

Eden II Initiative

DEPLOYMENT PROGRESSION

Scaled Field Nodes & Modular Infrastructure

Eden II standardizes distributed chemical synthesis across three interoperable hardware tiers, scaling seamlessly from individual farm gates to grid-scale agricultural utility hubs:

- **Generation 1 (Single-Farm Node):** 300 kW core (100 Hz) housed in a 20-ft ISO intermodal container. Engineered with an integrated 100 kWh LFP thermal shield buffer and native ambient-pressure aqueous sparging to provide complete, off-grid fertilizer sovereignty for 500-to-1,000-acre single-farm operations.
- **Generation 2 (Cooperative Node):** 600 kW core (200 Hz frequency scaling) inside a 40-ft ISO intermodal footprint. Delivers double the daily output of aqueous nitrogen via remote software tuning while harnessing native exergy recovery for integrated cold-chain chilling and multi-farm cooperative distribution.
- **Sovereign Cluster Utility:** 10 MW regional station utilizing a multi-container swarm footprint. Integrates 2.1 MW HPDD modular blocks to deliver grid-scale green ammonia, multi-vector Organic Rankine Cycle (ORC) power, cryogenic cold storage, and up to 99.8 MT/day of shock-condensed pure water utility to entire rural agricultural districts.

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HARDWARE SPECIFICATIONS BY DEPLOYMENT GENERATION

Architectural Metric	Generation 1: Single-Farm Node	Generation 2: Cooperative Node	Sovereign Cluster Utility
Power Baseline	300 kW core (100 Hz)	600 kW core (200 Hz)	10 MW station (Swarm array)
Physical Footprint	Standard 20-ft ISO container	Standard 40-ft ISO container	Multi-container modular footprint
Synthesis Chemistry	Ambient-pressure NH_4OH (20%–28%)	Ambient-pressure NH_4OH (20%–28%)	Liquid NH_4OH + Power-to- NH_3
Microgrid Buffer	100 kWh LFP thermal shield	100 kWh LFP buffer + expanded pack	Continuous HPDD baseload + BESS
Co-Gen Output	Closed-loop root-zone fertigation	Integrated cold-chain chilling assist	-25°C refrigeration + 99.8 MT/day H_2O
Primary Beneficiary	Single farms (500–1,000 acres)	Regional farming cooperatives	Multi-district agricultural utilities

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MODULAR INTEGRATION CAPABILITIES

- **Software-Defined Frequency Scaling:** Generation 2 nodes achieve double the daily synthesized yield within the exact physical chassis by remotely tuning the direct-drive hydraulic compression frequency from 100 Hz to 200 Hz via NexusLIMS OS.
- **Zero-Footprint Exergy Chilling:** The Sovereign Utility cluster converts high-pressure reactor expansion into -25°C chilling loops at a 0.0 kW parasitic load, preserving perishable post-harvest crops across regional distribution hubs.
- **Grid-Independent Aquifer Protection:** Multi-node utility clusters harvest their own feedstock water by shock-condensing combustion exhaust into ultra-pure distilled water, eliminating regional municipal water draws and protecting local aquifers.