

03 · COLD CHAIN · COLD STORES · FROZEN WAREHOUSES · DISTRIBUTION



BATTERY STORAGE FOR

The cold chain.

A cold store sells temperature, every hour of the year. AMPROTEQ storage carries the compressors through the peak windows and holds the month's demand, and keeps the chambers cold when the supply drops.

THE SYSTEM

APEX battery
PULSE transfer
Solaris™ EMS

7.56 R/kWh

WINTER PEAK
Cape Town Large User MV,
2026/27, ex VAT

4.2×

PEAK VS OFF-PEAK
June to August, weekdays

≤ 10 ms

COLD BOARD ONTO BATTERY
PULSE static transfer

82 R/kVA

DEMAND, EVERY MONTH
Highest half-hour, peak or
standard

CHEMISTRY

Liquid-cooled LFP · ≥ 88 % RTE

CONNECTION

400 V AC · onto your cold
boards

SA GRID CODE · PCS MODULE

NRS 097-2-1

02 • WHERE THE MONEY IS

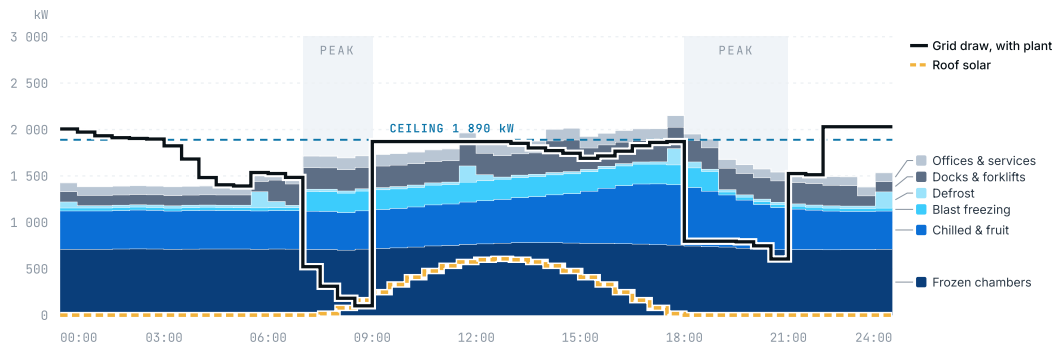
A cold store's weekday, priced by the half-hour.

02

The compressors never stop, and they work hardest in the afternoon and evening. The value sits in five peak hours a weekday, and in the one half-hour a month that sets the demand charge.

FIG 02-1 • AVERAGE WINTER WEEKDAY, CHILLED AND FROZEN STORE

MODELLED • KW



The black line is grid draw with two APEX A2000: well down through both peak windows, under the 1 890 kW July ceiling in peak and standard time, and refilled off-peak. The dashed gold line is the roof array.

CAPE TOWN LARGE USER • MV

C/KWH EX VAT

Winter peak		756 c
Winter standard		238 c
Off-peak, all year		181 c
Summer peak		352 c
Summer standard		227 c

Active energy, 2026/27. In winter a kilowatt-hour moved from off-peak into the peak is worth nearly four times what it cost, after losses.

WHICH LOADS SUIT THE BATTERY

OUR VIEW

LOAD	PATTERN	BATTERY ROLE
Frozen chambers	Around the clock, -25 °C	HELD ON ISLAND 1
Chilled & fruit	Pull-down after intake	ISLAND 2, PEAK SHIFT
Defrost	Short spikes, four a day	DEMAND CEILING
Blast freezing	Day shifts, scheduled	PEAK SHIFTING
Docks & forklifts	Shift changes	STAYS ON THE GRID
Offices & services	Small	SETS THE BASELINE

FIVE JOBS, ONE BATTERY

SOLARIS RUNS THEM AGAINST ONE STATE OF CHARGE



01

Peak shifting

Charges off-peak and carries the compressors through both weekday peak windows.



02

Demand ceiling

Holds the month's highest half-hour, so a defrost or a pull-down does not set the bill.



03

Cold-board ride-through

PULSE moves the cold boards onto the battery in half a cycle when the supply drops.



04

Power factor

The converter supplies reactive power, so the meter sees fewer kVA for the same kW.



05

Diesel displacement

The battery carries the outage first; the gensets start only when it runs low.

WHAT IT DOES FOR THE MODELLED COLD STORE

FROM THE COLD CHAIN CASE STUDY

4.2 R m

GROSS SAVING, YEAR ONE
At FY2027/28 prices

69 %

LESS ENERGY BOUGHT IN PEAK
1 498 MWh a year moved out

532 kVA

LOWER DEMAND, EVERY MONTH
2 496 → 1 964 kVA, on average

<5 years

SIMPLE PAYBACK
On an indicative turnkey cost

03 · THE SYSTEM

Low voltage, on your cold boards.

One container on each cold board, with a transfer cabinet in front of it. Solaris™ EMS runs them all, under one point of responsibility.

BATTERY · APEX

A2000

Battery, PCS, cooling and fire protection in one 20 ft high-cube, delivering 400 V straight onto the LV board.

ENERGY	2 088 kWh · 8 strings
POWER	1 000 kW · 1 100 max
OUTPUT	400 V, 3W + PE
THERMAL	Liquid · ≤ 3 °C cell spread
ENCLOSURE	IP54 · -25 ... +60 °C

TRANSFER · PULSE

P1000

Grid and gensets ahead of a thyristor switch; the cold board and the battery behind it.

POWER	1 000 kW · 1 100 max
TRANSFER	≤ 10 ms, half a cycle
BUS	400 V, 3W + N + PE
MODES	Grid · island · genset · bypass
ENCLOSURE	IP55 · -35 ... +50 °C

CONTROL · SOLARIS™

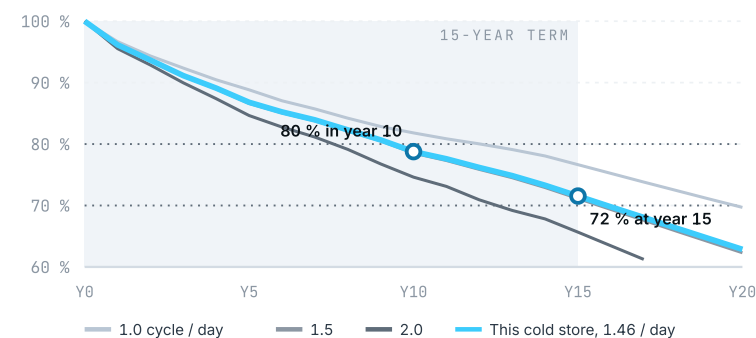
EMS

One controller runs every job against one state of charge and reports to your refrigeration SCADA.

JOB	Peak, ceiling, reserve, PF
FORECAST	Load and PV, day-ahead
PROTOCOLS	IEC 61850 · IEC 104 · Modbus
SCADA	To your plant room
ACCESS	VPN · on-site HMI

FIG 03-1 · CAPACITY RETENTION, MEASURED

% OF DAY ONE



The cell maker's tabulated 20-year test set at 90 % depth, by cycles a day. The cyan line is this cold store's duty.

AGEING YOU CAN BANK ON

APEX DATASHEET

≈ 7 000

FULL CYCLES

To 70 % state of health at one cycle a day and 98 % depth. Measured on the cell, not assumed.

72 %

HEALTH AT YEAR 15

At this cold store's duty of 1.46 cycles a day and 90 % depth. No augmentation in the term.

≥ 88 %

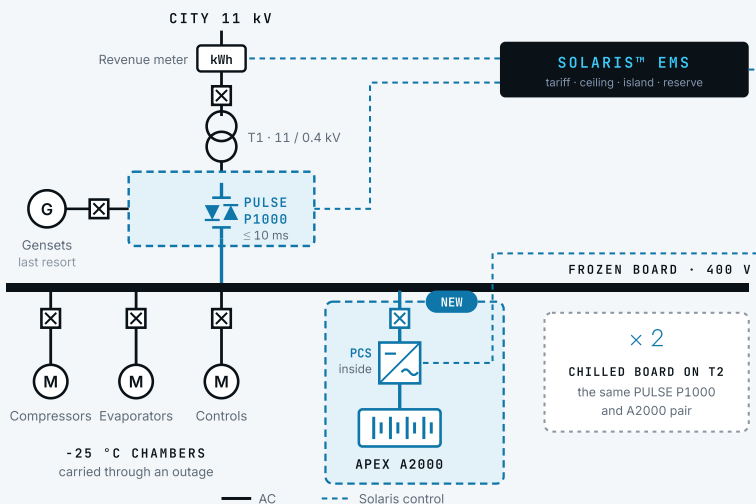
ROUND TRIP

AC to AC, through the PCS. 94 % DC at the battery, beginning of life.

Solaris keeps 450 kWh in the batteries at all times for the cold boards. It is never spent on the tariff.

SUPPLY DOWN? THE COLD BOARDS RUN AS ISLANDS.

PULSE · A2000 ON EACH COLD BOARD



The chambers never see the break

PULSE opens in half a cycle and the A2000 takes the voltage. Compressors, fans and controls run on.

No restart, no pull-down

With no break there is no compressor restart and no pull-down spike when the supply returns.

Gensets last, at a good load

Solaris starts the gensets only when the battery runs low. They join through PULSE, with no second break.

Back in phase

When the supply returns, the PCS steers the island onto it; PULSE closes when both sides match.

04 · THE RETURN

An asset that pays for itself in less than five years.

<5 years

SIMPLE PAYBACK
on an indicative turnkey cost

28 %

PROJECT IRR, 15 YEARS
after O&M, no augmentation

5.4 ×

THE INVESTMENT, RETURNED
net cash over the term

THREE WAYS TO BUY

Purchase · MOST OPERATORS

Turnkey supply, install and commissioning. You own the plant; we run it under a 15-year O&M and availability agreement.

Service agreement

We own and run the plant for a fixed monthly fee, for operators who keep storage off the balance sheet.

Phased

Start with the frozen board, where an outage costs most; add the chilled board's pair the following year.

LOAD STUDY TO POWER IN 26 WEEKS · ORDER IN THE SUMMER, LIVE BEFORE THE WINTER PEAKS



WEEK 1

Load study

your data, our model



WEEK 5

Proposal

sizing, price, terms



WEEK 10

Studies and order

City application, protection



WEEK 20

On site

plinths, cable, boards



WEEK 26

Power

live for the winter

YOUR NEXT STEP

A free load study for your store, in five working days.

Send twelve months of half-hour data, your tariff, your NMD and your genset hours. You get the sizing, the dispatch, the bill before and after, and the payback.

info@amproteq.energy

+27 82 552 6696

AMPROTEQ.ENERGY