Helios Protocol: The AI Earth Node

Infrastructure Arbitrage for the Qubic Network

We are solving two global crises simultaneously by converting stranded residential solar energy into distributed artificial intelligence.

Transforming passive homes into active compute nodes.

Two Colliding Crises: The Duck Curve vs. The Compute Shortage

A massive global inefficiency exists: we have too much power in one place and a desperate need for power in another.

The "Duck Curve" Paradox

At solar noon, residential generation spikes 400% above consumption. Utilities are forced to curtail (waste) terawatts of clean power because the grid cannot handle the surge.

The AI Compute Deficit

Simultaneously, the demand for AI training compute is outpacing global data center supply. We are running out of electricity where the servers are located.

The Solution: Infrastructure Arbitrage

Instead of building expensive copper infrastructure to transport electricity to distant data centers (incurring heavy transmission loss), Helios moves the **data** to the source of the **electricity**.

Solar Excess

Solar inverters hit capacity at noon.

Digital Transport

AI jobs sent via internet vs. power lines.

Distributed Compute

Home batteries become active nodes.

We turn wasted kilowatt-hours into monetized machine learning operations.

High-Level Architecture

Helios is a complete, end-to-end decentralized application built on a three-layer stack.

Layer 3: C++ Consensus

A mock Qubic Smart Contract that validates work and secures the network.

Layer 2: Python Backend

The local neural engine running PyTorch for actual model training.

Layer 1: React Frontend

Physics simulator and user dashboard for real-time monitoring.

Step 1: Detection (The Physics Engine)

The Helios Command Center is powered by a deterministic physics engine that models the thermodynamics of a solar home.

- **Solar Noon Trigger**

  When simulation hits 1:00 PM, battery saturation reaches 100%.

- **Automatic Capture**

  Rather than clipping excess energy, the system automatically triggers the "MINING" state.

- **Zero Waste**

  Energy that would vanish is instantly redirected to the GPU.

Step 2: Execution (Useful Proof-of-Work)

Unlike Bitcoin, which secures its network by hashing useless random numbers, Helios utilizes **Useful Proof-of-Work (UPoW)**.

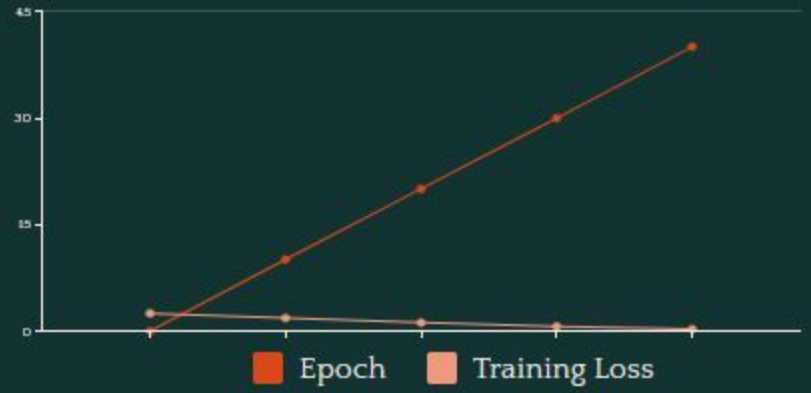


Fig 1. Real-time Training Loss Reduction during mining operations.

The Neural Node

Our Python/PyTorch backend executes real-time Gradient Descent on a neural network. The energy is not "spent"; it is "converted" into machine learning intelligence, visualized by the decreasing loss curve.

Step 3: Validation via Smart Contract

In a decentralized network, "trust, but verify" is the rule. The C++ Smart Contract (`helios_contract.cpp`) acts as the impartial judge.

Submission

The miner submits the `loss_score` derived from their training computation.

Comparison

The contract compares the submission against the network's current best benchmark.

Reward

Tokens are issued ONLY if the miner effectively improved the AI model's accuracy.

The Economic Loop

We transform the solar roof from a cost-saving appliance into a revenue-generating asset, closing the loop between homeowner and researcher.

Instant Compensation

Homeowners are paid immediately in Qubic Tokens for their contributed compute power.

Model Marketplace

Trained AI models (weights) are serialized and listed for sale to researchers, creating a secondary market.

Future Roadmap: Hardware Integration

Moving from simulation to physical reality. The backend is architected to scale beyond the browser.

1 — Phase 1: Simulation

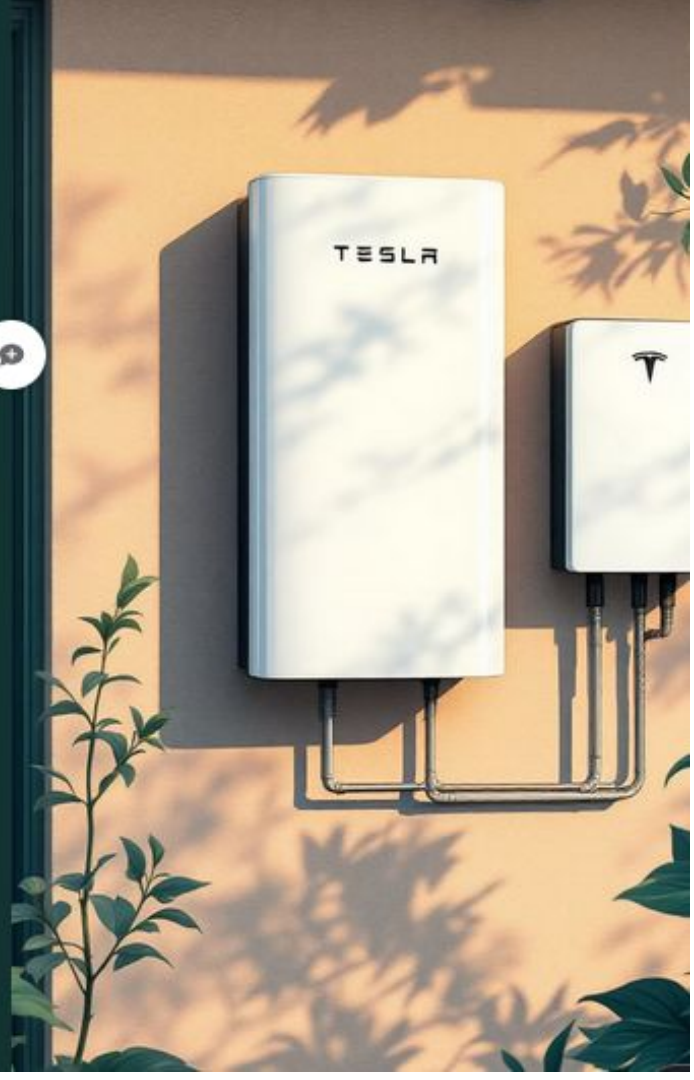
Current State: Deterministic physics engine demonstrating the economic logic.

2 — Phase 2: Modbus TCP

Integration with standard industrial protocols to read live inverter registers.

3 — Phase 3: Hardware Control

Direct API connections to Tesla Powerwalls and Enphase Inverters for automated mining triggers based on real-world voltage.



Conclusion

Helios Protocol proves that the inefficiencies of the green energy transition are actually the fuel for the AI revolution.

By leveraging the Qubic Network's unique architecture, we have successfully demonstrated a system that turns sunlight directly into distributed intelligence.

https://github.com/helios-protocol

100%	0	AI
Renewable	Waste	Output
Powered by excess solar	Eliminating curtailment	Distributed Intelligence