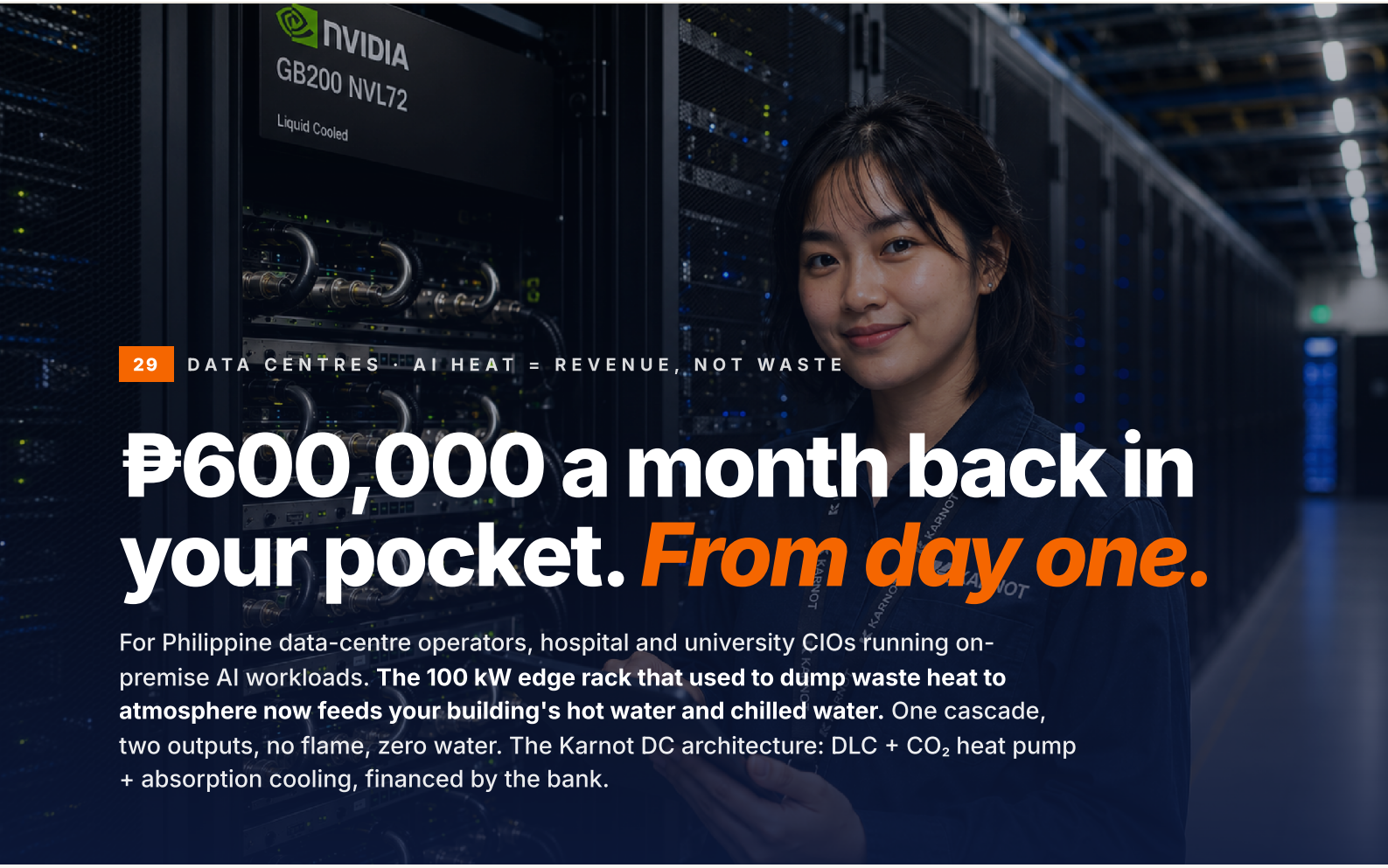

29 DATA CENTRES · AI HEAT = REVENUE, NOT WASTE

₱600,000 a month back in your pocket. *From day one.*

For Philippine data-centre operators, hospital and university CIOs running on-premise AI workloads. **The 100 kW edge rack that used to dump waste heat to atmosphere now feeds your building's hot water and chilled water.** One cascade, two outputs, no flame, zero water. The Karnot DC architecture: DLC + CO_2 heat pump + absorption cooling, financed by the bank.

100 KW EDGE-DC SCENARIO · HOSPITAL ICU AI / UNIVERSITY RESEARCH COMPUTE / COLOCATION NODE

₱600K
In your pocket every month
Net of the green-loan payment · from day one

PUE 1.22
Cooling at hyperscale efficiency
vs PUE 1.8–2.0 for conventional CRAC + chilled-water edge DC

Zero L
Water consumption
vs 1.8 L per kWh-IT for evaporative cooling · Microsoft water-positive 2030 ready

You pay nothing up front. *The bank does.*

DBP, LandBank and BPI all run **green-loan programmes — ~6.5–8% p.a., 5–10 year terms, 70–80% LTV**. The monthly cooling-power saving (plus recovered hot water vs LPG) is larger than the monthly loan payment. **Cash flow goes UP from day one**, the loan clears in year 5, and the absorption chiller plus recovered hot water keep delivering for the remaining 10+ years of asset life. Karnot files the loan, the BOI Pioneer registration and the RA 11285 paperwork as part of project scope.

AIR COOLING IS OVER · LIQUID COOLING IS MANDATORY

A GB200 rack draws 110 kW. *Air physically cannot handle that.*

Air cooling tops out at **~15 kW per rack**. NVIDIA's GB200 NVL72 ships at **110–120 kW per rack** with direct liquid cooling as standard. The Philippine data-centre market is growing at **22.88% CAGR through 2031** — from 633 MW today to 850 MW by 2030 — and the pipeline is dominated by AI-capable, liquid-cooled facilities (STT GDC, ENDECGROUP, Equinix, EdgeConneX, Megawide). Every operator from hyperscale to hospital edge faces the same physics. **The question is no longer if you switch to liquid cooling. It's what you do with the heat.**

💧

Water consumption is the new permit blocker

Conventional evaporative cooling consumes **~1.8 L per kWh-IT** — about **104 million gallons/yr for a 25 MW facility**. Microsoft has committed to water-positive by 2030. Communities in Pampanga, Cavite, Batangas are already objecting to data-centre water use in planning hearings. Karnot's cascade architecture is **zero-water**. Full stop.

🔥

AI heat is your single biggest hidden asset

Every kWh of GPU compute produces ~0.9 kWh of recoverable thermal energy at 30–40 °C. Today, you spend electricity to **dump that heat to atmosphere**. The Karnot CO_2 heat pump **upgrades it to 90–110 °C** — useful for hot water, absorption cooling, district heat, aquaculture, drying. The same kWh of compute that cost you electricity to cool, now generates heat that pays you back.

THE KARNOT CASCADE · ONE COOLING LOOP, TWO OUTPUTS

DLC + CO_2 HEAT PUMP + ABSORPTION CHILLER · CLOSED THERMODYNAMIC CASCADE

STAGE 1 · DLC COLD PLATES

GPU / CPU coolant @ 30–40 °C

Direct Liquid Cooling cold plates on each GPU. Water moves heat **3,500× more effectively than air**. No fans, no ducts, no raised floor, no containment. NVL72-ready.

→

IHEAT CO_2 (R744)

Transcritical CO_2 heat pump. Cools cold side and produces 90–110 °C hot side simultaneously. COP 3.6 cooling, COP 4.6 heating.

→

STAGE 2+3 · HOT OUTPUT

90–110 °C heat · two duties

Drives a LiBr absorption chiller (COP 0.7–0.8) for the remaining cooling capacity — no extra electricity. **Surplus heat to hot water, district loop, fodder grow rooms, aquaculture.** Closed loop. Zero water.

THE FOUR BOXES · ONE PROJECT

Karnot iHEAT CO_2

75 kW · transcritical R744

Transcritical CO_2 (R744) heat pump. **Cooling COP 3.6**, heating COP 4.6 at 110 °C. Cools cold side AND lifts to 110 °C in one machine. Panasonic two-stage rotary, CE/TÜV/Keymark certified. Scalable to 750 kW per unit at hyperscale.

DLC manifolds

NVL72-ready · 30-40 °C

Direct Liquid Cooling rack manifolds. Cold plates on each GPU/CPU. **3,500× heat capacity** of air per unit volume. Eliminates fans, hot/cold aisle containment, raised floor. Sized 30 kW (single rack) to 25 MW (200 NVL72).

Adsorption chiller

50 kW · water as refrigerant

Fahrenheit (DE) rack-integrated unit. **50 kW cooling from hot water alone**, water as refrigerant, zero synthetic refrigerants. Already deployed at Leibniz Supercomputing Centre Munich (Top500). Negligible electrical input.

iVOLT Solar

Zero-export · load-matched

Behind-the-meter rooftop PV plus $LiFePO_4$ battery, sized to offset the iHEAT CO_2 electrical demand. **~117% of cascade load**. No grid export, no Meralco net-metering paperwork.

WHAT YOU STOP PAYING

100 kW edge DC — *hospital ICU AI, university research, colo node.*

ANNUAL FIGURE · 100 KW EDGE DATA CENTRE	TODAY · CRAC + CHILLED WATER	KARNOT DLC + CO_2 CASCADE	YOU STOP PAYING
PUE (cooling efficiency)	1.80–2.00	1.22	**40% less overhead**
Cooling electricity (per 100 kW IT)	~80 kW continuous	~22 kW continuous	**58 kW = ~510,000 kWh/yr**
Cooling cost	~₱7.1M/yr	~₱1.95M/yr	**~₱5.15M/yr saved**
Plus — hot water from waste heat	(LPG boiler still required)	30 kW @ 90 °C continuous	**~₱2.0M/yr LPG replaced**
Water consumption	~158,000 L/yr if evap-assisted	Zero litres	**Permit-blocker eliminated**
Total investment (VAT-inc)	**(already paid)**	**~₱6M (iHEAT CO_2 + DLC + adsorption + Permits)**	**< 1 yr cash payback**

Modelled · 100 kW edge data-centre installed at a Philippine hospital ICU, university research lab, or colocation node. PUE conventional 1.80 (CRAC + chilled-water), PUE Karnot cascade 1.22. Meralco GP ₱14/kWh including 3-phase premium. Recovered 30 kW @ 90 °C offsets LPG hot water at ₱17/kWh useful (see Karnot Food Processing brief for derivation). CAPEX includes iHEAT CO_2 75 kW + DLC manifolds for one 100 kW rack + Fahrenheit 50 kW adsorption chiller + Permits-Managed Service. ***Total annual saving ~₱7.15M (cooling + recovered hot water).*** *Excludes iVOLT solar.* ***The same architecture scales to 25 MW hyperscale*** *(200 NVL72 racks, $5.5M/yr OpEx saving, $66.7M lower CAPEX vs conventional — see the Karnot DC Technical Paper for Microsoft-scale validation).*

THE CASH FLOW · PLAIN AND DULL

MONTH 1

₱600K

Saving on the bill **minus** the green-loan payment. Net cash in pocket. Every month. From day one.

YEAR 1

₱7.2M

In your pocket while the loan is being repaid. The kit pays for itself in cash terms inside month 10.

YEAR 5

₱36M

Loan paid off. From now on you keep **every peso** of the ₱7.15M annual saving — for 10+ more years of asset life.

YEAR 15

₱108M

Total cash retained over the 15-year asset life vs running conventional CRAC + an LPG boiler for hot water.

HOW YOU PAY FOR IT · YOU DON'T

Three banks already lend for this. *Karnot files the paperwork.*

Philippine green-loan programmes *built for exactly this project*

DBP · SEFP
Sustainable Energy Finance Programme
Agri-industrial priority · covers ICT infrastructure · 70–80% LTV · 5–10 yr · **~6.5–8% p.a.**

LANDBANK · SEILP
Sustainable Energy Investment Loan
Path of least resistance for hospitals + universities that bank with LandBank · **~7% p.a.**

BPI · SDF
Sustainable Development Finance
Fastest decisions for commercial colocation operators · **~1–1.5% below standard SME**

These are **loans**, not grants. Real green-discounted commercial loans, sized to fit on top of the monthly cooling + LPG saving. **Karnot files the application, BOI Pioneer registration and RA 11285 Income Tax Holiday paperwork as part of project scope.**

WHERE THE EDGE DC ACTUALLY LIVES

HOSPITAL + UNIVERSITY + RESEARCH · THE PH MARKET TODAY

AI inference at the edge. *The market the hyperscalers can't reach.*

PH hospitals: ICU patient-monitoring AI, real-time imaging triage, hospital pharmacy automation, infectious-disease surveillance — all latency-critical workloads that **cannot run from a Singapore cloud region**. PH universities: research compute clusters, AI lab GPU pools, simulation, supercomputing. PH colocation operators: edge nodes in Cebu, Davao, Iloilo, Clark, Bacolod — closer to users, lower latency, sovereignty-compliant. **These deployments are 50–500 kW — perfectly sized to one Karnot iHEAT CO_2 cascade.** The waste heat goes straight into the hospital's hot-water loop, the university canteen, the campus chilled-water plant. The CFO sees ₱600K/month back. The CIO sees PUE 1.22. The community sees zero water.

> **"Every Philippine hospital adding ICU monitoring AI, every university spinning up an AI research lab, every colocation operator extending past Manila — all of them are about to install 100–500 kW edge DCs and discover that conventional CRAC at PUE 1.8 is uneconomic at AI density. Liquid cooling is mandatory. The question is whether the heat you remove gets dumped to atmosphere or feeds the hospital wards, the university canteen, the chilled-water plant. We package the cascade — DLC manifolds, iHEAT CO_2 heat pump, absorption chiller, hot-water loop — as one project, financed by the bank, paid out of the saving. ₱600K a month back in your pocket. The Microsoft-scale architecture applies at the edge too."**
>
> **Stuart Cox · Founder & CEO · Karnot Energy Solutions Inc.**