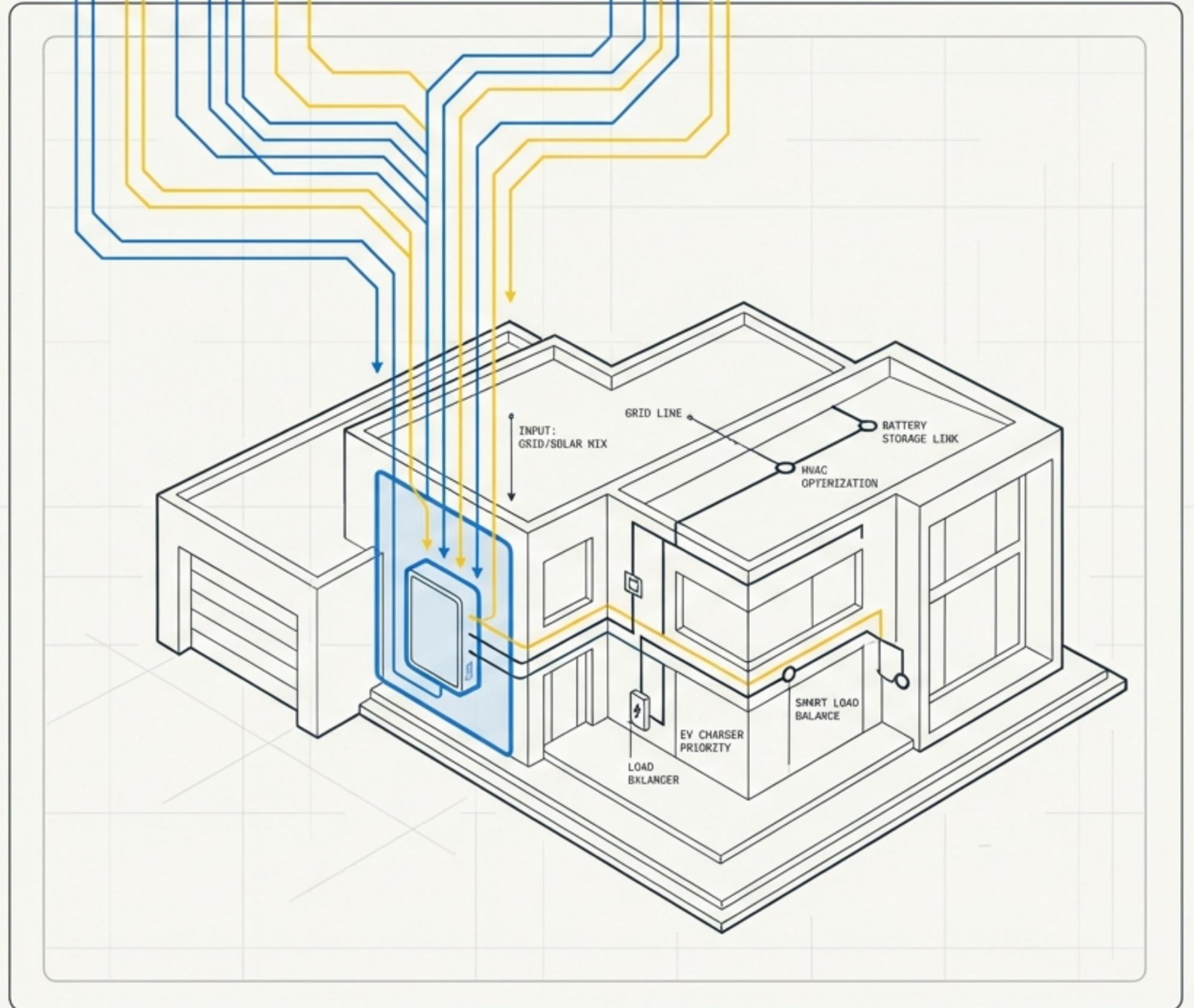




The Intelligent Residential Energy Orchestrator (IREO)

Turning Canadian Homes into Autonomous Power Plants

Opcelerate Neural Inc. | Sherwood Park, Alberta, Canada |
March 2026





94.7%

Self-Consumption



\$2,840

Average Annual Savings



18-24 Mo

System Payback

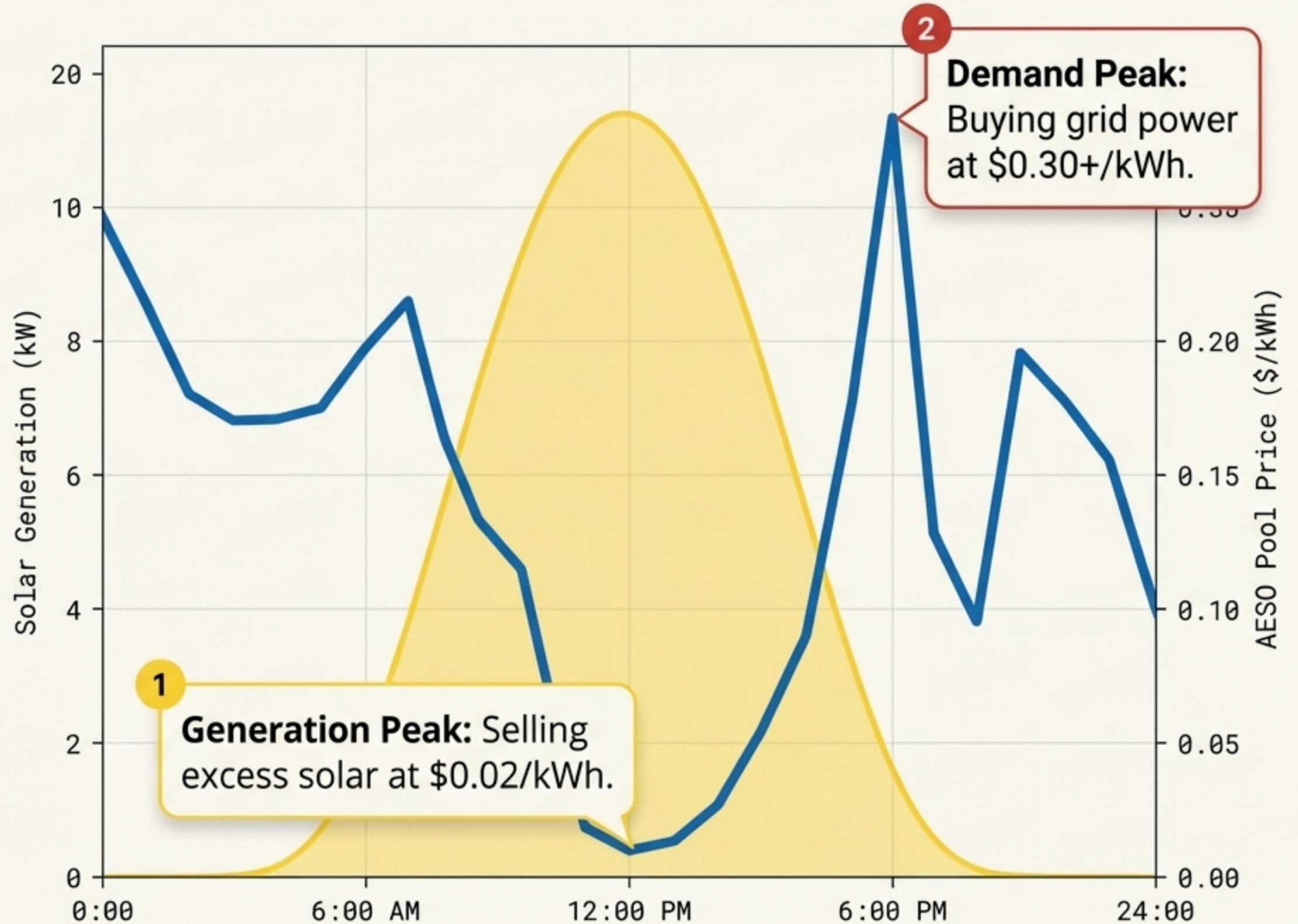
Executive Summary

IREO is not a conventional battery. It is an AI-powered Virtual Power Plant (VPP) hub that orchestrates the grid, rooftop solar, battery storage, and household loads. Using reinforcement learning, it makes split-second, revenue-optimizing decisions to buy low, sell high, and store energy.

The Alberta Energy Challenge

Traditional setups dump excess solar to the grid precisely when energy is cheapest, losing 60-70% of potential value.

Without intelligence, batteries cycle inefficiently and miss lucrative arbitrage windows.



The Paradigm Shift

Moving from blind energy storage to dynamic, revenue-generating orchestration.

	Passive Solar + Dumb Battery	IREO Intelligent VPP
Data Processing	None	Real-time Python engine forecasting AESO prices
Market Response	Static / Blind	Predictive Arbitrage (Buy low, sell high)
Self-Consumption	~30%	94.7%
Grid Role	Intermittent burden	Stabilizing Virtual Power Plant asset



Hybrid Inverter Stage:
Seamlessly bridges AC grid and DC solar/battery.



AI Computer Module:
The localized hardware running the Python logic engine.



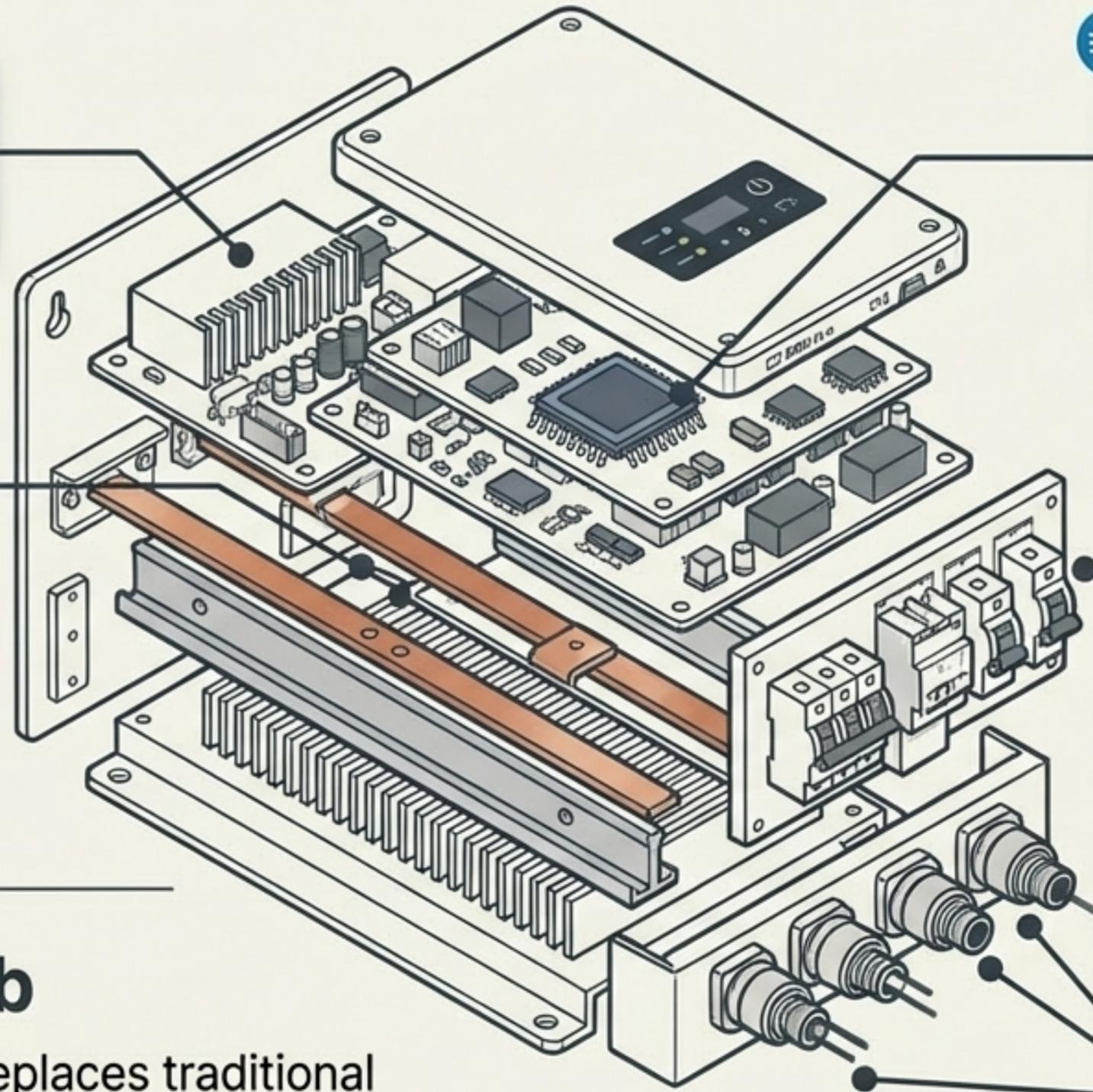
Switching Busbars:
Handles high-load routing instantly.

Fail-Safe Systems:
Arc-fault detection, thermal shutdown, and emergency manual bypass.

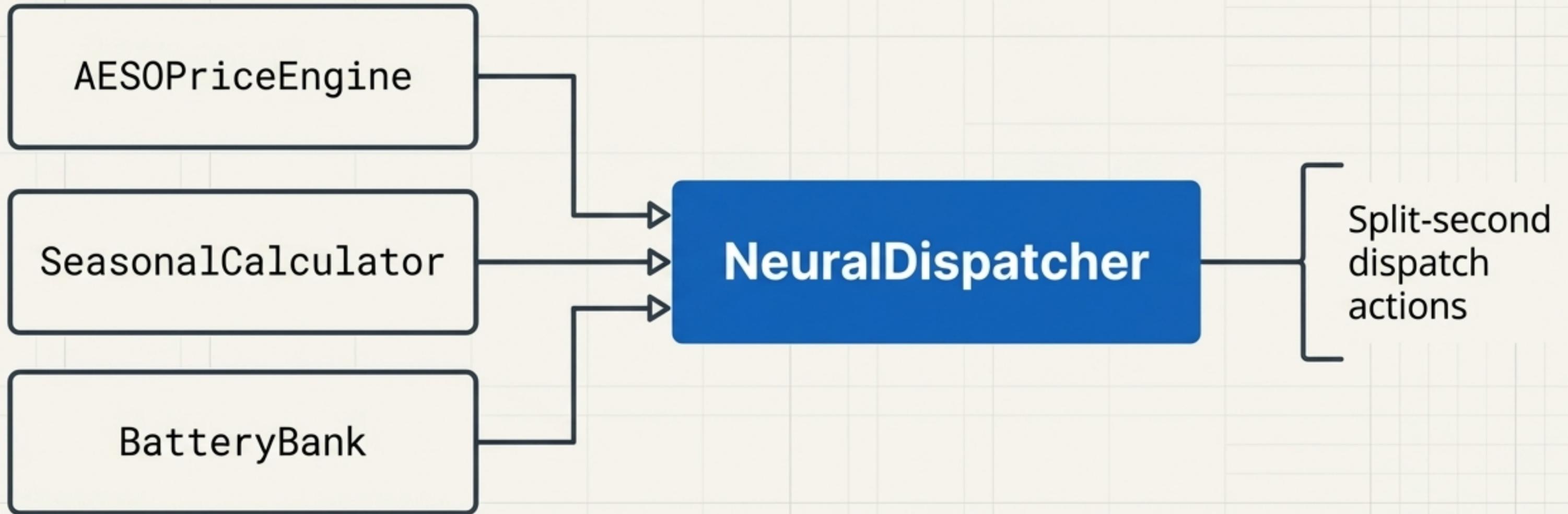
The Physical Hub

A compact enclosure that replaces traditional large inverters, packing heavy-duty power electronics alongside localized edge-computing.

EV Ports: Future-ready bidirectional V2H/V2G hardware.



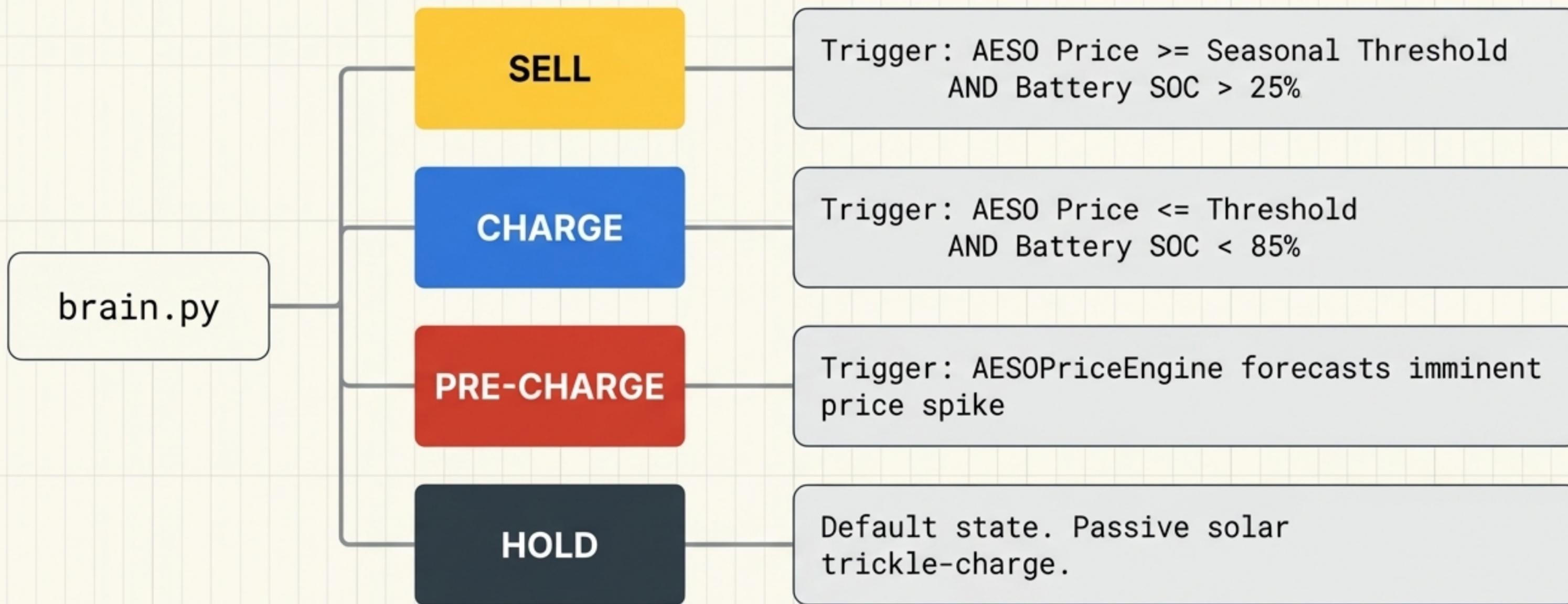
The Neural Dispatcher



IREO's core intelligence is a proprietary, real-time Python-based engine utilizing reinforcement learning and model-predictive control. All decisions execute locally—if the internet drops, IREO seamlessly switches to local fallback. Your home never loses power.

The Logic Engine

Evaluating market conditions and loads every few minutes to maximize revenue without compromising resilience.



Real-Time Optimization

Operating at a 5-minute resolution, IREO transforms grid volatility from a financial penalty into a daily revenue stream.

PRE-CHARGE

AESO price is spiking. IREO anticipated this and topped up the battery overnight at \$0.03/kWh. Home runs entirely on cheap stored power.

HOLD / TRICKLE

Solar is maxed out, but AESO price has crashed to \$0.02/kWh. IREO refuses to sell, routing solar strictly into battery and household loads.

SELL

Evening demand hits. AESO price surges to \$0.30/kWh. IREO aggressively discharges battery to the grid, capturing peak market revenue.

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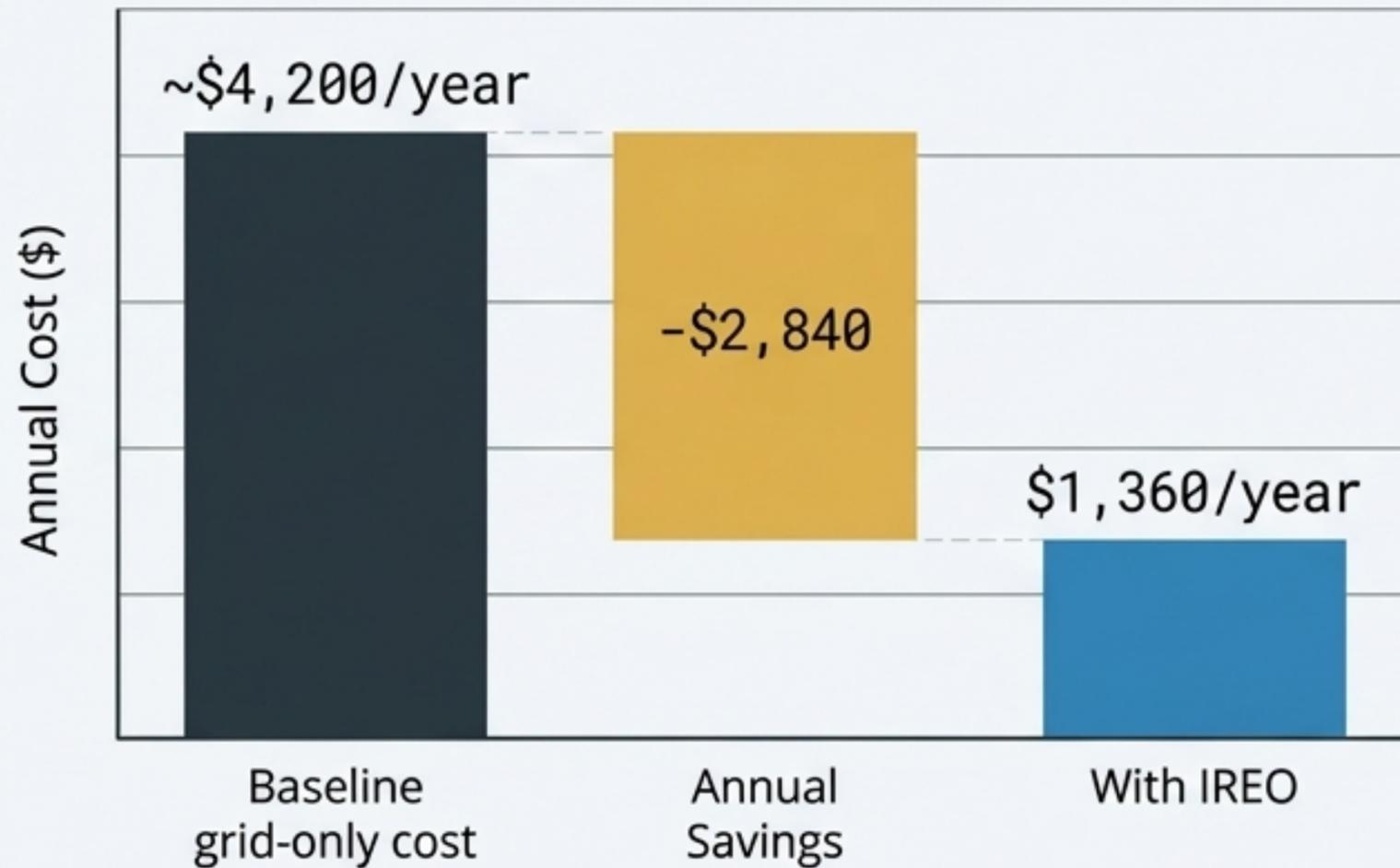
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Economic & Environmental Impact

Based on a typical 2026 Alberta home setup (10 kW solar + 15 kWh battery).

Financial



Lifetime (15-year) Value: \$71,000+ cumulative savings.

Environmental



Carbon displaced: equivalent to removing **2.1** passenger vehicles from the road annually.



Canadian Engineering, Safety & Reliability

Designed and manufactured in Alberta, for Alberta's extreme climate and unique market. IREO keeps economic value inside local communities while guaranteeing your home remains powered, no matter what.



Absolute Fail-Safe

Hardware defaults to normal house power even if all digital modules fail.



Physical Safety

Integrated thermal monitoring and arc-fault protection.



Local-First Architecture

Zero reliance on cloud connectivity for basic power continuity.

The Virtual Power Plant Roadmap

As the grid evolves, so does IREO. Every new capability is delivered seamlessly via Over-The-Air (OTA) software updates—requiring absolutely no new hardware installation.

Residential V2H/V2G
Bidirectional EV support unlocks the car as a massive external battery asset.



Q2 2026

Peer-to-Peer Trading
Energy routing between neighbouring IREO homes.



Q4 2026

Full VPP Aggregation
Fleet-wide coordination for AESO ancillary services and demand-response programs.



2027



Ready to transform your home into a power plant?

Explore the live neural dispatcher logic and request a free energy assessment.

Live Demo: </dashboard>

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