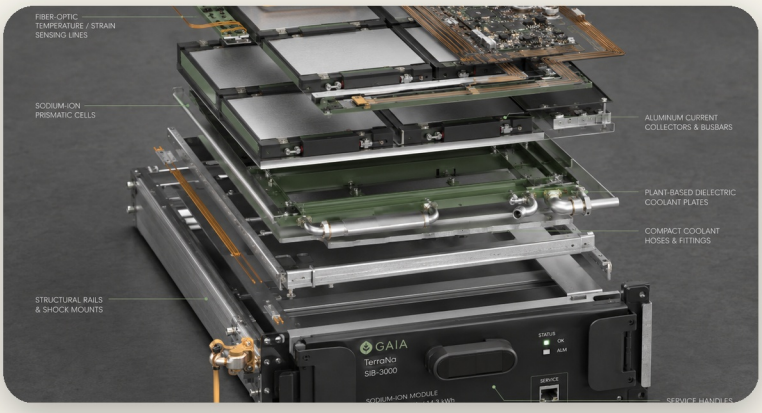
p-Chip identity anchors, fiber-optic sensing, EIS, pressure/gas/coolant sensors, and edge AI create a living digital twin for every module and every material batch.



OPEN-SIDE SERVICE ARCHITECTURE

Racks, thermal plant, power electronics and service aisl





Cell-level transparency

AI diagnostics are tied to physical identity, not anonymous telemetry.

Design-for-disassembly

Service handles, removable modules, recoverable coolant and recyclable structures.

Baseline principle: keep v1 organic-component ambition; replace only hemp anode with proprietary palm-kernel / biomass hard carbon; add closed-loop heat, AI, 5G, and p-Chip layers.

MARKET-READY STORY. IMPLEMENTATION-READY BASELINE.

TerraNa BioLoop SIB-3000 is the platform bridge from grid storage to EV-like sodium performance.

Baseline product targets

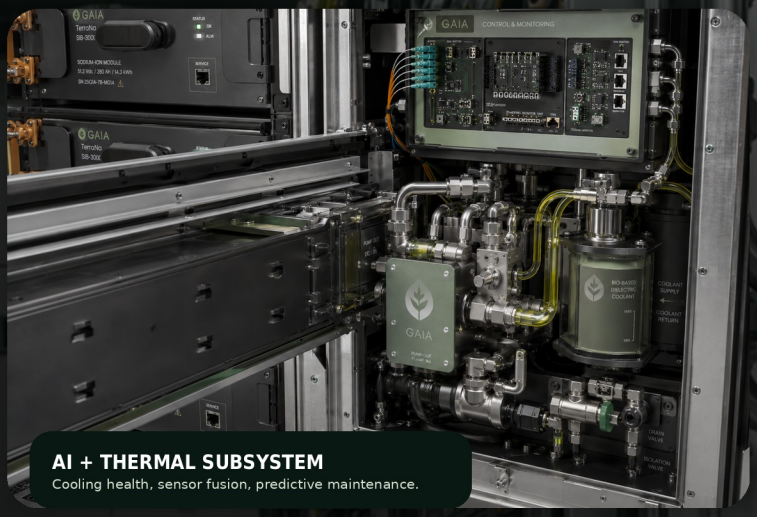
A disciplined product baseline: ambitious enough to differentiate, bounded enough for engineering validation.

Dimension	Competitor benchmark	Gaia target
Container energy	2.36 MWh	3.05 MWh target
System mass	<=38 t	<=36 t target
Cooling	Liquid cooling	Plant-based RootLoop
Communications	CAN/RS485/ Ethernet	Wired + 5G edge gateway
Traceability	Real-time reporting	CellDNA passport + AI twin
Circularity	Recyclable claim	TakeBack + material recovery

Competitor figures are extracted from the provided SCE/Supercloud battery-integration specification. Gaia figures are internal design targets pending prototype validation.

Product family roadmap

- **SIB-3000 BioLoop**
  3 MWh-class BESS for grid, microgrid, data centers and renewable firming.
- **HeatVault Edition**
  Adds Heat Harvest Port, heat-pump interface, and thermal recovery metering.
- **PowerCap Module**
  Palm-carbon sodium-ion capacitor buffer for pulse power, regen and fast response.
- **TerraNa-eDrive**
  Sodium-first EV/fleet platform for urban, depot, cold-weather and commercial mobility.



AI + THERMAL SUBSYSTEM
Cooling health, sensor fusion, predictive maintenance.

LOWER CRITICAL-MINERAL EXPOSURE

Sodium-first chemistry, biomass carbon, aluminum-first current collectors.

HEAT AS A RESOURCE

Battery heat becomes preheating, building energy, greenhouse or process heat.

DATA AS A WARRANTY ASSET

p-Chip identity and AI telemetry tie performance to actual chemistry history.

EV-like sodium roadmap

Gaia should attack urban EVs, fleets, buses, battery swap, cold-climate vehicles and charging-buffer packs first, while using pack architecture, pre-sodiation, AI thermal control and PowerCap pulse modules to close the density gap.

175-190 Wh/kg	**120-145 Wh/kg**	**5,000+ cycles**	**15 min**
cell development target	pack target with CTP	fleet-duty target	fast-charge target where validated

Substantiated claims and public-facing discipline

Public specs and market benchmarks shown here are sourced from the supplied SCE/Supercloud PDF and published sodium-ion references. Current public sodium-ion benchmarks remain below top NMC energy density; Gaia EV messaging should use 'designed to', 'target', and 'pending validation' language. Do not market whole batteries as curbside-trash disposable or fully compostable; market Gaia TakeBack, material recovery, serviceability, and compostable/biobased subcomponents after certification.

Sources: Supplied SCE/Supercloud PDF p.5 for competitor BESS specs; IEA sodium-ion commentary; CATL Naxtra news; Northvolt sodium-ion news; p-Chip official materials for microtransponder identity; Cargill NatureCool 1000 sheet for bio-based dielectric coolant; IEC 61850-7-420 and ISA/IEC 62443 for DER communications/cybersecurity context.