

40

KARNOT POULTRY SCALDER SYSTEM

₱136,000 a month back in your pocket. *From the scalders alone.*

For NMIS-licensed chicken dressing plants that hold the scalders at 52–55 °C all shift (PAES 529 soft scald) on a diesel or LPG boiler — while the immersion chillers throw heat into the yard. The Karnot heat pump delivers the same heat at **less than a quarter of the cost**, recovers the chillers' waste heat, and takes the boiler, the flue and the fuel deliveries off your site.

PER 2,000 BIRDS/HR LINE · 8 H/DAY · 26 DAYS/MONTH · VS DIESEL STEAM BOILER · SCALDER ONLY

₱136K

Kept in the plant every month

Scalders heating alone · sterilisers, washdown & heat recovery are on top

77%

Off the scalders heating cost

₱13 per kWh of diesel heat → ₱3 on the heat pump · ₱2 with chiller heat recovery

38 t

CO₂ avoided per year

Diesel burned on site → grid electricity at COP 4 · clean numbers for RA 11285 reporting

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

DBP, LandBank and BPI all run **green-loan programmes** built for exactly this kind of energy project — **~6.5–8% p.a., 5–10-year terms, 70–80% LTV**. The monthly fuel saving is sized to carry the monthly loan payment. Net result: **cash flow goes UP from the first month**, and when the loan is paid you keep every peso of the saving for the rest of the asset's 15-year life. Karnot files the loan application as part of the project — you don't fight the bank alone.

THE PROBLEM YOUR BOILER CAN'T FIX

₱13 heat, twenty metres from free heat. *Every shift.*

A litre of diesel holds about 10 kWh of energy. A steam boiler feeding the scalding through a distribution loop puts about **65% of it into the water** — the flue, blowdown, standby and pipework take the rest. At ₱85 a litre, that is **about ₱13 for every kilowatt-hour of heat that actually reaches the scalding**. Meanwhile the immersion chillers are pulling heat out of every bird and rejecting it to the yard. The plant pays to throw heat away, then pays ₱13 a kilowatt-hour to buy it back.

**The scalding is the wrong job for a boiler**

Steam boilers earn their keep at high temperatures. The scalding needs **52–55 °C water** (PAES 529 soft scald) — a steady, moderate load, held all shift. That is precisely the duty a heat pump does best: for every **₱1 of electricity it moves about ₱4 of heat** into the water. Same tank, same temperature, same throughput — about a quarter of the cost.

**Your chillers are a free heat source**

Immersion chilling rejects heat continuously, all shift — at the same moment the scalding is buying it. Plumb the heat pump to source from the chillers' rejected heat instead of ambient air and **one compressor input does two jobs**: it assists the chilling and heats the scalding. Effective heat cost falls to **around ₱2 per kilowatt-hour**.

THE ARCHITECTURE · CHILLING AND SCALDING, TIED TOGETHER

ONE HEAT PUMP · CHILLER HEAT RECOVERY · HOT BUFFER · CO₂ STERILISER LOOP

COLD SIDE · THE SOURCE

Immersion chilling · heat recovery

The heat pulled out of the birds becomes the heat pump's source instead of being dumped to the yard. **The chilling gets assistance; the scalding gets the heat.**

**1 × iHEAT R290**

Outdoor monoblock. R290 sealed outside the building — only hot water enters the plant.



HOT SIDE · THE LOAD

Scalding tank @ 52–55 °C

Steady makeup and standing-loss heat, all shift, per **PAES 529**. Washdown hot water comes off the same loop. No steam line, no boiler watch, no fuel deliveries.

BUFFER

iSTOR hot buffer tank between heat pump and scalding — steady 55 °C supply through peak makeup, no short-cycling

82 °C STERILISERS

Separate CO₂ loop · up to 90 °C

ANSWERED STRAIGHT

R290 stops at 75 °C, sterilisers need 82. **A smaller Karnot CO₂ unit carries that loop** — one machine does not do everything, and we say so.

THE FOUR BOXES

**Karnot iHEAT R290**

The heart · scalding + washdown

Hot water to 75 °C — the 52–55 °C scald range is its sweet spot. **₱4 of heat per ₱1 of electricity**, Natural refrigerant, GWP 3.

**CO₂ high-temp unit**

The steriliser loop · up to 90 °C

Carries the 82 °C knife and equipment sterilisers that R290 cannot reach. CO₂ refrigerant, GWP 1, no phasedown clock.

**iSTOR hot buffer**

The flywheel · steady 55 °C

Sits between heat pump and scalding. Rides through peak makeup demand so the line never waits for hot water and the compressor never short-cycles.

**iVOLT Solar · optional**

Load-matched · zero-export

Dressing plants run in daylight — exactly when the roof generates. Sized to the heat-pump load: **no export, no net-metering paperwork**.

— WHAT YOU STOP PAYING

A 2,000 birds/hr line — *the scalding, line by line.*

SCALDER HEATING · 65 KW LOAD	TODAY · DIESEL BOILER	KARNOT HEAT PUMP	YOU STOP PAYING
Cost per kWh of heat in the water	₱13.08	₱3.00	₱10 of every ₱13
Heat per month (65 kW × 8 h × 26 d)	13,520 kWh	13,520 kWh	same heat, same water
Monthly scalding heating cost	₱176,800	₱40,560	₱136,240 / month
CO ₂ per year	66.9 t	28.8 t	38.1 t less
Annual scalding heating cost	₱2.12 M	₱0.49 M	₱1.63 M/yr

Stated assumptions, checkable against your own bills: diesel ₱85/L at 10.0 kWh/L net CV, steam-system efficiency 65% (flue, blowdown, standby and pipe losses; a direct-fired boiler does better and the comparison still holds), electricity ₱12/kWh, iHEAT R290 at COP 4 at 52–55 °C delivery, 65 kW scalding load (~32.5 Wh per bird). Excludes the sterilisers, the washdown, chiller heat recovery (₱2/kWh case) and solar — every one of which moves the number further in your favour. Estimates, not a quotation. Run your own numbers at karnot.com/engineering-hub/scalding-energy — every price is editable.

— THE CASH · CUMULATIVE SCALDER SAVING, BEFORE EQUIPMENT COST

MONTH 1

₱136K

The first month's diesel you didn't buy. **Scalding alone** — at the stated assumptions.

YEAR 1

₱1.63M

A year of scalding fuel, kept. Green-loan payments come out of this — and are sized to fit inside it.

YEAR 5

₱8.2M

Typical loan fully paid off within this window. From here every peso of the saving is yours.

YEAR 10

₱16.3M

Cumulative scalding fuel not bought over ten years — on a machine with a 15-year asset life.

— 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 · 70–80% LTV · 5–10 year terms · ~6.5–8% p.a.

LANDBANK · SEILP**Sustainable Energy Investment Loan**

Path of least resistance if you already bank with LandBank · ~7% p.a.

BPI · SDF**Sustainable Development Finance**

Fastest decisions for established SMEs with BPI relationships · ~1–1.5% below standard SME rate

These are **loans**, not grants — we don't pretend otherwise. They are real green-discounted commercial loans, with payment schedules sized to fit inside the monthly fuel saving. **Karnot files the application as part of the project scope.** You sign at the bank window, not before.

— THE 82 °C QUESTION · ANSWERED STRAIGHT

R290 TO 75 °C · CO₂ TO 90 °C**One machine does not do your whole plant. *We say so up front.***

Knife and equipment sterilisers need **82 °C**, and an R290 heat pump tops out at 75 °C. So the scalding and washdown run on the big iHEAT R290, and the steriliser loop runs on a **smaller Karnot CO₂ unit, which delivers water up to 90 °C**. Both are natural refrigerants — GWP 3 and GWP 1 — with no phasedown clock, against the F-gas phasedown now written into DENR DAO 2021-31. A supplier who tells you one machine covers everything is not telling you the whole story — and you should ask what else they are rounding up.

“Every dressing plant in the country runs the same four thermal jobs: scald, sterilise, wash down, chill. Most burn diesel for the first three and pay again to do the fourth. The physics says those jobs belong on one connected system — the heat you pull out of the birds is most of the heat your scalding needs. We put the arithmetic on the table, with the assumptions shown, and we run it on your fuel receipts before we ask you to spend anything. Every month the boiler keeps running is ₱136,000 you didn't need to burn.”

Stuart Cox · Founder & CEO · Karnot Energy Solutions Inc.