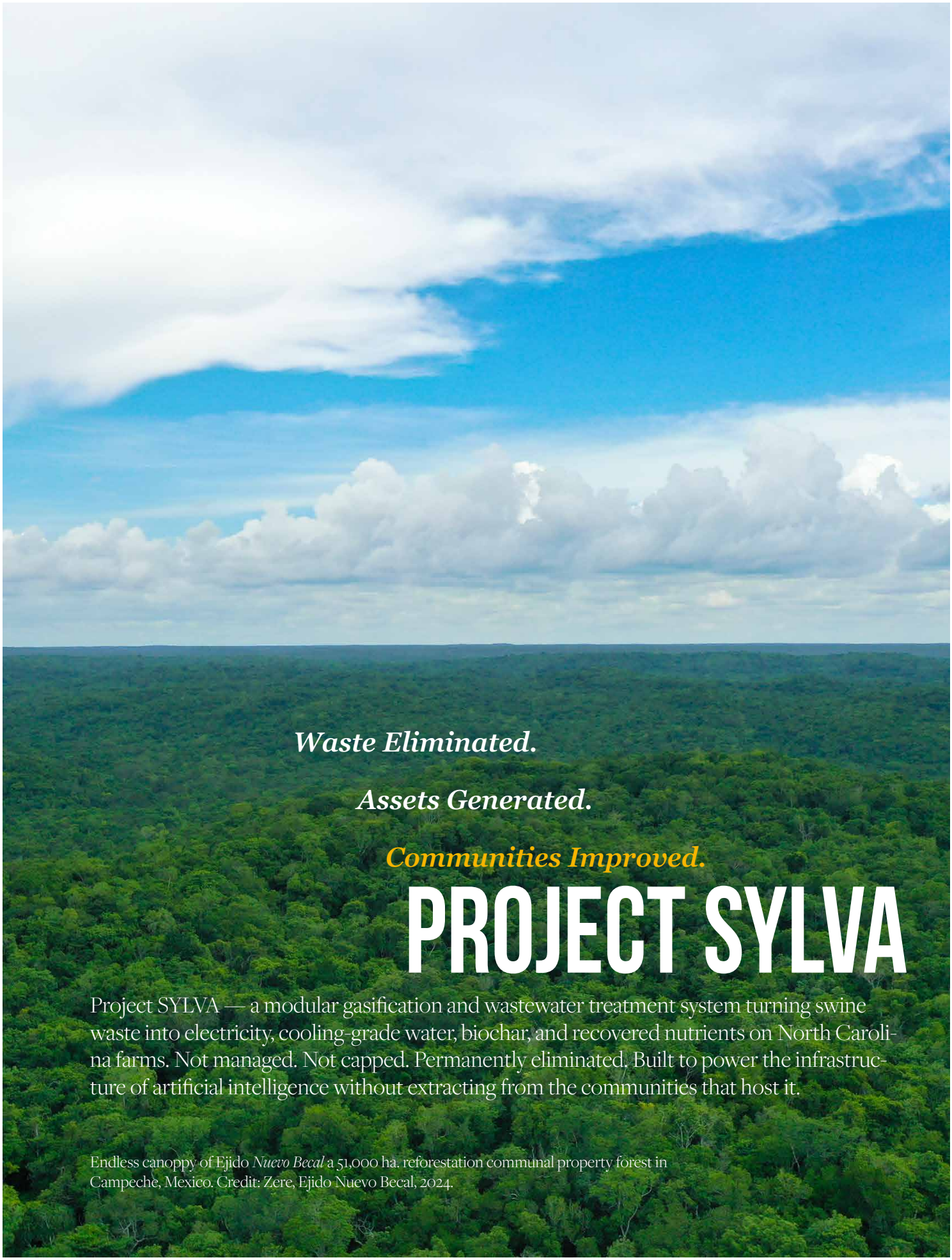

Waste Eliminated.

Assets Generated.

Communities Improved.

PROJECT SYLVA

Project SYLVA — a modular gasification and wastewater treatment system turning swine waste into electricity, cooling-grade water, biochar, and recovered nutrients on North Carolina farms. Not managed. Not capped. Permanently eliminated. Built to power the infrastructure of artificial intelligence without extracting from the communities that host it.

Endless canoppy of Ejido *Nuevo Becal* a 51,000 ha. reforestation communal property forest in Campeche, Mexico. Credit: Zere, Ejido Nuevo Becal, 2024.

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PROJECT SYLVA

Modular gasification and wastewater treatment system

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The North Carolina Coincidence: On the left, an anaerobic swine lagoon containing decades of untreated waste; on the right, a hyperscale AI data center requiring massive baseload power and cooling. Project SYLVA is the engineering bridge between them.

ORGANISATION
Zere LLC

COUNTRY · CITY
United States · Charlotte, NC

SCOPE CATEGORY
AI × Energy

FUNDING STAGE
Unfinanced — seeking first capital

TECHNOLOGY PARTNER
Proytec S.A. de C.V. — Mexico

PROJECT
Project SYLVA — NC Swine Deployment

TECHNOLOGY READINESS
TRL 7–9 Proytec thermal & WWT stack · TRL 4–6 integrated EcoTower dual-module · TRL 4 swine-waste application

CONTACT
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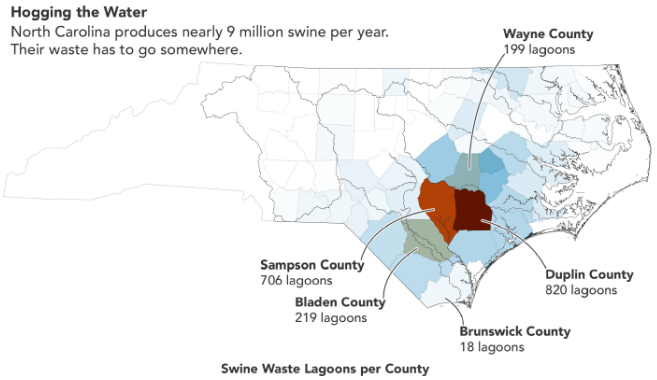
01 · THE COINCIDENCE

Two infrastructure problems. One Solution. One State.

In Duplin and Sampson counties, North Carolina, hogs outnumber people 31 to 1. Across the state, 7.6 million head generate roughly 150 metric tons of waste per day on a typical 30,000-head farm — managed for four decades through open-air anaerobic lagoons and sprayfields. Farmers now pay $480,000 to $987,000 per farm per year to maintain, monitor, and defend this system as environmental regulation tightens. The feedstock never stops. Neither do the costs.

Four hundred miles away — and increasingly in the same state — hyperscale AI data centers are rising. NVIDIA Blackwell racks consume 85 to 120 kilowatts each and are projected to reach 250 kW by 2027. Air cooling fails above 30–40 kW per rack — a hard thermodynamic limit. Liquid cooling is no longer an upgrade; it is a design requirement. Duke Energy projects North Carolina's net electricity load will rise 16% to 60% over the next fifteen years, with 80% of that demand coming from data centers. The 900 MW required by the Kingsboro campus being developed by Energy Storage Solutions (ESS) in Edgecombe County alone is the power equivalent of a medium-sized nuclear reactor dedicated to a single industrial tenant.

> *"We are witnessing the deployment of hyperscale facilities placing a concentrated continuous load onto existing utility generation that is aging or already slated for retirement. It is structurally unsustainable."*
>
> *— NC Energy Policy Task Force, February 2026*



Meanwhile, back at the farms — two industries under siege. One coincidence nobody is naming.

Contract swine farmers face multimillion-dollar nuisance lawsuits, hurricane flooding that breaches lagoon berms, and a shrinking permit runway. Hyperscale data-center developers face a grid that cannot carry them, communities in revolt against what they perceive as resource extraction, and rate cases that shift costs to residential customers. Both industries are operating amid intense social friction. Both are in the same state. And each produces — or needs — what the other lacks. Together, they will shape the future of the North Carolina economy.

7.6 M	~$607K	900 MW	16–60%
NC hog inventory, 2026 USDA NASS	Average annual waste disposal cost per 30,000-head farm	Kingsboro campus power draw, single-tenant	NC grid load growth projected through 2040

Pablo Granados in El Tarachi, Veracruz. The enea (Typha domingensis) invasion shown here represents the ecological collapse that turned a week-long film shoot into the mission that founded Zere

> *Pablo Granados has a voice matched in strength only by heart. A passionate, dedicated mangrove restoration expert and field adviser to projects throughout southern coastal Mexico, he patiently schools anyone who will listen about the importance of protecting wetlands, waterways, and forests. "Man has never been separate from the land, the animals, and the products of our farming," he says. "We need to care for it so we can both thrive." Eduardo spent a week in Veracruz with Pablo and a film crew. It became an addiction — exploring jungles, wetlands, and ecological disasters. It changed Eduardo's life, and Alberto's. Zere was born to help the land, and people like Pablo who are entwined with it.*

North Carolina's chronic agricultural waste stream sits next to a growing need for distributed baseload power and cooling-grade water. The feedstock is adjacent to the demand. This proposal explains how to connect them — commercially, chemically, and socially — without further harming the communities that have carried the lagoon system's burden for decades.

01 · THE TECHNOLOGY

One question in Yucatán. Forty years of engineering to answer it.

A year or so into their work together, Alberto and Eduardo discovered an ancient mangrove forest in Celestún, a fishing town in Yucatán — a symphony of green, light, life, and nature like no other. A living canvas. Haunting. Enchanting. But then — the other side of paradise. Marshes where children played along the shore of dark, unclean water, filled with flamingos and piles of trash: plastic bags, discarded diapers, tires, food waste. Less than a hundred feet away in any direction, the water was beautiful, and flocks of flamingos, cranes, and every living creature there lived in harmony; jaguars live in the nearby jungle — a rare sight this far up the Yucatán. Two hundred yards further, a piece of hell on earth roughly the size of four football fields darkens the landscape: the open-air unregulated town landfill. Cattle graze beside crows, dead fish, plastic, and burning heaps of waste. Worse still, the "tea" formed by rainwater and the juices of the waste leaches into the underground rivers that connect the whole peninsula — the main source of fresh water for millions.

How the system works.

The EcoTower processes the full waste stream of a standard 30,000-head NC finishing farm — approximately 150 metric tons per day of combined solid and liquid waste — through two integrated modules. Module 1 separates the solid fraction and gasifies it in a controlled, oxygen-starved environment at 800°C. The organic matter does not combust; it thermochemically decomposes into syngas (hydrogen and carbon monoxide), stable biochar, and recovered nitrogen as ammonium sulfate. Module 2 treats the liquid fraction through pre-aeration, activated-sludge bioreaction, sedimentation, and final disinfection, producing treated water that exceeds NC DEQ discharge standards. Two optional add-ons can be included based on client needs: (1) an on-site HOCl generation system to improve the antifungal, antiviral, and antibacterial qualities of the water for farms, and (2) a reverse-osmosis plus electrodeionization polishing stage (commercially available, industry standard) to reach sub-1-ppm TDS for NVIDIA direct-to-chip cooling manifolds for data centers.

The syngas produced in the WtE module fuels on-site microturbines. For a 30,000-head finishing farm, the system yields between 970 kW and approximately 1.5 MW of net, continuous generating capacity, 24/7 baseload. Unlike solar or wind, there is no intermittency and no storage requirement: the feedstock is produced daily, and the system turns a disposal cost into steady power while eliminating the waste stream

PROVEN IN OPERATION — ADAPTED FOR NEW APPLICATION. Club de Golf Campestre, Mexico City — 15 years continuous operation on organic waste streams. Club de Golf San Carlos, Toluca — 10 years continuous operation. Huehuetoca Municipal Pilot Plant, State of Mexico — municipal organic waste, NOM-001-SEMARNAT compliance confirmed. Teapa, Tabasco — feasibility study, 25+ MT/day, 0.45 MW, 38% IRR, 30-month payback (feasibility only; not operating). The Proytec thermal and wastewater process stack is TRL 7–9. The modular dual-module EcoTower productization is TRL 4–6. Its application to concentrated swine waste on North Carolina farms is TRL 4 — the specific pathway this proposal advances.

Proytec's Huehuetoca pilot plant: An operational dual-tower configuration demonstrating integrated waste-to-energy and wastewater treatment. This PEMEX-derived process engineering serves as the TRL 7–9 foundation for the modular EcoTower deployment in North Carolina

The Celestún 'Charcas': Residential salt flats where people build homes on foundations of rubble and trash. Here, children and flamingos coexist in a landscape where rainwater leaches toxins into the peninsula's primary aquifer.

ASSET	DESCRIPTION	REVENUE PATHWAY
Electricity	970 kW–1.5 MW net continuous per 30,000-head farm. 24/7 baseload.	Primary — CEPS-qualifying PPA to Duke Energy OR direct-to-hyperscaler colocation PPA
Cooling-grade water	~57,853 gal/day per farm treated effluent. Polishing to <1 ppm TDS via RO + EDI meets NVIDIA D2C specification.	Direct water sales to colocated data center (5–10 mi catchment)

Upon return from Celestún, Eduardo called Alberto, who reached back in time to two Mexican engineers — Sergio and Gustavo, friends of his father and business partners of his in other ventures — to ask whether the wastewater systems they had spent decades perfecting could help clean contaminated water in remote locations like Celestún. Sergio said yes — but it would take significant electrical energy. Then he paused. "But we can get that energy from the trash itself."

03 · DEPLOYMENT & SCALE

Hog Power. 24/7 baseload. Cooling-grade water. Behind the meter of the AI buildout.

Eastern North Carolina sits at the intersection of two U.S. infrastructure challenges: a chronic agricultural-waste problem rooted in decades of lagoon-and-sprayfield practice, and a hyperscale AI data-center buildout that needs baseload power and cooling-grade water the existing grid cannot deliver without triggering a ratepayer revolt. EcoTower turns that adjacency into opportunity.

To build a centralized natural-gas combined-cycle plant of comparable capacity, a utility must commit roughly $1.2 billion and navigate a decade-long permitting gauntlet. A single EcoTower module deploys for about $1.5 million, can be operating within months of site approval, and scales linearly — farm by farm, megawatt by megawatt — exactly where the load is growing. This is not an incremental improvement. It is a different infrastructure and financing model.

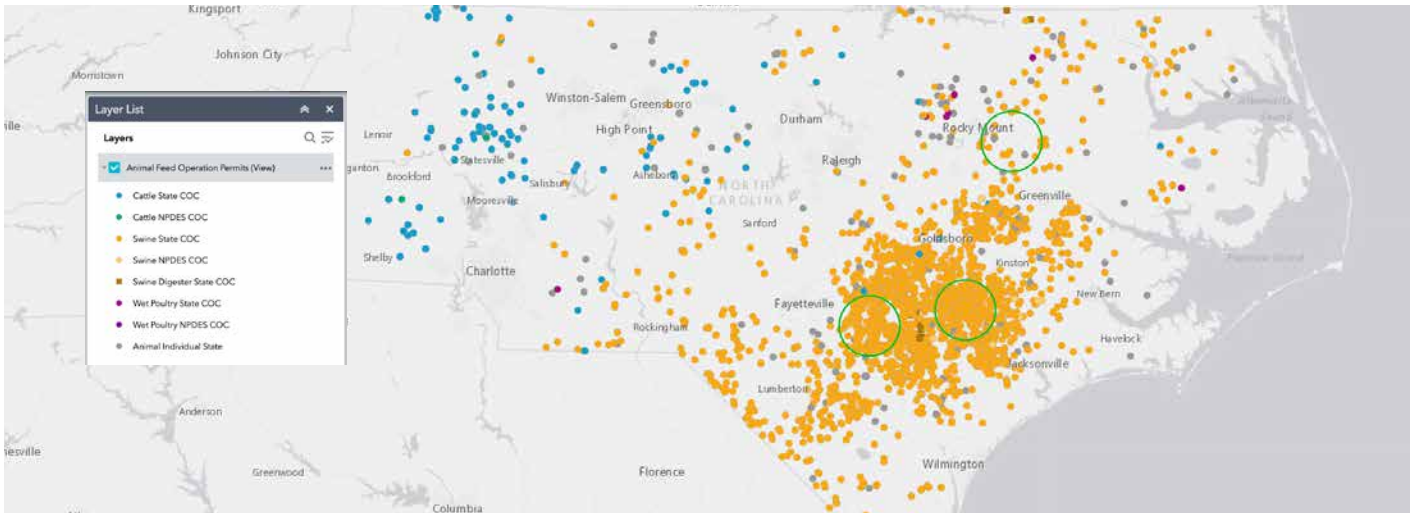
THE TDS PROBLEM, AND HOW IT IS SOLVED. Raw agricultural effluent runs above 2,000 ppm total dissolved solids. The Open Compute Project secondary cooling specification requires <1,000 ppm; NVIDIA's direct-to-chip cold plate micro-channels (under 0.3 mm wide) require <1 ppm ultra-pure deionized water. The gap is real. The solution is mature: industrial reverse osmosis drops TDS to the 10–20 ppm range, and electrodeionization polishes the output to sub-1-ppm by continuously pulling remaining trace ionized species through ion-exchange membranes under a direct-current field. Both technologies are commercially available. The CapEx and energy load are factored into unit economics.

DISTANCE AND LOGISTICS. Because of weight and pumping costs, water is a geospatially bounded resource. Baseload power can be wheeled across the existing grid and biochar can ship to any market, but treated water is most economical when delivered within a limited radius of the offtaker. Depending on terrain, pipeline costs, and the developer's cooling requirements, EcoTower can supply both power and semiconductor-grade water behind the meter. Even when direct piping is not deployed, adding EcoTowers reduces regional resource stress by converting agricultural waste into a recurring, distributed source of clean water and energy — easing competition among agriculture, municipalities, and the growing tech sector. For Tier 1 data-center siting decisions, the geospatial overlap of permitted swine capacity becomes a measurable, under-scored advantage.

	PHASE 1 · FARM	PHASE 2 · COUNTY	PHASE 3 · INDUSTRIAL
Configuration	Single-module deployment	Multi-module aggregation	Data-center colocation
Scale	970 kW–1.5 MW net · 30,000-head farm	~3.5 MW net · 120 MT/day · county-scale	16–40 MW net · 600–1,200 MT/day · industrial
Revenue architecture	Grid-interconnected PPA under NC CEPS swine-waste set-aside (3.0× Tier 1 REC multiplier, N.C.G.S. § 62-133.8A)	Mixed CEPS PPA + emerging BYOC offtake negotiation	Direct hyperscaler PPA under "Bring Your Own Capacity" framework + direct cooling-water sales
Customer	Duke Energy (CEPS compliance deficit)	Utility + early data-center offtaker	Hyperscale operator (Amazon, Microsoft, Meta, Google)

DUAL REVENUE ARCHITECTURE. The proposal presents two parallel revenue pathways, not one. Architecture A (grid-interconnected PPA): Phase 1 deployments sell power to Duke Energy under North Carolina's Clean Energy and Energy Efficiency Portfolio Standard (CEPS), which carries a dedicated swine-waste set-aside. Projects located in Tier 1 distressed counties qualify for a 3.0× REC multiplier under N.C.G.S. § 62-133.8A, establishing an immediately bankable revenue stack. Architecture B (direct hyperscaler BYOC): Phase 2 and Phase 3 deployments directly serve co-located data-center operators under the "Bring Your Own Capacity" framework endorsed by the NC Energy Policy Task Force (February 2026). Architecture B is expected to command a green premium of 2–3× over utility PPA pricing because it solves three hyperscaler problems simultaneously — decoupled baseload power, cooling-grade water, and a community-restoration narrative that inverts the data-center backlash now active in NC. Phase 1 de-risks the technology; Phase 2–3 scale the margin.

SB 449 / SESSION LAW 2025-97 — A CLOSING REGULATORY WINDOW. North Carolina's Senate Bill 449, enacted as Session Law 2025-97, extends the expiration of existing swine digester permits to September 30, 2028. A three-year direct runway during which EcoTower hardware can be deployed under existing agricultural permits — bypassing the standard 3–5-year National Environmental Policy Act review that centralized power projects face. The time value of this acceleration on a $1B+ data-center campus decision is material. The window is open. It is not open indefinitely.



The Kingsboro Catchment: 130 active swine farms within 30 miles of the planned 900 MW AI campus hold ~534,000 permitted head—establishing the immediate feedstock density for distributed power. By expanding to dairy and slaughterhouse waste, the EcoTower creates a redundant, feedstock-agnostic energy reserve for the entire North Carolina AI corridor.

04 · OPERATING MODEL

Greencycling. Waste in. Restoration out. The loop never stops.

Greencycling is the operating model that governs every EcoTower deployment. It is not a marketing layer; it is a structural contract. Every deployment is engineered as a closed loop: organic waste becomes feedstock; feedstock becomes electricity, cooling-grade water, biochar, and recovered nutrients; and 20% of net profit — every month — flows into an independent community fund. The fund is independent of Zere LLC, independent of the data-center offtaker, and directed by the community that has carried the lagoon system's burden for four decades. It is structural, not charitable.

This design point exists because the data-center industry is currently under significant political pressure across North Carolina precisely because of its extractive footprint — aquifer draw, grid monopolization, negligible local employment, and what NC residents have publicly called "the hog farms and slaughterhouses of the 1990s" in commission meetings on proposed new campuses. Greencycling inverts that relationship. The hyperscaler's green premium for carbon-negative baseload and cooling-grade water directly funds the elimination of the agricultural lagoon that the community has objected to for thirty years. Data centers transition from resource extractors to community funding partners without greenwashing, because the mechanism is structural and the money is audited by the community that receives it.

> *Community-directed · Modeled on the Snow Hill / GFL consent decree. Fund structure and final terms subject to direct engagement with local NC environmental organizations and communities affected by industrial farming.*

ACADEMIC VALIDATION. Peer-reviewed research on NC landowner willingness to accept nature-based solution payments (Hovis et al., 2023, Journal of Soil and Water Conservation) confirms approximately 70% participation rates at $128–$132/acre/year for conventional PES-style programs — establishing the structural receptivity of the NC farm community to payment-for-environmental-service models. Greencycling goes further: farmers host the EcoTower with no establishment cost and no land taken out of production, and the surrounding community receives 20% of net revenue by mandate.

Greencycling — The Virtuous Circle: A structural mandate ensuring that 20% of net profits from every Zere infrastructure project are directed toward nature-based solutions and community restoration. This converts the industrial success of the EcoTower into a permanent fund for ecological health.

Five nodes. One loop. Measurable restoration.

1 · **Waste Treatment**. EcoTower permanently eliminates the lagoon. No landfill, no sprayfield, no atmospheric emission.

2 · **Energy Generation.** Gasification produces electricity for system self-sufficiency plus surplus for grid or data-center offtake. Stable, recurring revenue.

3 · **Revenue Generation.** Waste-treatment service fees plus byproduct sales: power, cooling-grade water, biochar, recovered nitrogen.

4 · **Nature Restoration.** 20% of net profit funds community-directed watershed restoration, wetland recovery, riparian buffers, and flood-mitigation NBS — in alignment with the FloodWise program framework being developed across the NC Coastal Plain.

5 · **Wastewater Treatment.** Output exceeds NC DEQ discharge standards. Local ecosystems, water quality, and biodiversity recover alongside the waste stream being eliminated.

> *Ed Celis spent several summers in Chapel Hill, a town his father cherished enough to retire there after a life traversing the world. When we looked at North Carolina — 7.6 million hogs, a stressed grid, communities carrying the lagoon legacy for four decades, and a new AI buildout repeating an old extraction pattern — the question Alberto and Ed asked in Yucatán answered itself a second time. Same reframe. Different watershed.*

05 · WHO IS BUILDING THIS

The hands that built the thing.

Project SYLVA is led by a cross-border team combining U.S. commercial development (Zere LLC), **Mexican engineering heritage** (Proytec S.A. de C.V., **with forty-plus years of PEMEX-derived process engineering**), **and Mexican carbon-certification capability** (ASES / Nat5). We are building the project in direct consultation with local farmers and integrators, community leaders, researchers, and public agencies in North Carolina. Total active operating team across all partners: fifteen-plus.

Eduardo (Ed) **Celis Rojo · Managing Partner, Zere LLC.** Entrepreneur and strategic developer. BA Trinity University, San Antonio. CEO of Hypurist LLC (HOCl disinfection technology). Leads U.S. commercial development, investor relations, and partner engagement for Project SYLVA.

Alberto Osegueda Magaña · Partner, Legal & Financial, Zere LLC. Corporate attorney, JD with honors from ITAM. Former Secretary of Finance, UGOCEP. Co-investor in Proytec. Architects the cross-border legal and financial structure that makes technology deployment possible.

Ing. Sergio Félix Cruz Carranza · Co-Founder, Proytec S.A. de C.V. Petroleum and chemical engineer. Forty-plus years at PEMEX across gasification, thermal conversion, filtration, refinement, and wastewater treatment systems. Technical architect of the EcoTower dual-module configuration. Designed the gasification process from first principles.

Ing. Gustavo Bonilla Pérez · Co-Founder, Proytec S.A. de C.V. Forty-plus years at PEMEX. CIPM recognition at the 2022 Congreso Mexicano del Petróleo. Leads process optimization and commercialization of EcoTower deployments. The commercial bridge between Proytec's technology and the markets it serves.

Guillermo Hinojosa Mendoza · CEO, ASES · Analytical and Sustainable Ecological Services. Leads ASES / Nat5's carbon-certification methodology development for the EcoTower's biochar, methane avoidance, and emerging biodiversity, water, and verified-soil credit pathways.

A forty-year engineering partnership in action:
From left: Ed Celis, Alberto Osegueda, Gustavo Bonilla Pérez, and Sergio Felix Cruz Carranza.
Behind them, the dual-tower system that serves as the blueprint for Project SYLVA's deployment in North Carolina.

Zere LLC additionally operates with five committed senior advisors across legal, energy, waste, and capital markets disciplines (unpaid, commitments pending first capital close). Proytec's core Huehuetoca engineering team of 8 supports every deployment. Combined active team across Zere, Proytec, and ASES/Nat5: 15+.

Ecosystem engagement.

Zere LLC is actively engaged with senior leadership across the full stakeholder ecosystem required for North Carolina deployment: the state's principal agricultural policy body, its state soil and water conservation foundation, farmer associations representing NC swine and general agriculture interests, community groups representing the rural counties most affected by the lagoon-and-sprayfield legacy, conservation organizations focused on Coastal Plain watershed and flood resilience, the NC Department of Agriculture and Consumer Services, the NC Department of Environmental Quality, NC State University's agricultural research extension network, and a major U.S. wastewater-equipment manufacturer engaged on integrated solid/liquid separation for the swine-waste feedstock stream. Specific counterpart names and institutions available on request under NDA.

Zere was born of an idea to fund and support projects of nature restoration and conservation at scale through carbon credits. After two years — and significant wins and lessons — we took a sharp pivot into tech. We developed the idea of a system that generates revenue from waste to fund the restoration of nature and communities. We called it Greencycling. Meanwhile, Proytec developed the hardware: the EcoTower builds on systems Sergio and Gustavo spent four decades refining at PEMEX — gasification, filtration, thermal conversion, wastewater treatment. Their broader team at Proytec brings 20+ years each in the same disciplines. The modular dual-module EcoTower productizes that lineage: one tower gasifies the separated solids; one treats the separated liquid. PEMEX-grade thermochemical process engineering, scaled to serve a single farm or a local cluster of farms.

06 · PILOT & THE ASK

One pilot. A living lab. Infinite replication.

Zere LLC has identified NCSU's Tidewater Research Station as one top research pathway for the first US pilot, among several being evaluated. The pilot site itself is planned for Sampson or Duplin County — the two counties that together hold roughly half of North Carolina's permitted swine capacity — targeting operational status in late 2026.

Site identification is active. The goal is to match system design to site-specific feedstock, watershed, and community conditions — not the other way around. The first deployment is a living lab where farmers, community members, regulators, researchers, and our engineering team refine the engineering, regulatory, and social basis for broader deployment in North Carolina and, ultimately, global scaling. Each stakeholder brings a different lived reality; each can make the solution wiser. The pilot is designed to let them.

Electricity offtake relationships are being established with NC utility partners. Legal counsel engagement is in process to support Power Purchase Agreement negotiation and Environmentally Superior Technology determination under N.C. Gen. Stat. § 143-215.10I. Project SYLVA has independently reviewed the five EST criteria under SL 2024-57 and satisfies each: substantial elimination of ammonia and odor emissions; substantial elimination of groundwater and surface water discharge; substantial elimination of airborne pathogens and heavy metals; substantial elimination of nutrient and heavy-metal contamination; and substantial elimination of the release of vector-attracting disease organisms. Formal determination pathway through NC DEQ is active.

1 · CREDIBILITY. Third-party validation from a global peer-review platform signals to NC farm owners, regulators, hyperscaler ESG teams, and integrators that this system is ready for serious consideration. The TERA designation accelerates every downstream conversation.

2 · MARKET ACCESS. New Energy Nexus operates in every major swine-producing region in Asia — China, Vietnam, the Philippines, Indonesia. Identical waste chemistry. Larger scale. Faster deployment cycles. The TERA network is the shortest path to those markets once the NC pilot is operational.

3 · First-deployment capital. The $1M Gold Prize funds hardware for the first NC pilot. The Towngas · SPIC backing unlocks real-world deployment scenarios — exactly what a hardware-based modular system needs. Every subsequent deployment is de-risked by the first.

Why TERA-Award. Why now.

Project SYLVA is at the convergence of proven process engineering, a structured pilot pathway, the clearest regulatory window in a generation, and a capital gap that TERA is uniquely positioned to bridge. The AI buildout will not wait. The lagoon permit window closes September 30, 2028. The communities of eastern North Carolina have waited longer than that already.

> *Recent legislation and policy changes in the U.S. have made carbon markets — and most federal funding for green solutions — harder to access, while in Mexico the process of securing funding and feedstock access is slowed by logistical roadblocks and conflicts of interest that have delayed our progress. We are currently in advanced-stage conversations on four projects across three Mexican states and Mexico City. One involves a large integrator of pig farms. Eduardo knew about pig farms in North Carolina.*

The Stakes: A typical Longleaf Pine savanna in the North Carolina Coastal Plain. This flat, permeable landscape sits directly above the aquifers currently threatened by industrial agricultural waste. Project SYLVA's deployment ensures that the next generation of AI infrastructure leaves this horizon—and its water—cleaner than we found it.

Let's build this together.

"A pair of boots on the ground is worth 100 white papers in the cloud."

The Heritage Restoration: *Pablo Granados navigating the restored mangroves of the Yucatán. Our work in Mexico proves that when industrial processes are aligned with ecological mandates, nature heals. This same structural commitment to restoration is what drives the Greencycling model for Project SYLVA.*

PROJECT SYLVA

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