

ILLUSTRATIVE CASE · COMPOSITE SITE · NOT A CLIENT PROJECT



CASE STUDY · DATA CENTRES

Taking a colocation campus out of the peak.

4 × A5000 · 4 × N2500 10 MW · 20 MWH · 22 KV · SOLARIS EMS

A 11.6 MW-IT colocation campus in Midrand draws 134 GWh a year on Megaflex, in every half-hour of the year. **Four APEX blocks on two spare 22 kV bays** take a third of its peak energy off the bill, free 2 MVA of notified demand and share the load with the standby sets in an outage. The UPS is untouched. The operator owns the plant, and it pays back its installed cost in less than four years.

20.2 R m

GROSS SAVING, YEAR ONE
FY2027/28 prices

<4 years

SIMPLE PAYBACK
indicative turnkey cost

34 %

LESS PEAK ENERGY
6.6 GWh moved a year

20 → 18 MVA

NOTIFIED DEMAND
renewed from year two

39 %

15-YEAR IRR
NPV R140 m at 12 %

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MODELLED ON ESKOM MEGAFLEX 2026/27

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Resilience & delivery

This case study describes a composite site, assembled from typical South African colocation loads. It is not a client, a project or a result. Tariff rates, time-of-use periods and product ratings are real; the site, its load and its outcomes are modelled. A site proposal replaces every figure with one from your own data.

01 • THE SITE

A campus that never stops drawing.

The modelled campus runs every hour of the year. Its bill is R310 m, and 32 % of the energy cost is bought in 14 % of the hours.

■ SITE PROFILE

COMPOSITE

Operation	Colocation, four data halls
Region	Midrand, Gauteng
Supply	Two 22 kV feeders, Eskom direct
Tariff	Megaflex Me02N, zone 0
IT load	11.6 MW average, filling
Annual PUE	1.32
Notified demand	20 000 kVA
Recorded peak	19 639 kVA
Power factor	0.95 lagging
Standby	10 × 2 MW sets on the 22 kV bus
Annual energy	134 GWh
Annual bill	R310 m ex VAT

■ ANNUAL BILL, BEFORE

R M EX VAT

Energy, peak	R77.5 m
Energy, standard	R89.0 m
Energy, off-peak	R75.4 m
Levies & subsidies	R47.0 m
Capacity charges	R15.1 m
Network demand	R5.7 m
Reactive energy	R0.3 m

Peak energy costs about as much as all off-peak energy, in a seventh of the hours. It is the line the battery attacks first.

■ ENERGY BY END USE

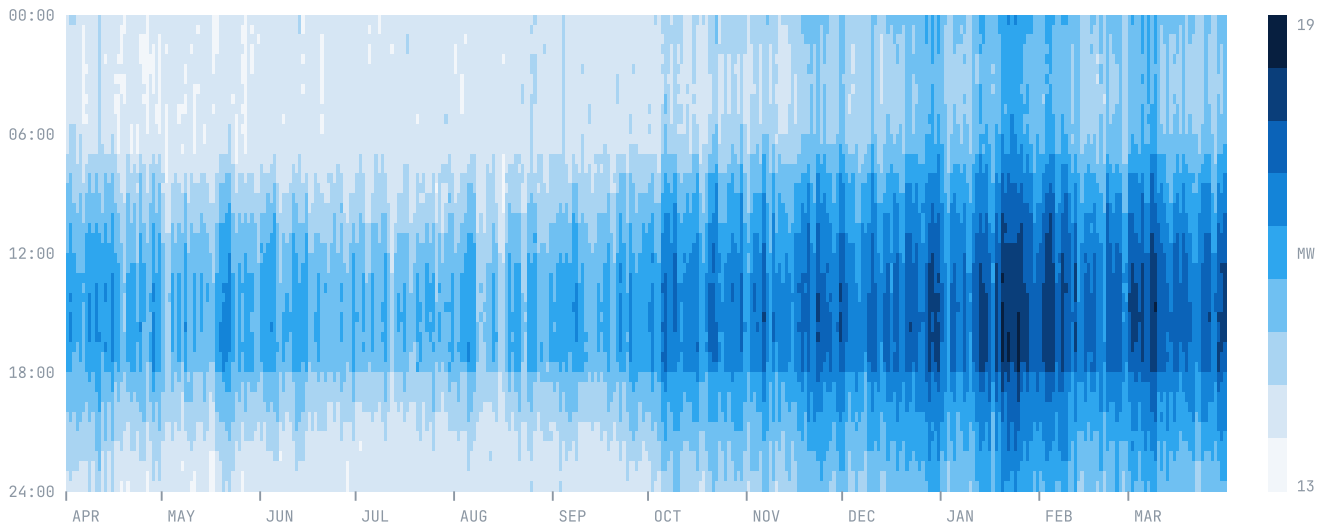
GWH A YEAR

IT halls	102 GWh
Cooling plant	24 GWh
UPS & losses	6 GWh
Offices & services	3 GWh

The IT halls set a floor that never moves. Cooling adds the swing, and the swing sets the demand.

■ FIG 01-1 • EVERY HALF-HOUR OF THE YEAR

GRID DRAW WITHOUT STORAGE • MW



Each column is a day from April 2026 to March 2027, each row a half-hour. There are no weekends and no shutdowns: the darker afternoons are the cooling plant working through the Highveld summer, and the slow darkening across the year is new IT load as the halls fill.

THE BRIEF

Cut the cost of the peak windows without touching the UPS, the tier design or a single customer rack.

THE CONSTRAINT

Capital is approved on payback. Two spare panels on the 22 kV board, one per bus section, outside the secure perimeter.

THE RISK

The recorded peak of 19 639 kVA sits within 2 % of the NMD, and the next hall would push the campus past it.

02 • THE LOAD

Flat by design, swung by the weather.

02

The IT halls draw the same at 03:00 as at 18:00, so the peak windows carry a full share of the load. The cooling plant adds the swing on top, and it peaks in the summer afternoons.

FIG 02-1 • AVERAGE HIGH-SEASON WEEKDAY

JUNE TO AUGUST • MW

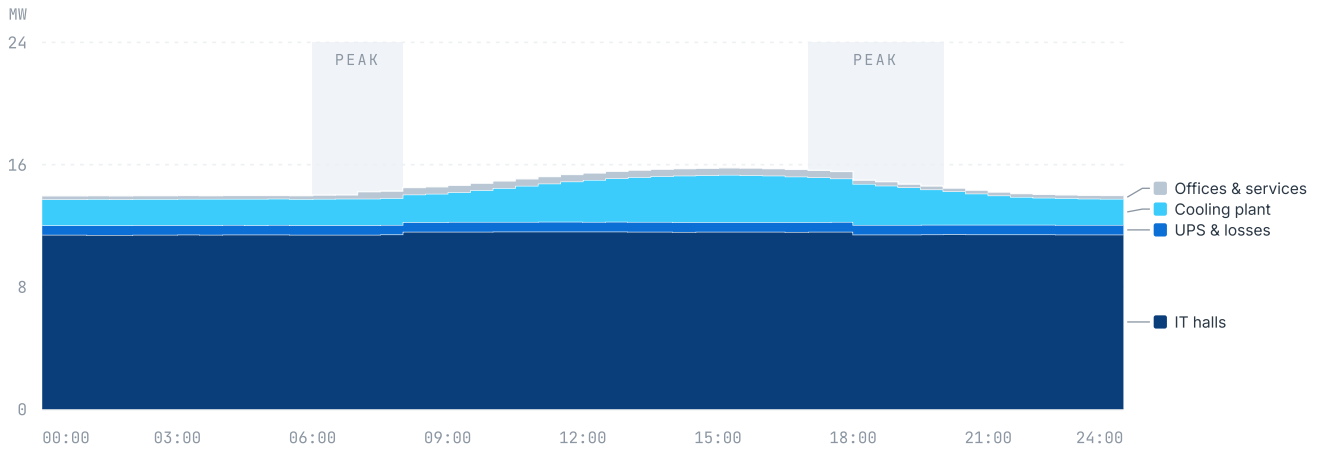


FIG 02-2 • AVERAGE LOW-SEASON WEEKDAY

MW

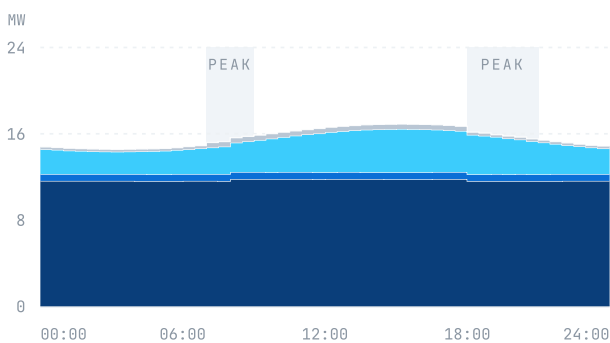


FIG 02-3 • HOTTEST DAY • 25 JAN

PEAK 18.7 MW

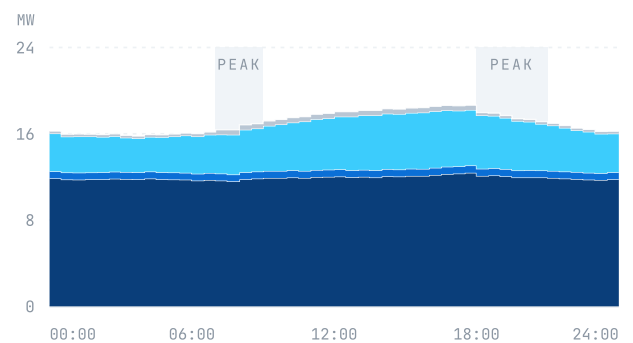
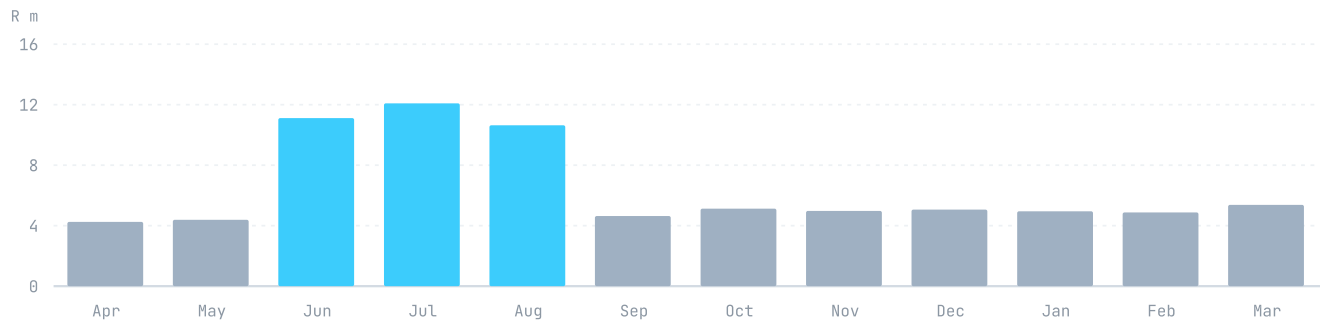


FIG 02-4 • WHAT THE PEAK PERIODS COST, BY MONTH

R M ACTIVE ENERGY, WITHOUT STORAGE



Finding 01

The peaks cannot be moved

Over three quarters of the peak-window load is customer IT. It cannot be shifted or switched off, only supplied differently.

Finding 02

Winter costs 2.4 times more

The same kilowatt-hour costs R7.20 in a June peak and R2.99 in a November one, so the value is concentrated in three months.

Finding 03

Summer sets the demand

Cooling averages 2.2 MW in winter and 3.0 MW the rest of the year. The year's highest half-hour falls on a hot summer afternoon.

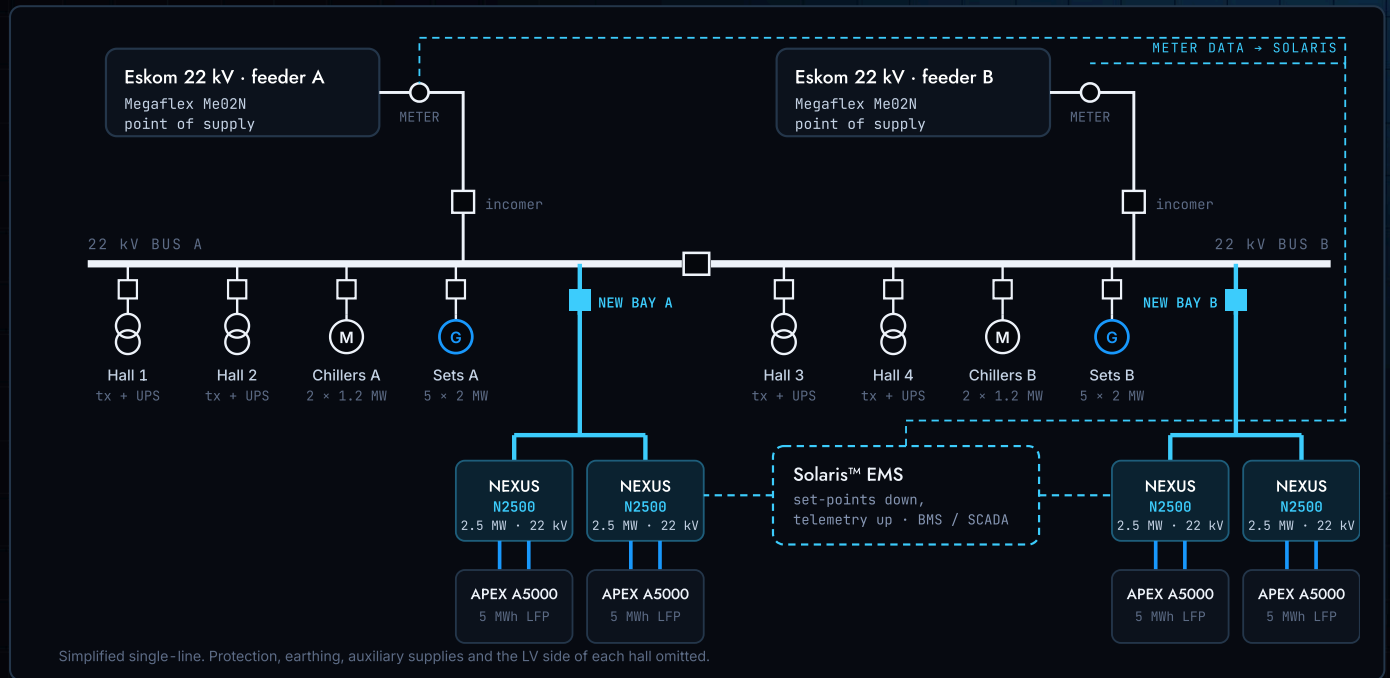
03 • THE PLANT

Four blocks on two spare bays.

Each 22 kV bus section takes two 2.5 MW / 5 MWh pairs. The plant sits upstream of every hall transformer and UPS, behind the Eskom meter, so the supply agreement and the critical path do not change.

FIG 03-1 • SINGLE-LINE, AS CONNECTED

SIMPLIFIED



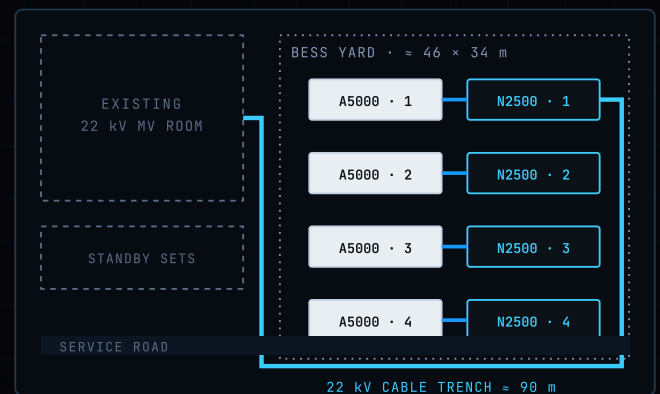
PLANT AT A GLANCE

PER THE RANGE DATASHEETS

Battery	4 × APEX A5000, 20 MWh LFP
Usable	18 MWh at 90 % depth of discharge
Conversion	4 × NEXUS N2500, 48 × 215 kW
Power	10 MW, 11 MVA maximum
Connection	Two 22 kV bays, one per bus
Round trip	≥ 88 % AC-AC
Control	Solaris™ EMS, to the BMS by IEC 104
Footprint	≈ 1 560 m ² fenced yard

FIG 03-2 • THE YARD

INDICATIVE



WHY FOUR BLOCKS

FULL YEAR AT FY2027/28 PRICES • INDICATIVE TURNKEY COST • NPV AT 12 %

OPTION	RATING	22 kV BAYS	CYCLES / YR	GROSS SAVING	PAYBACK	NPV
2 × A5000	5.0 MW / 10 MWh	1	425	R11.7 m	2.8 yrs	R73 m
4 × A5000 ♦	10.0 MW / 20 MWh	2	365	R21.9 m	2.8 yrs	R140 m
6 × A5000	15.0 MW / 30 MWh	3	286	R25.9 m	3.5 yrs	R145 m

Two blocks pay back as fast but leave half of each peak on the bill and earn R10 m a year less. Six blocks cannot refill at midday without crossing the 17.4 MW ceiling, so they cycle less and need a third bay. Four blocks fill both bus sections and earn the most per rand. ♦ Selected.

04 · HOW IT RUNS

Two cycles in winter, one in the summer heat.

Solaris discharges through both peak windows and recharges at midday without crossing a 17.4 MW ceiling. In summer the chillers leave less room to recharge, so the plant cycles once and guards the ceiling.

FIG 04-1 · WEDNESDAY 15 JULY 2026 · HIGH SEASON

MODELLED · MW

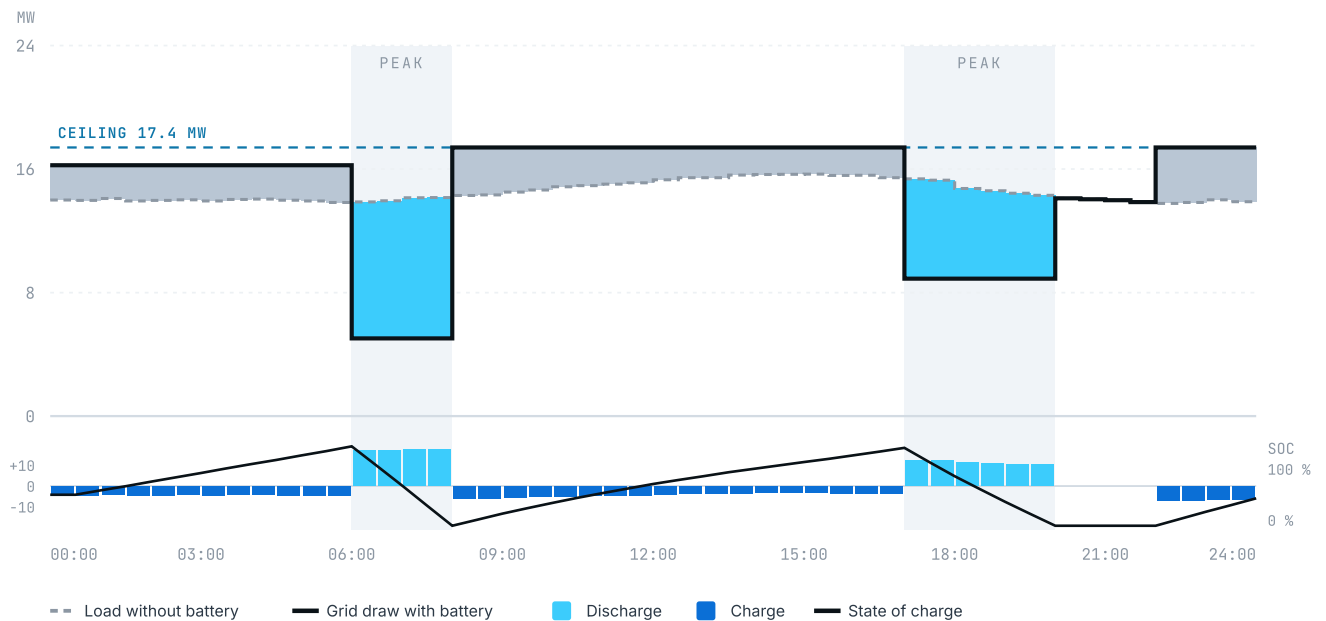
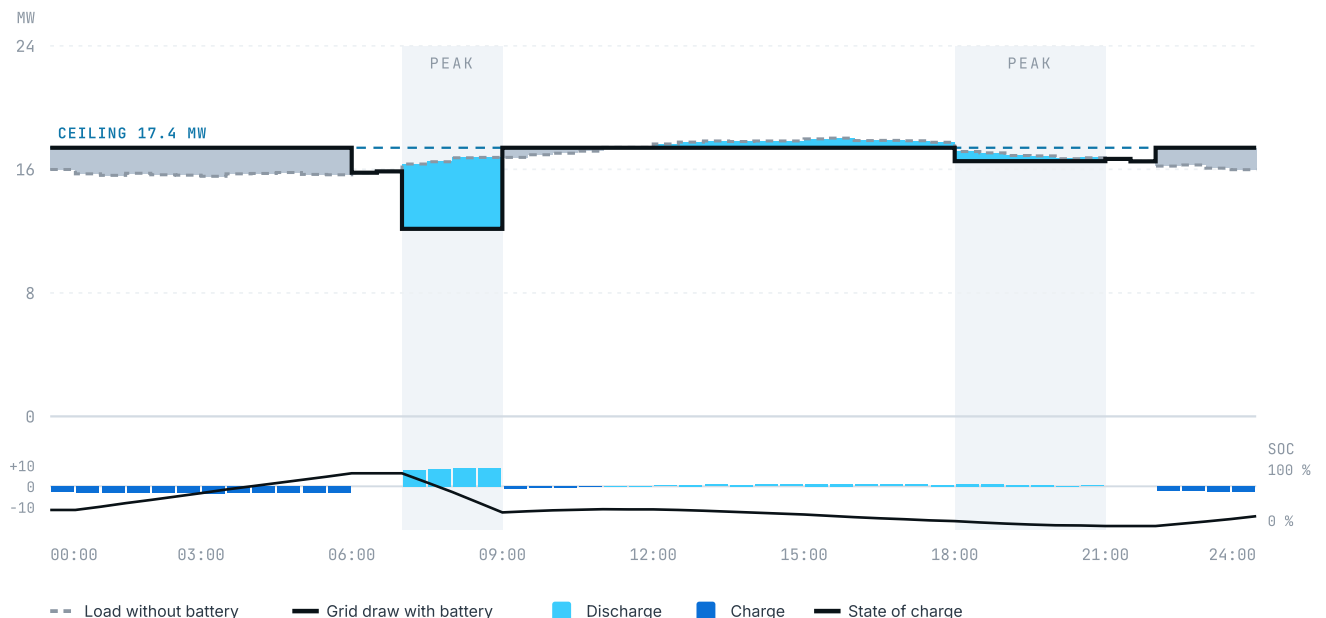


FIG 04-2 · WEDNESDAY 13 JANUARY 2027 · SUMMER, LOW SEASON

MODELLED · MW



Cyan: energy the battery supplies, so the campus does not buy it. Grey: energy bought to recharge, at off-peak or standard prices and never above the ceiling. In January the midday recharge is small, and Solaris spends it holding the line. Lower strip: battery power (± 10 MW) and state of charge. Weekends: held full as reserve.

365

EQUIVALENT FULL CYCLES A YEAR

6.6 GWh

DELIVERED FROM THE BATTERY

1.9 per day

WEEKDAY CYCLES, WINTER

17.4 MW

CEILING, ALL YEAR

05 • THE BILL

R21.9 m a year, from four lines.

05

Nearly nine tenths of the saving is energy moved out of the peak. The lower notified demand adds the rest, or stays in hand as room for the next hall.

FIG 05-1 • WHERE THE SAVING COMES FROM R m, FY2027/28

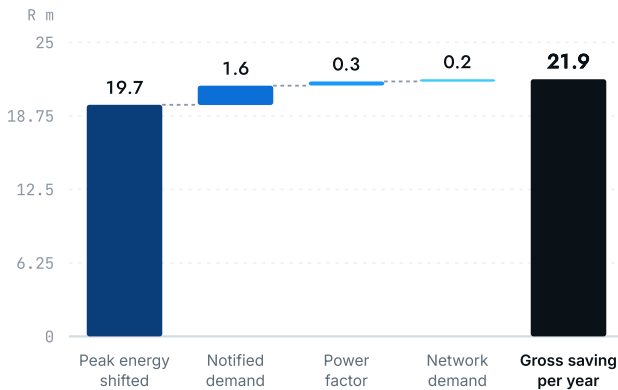
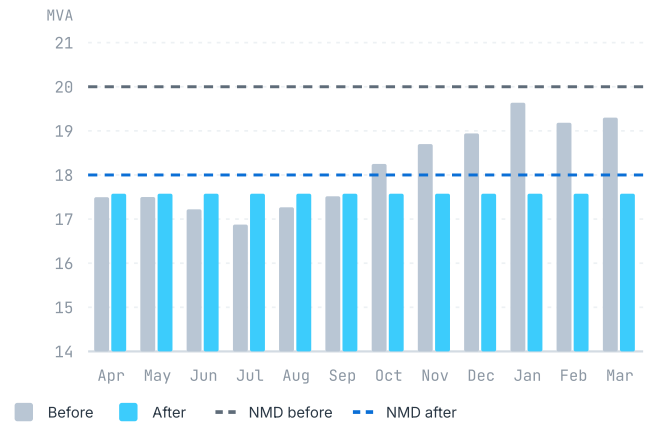


FIG 05-2 • MONTHLY PEAK DEMAND

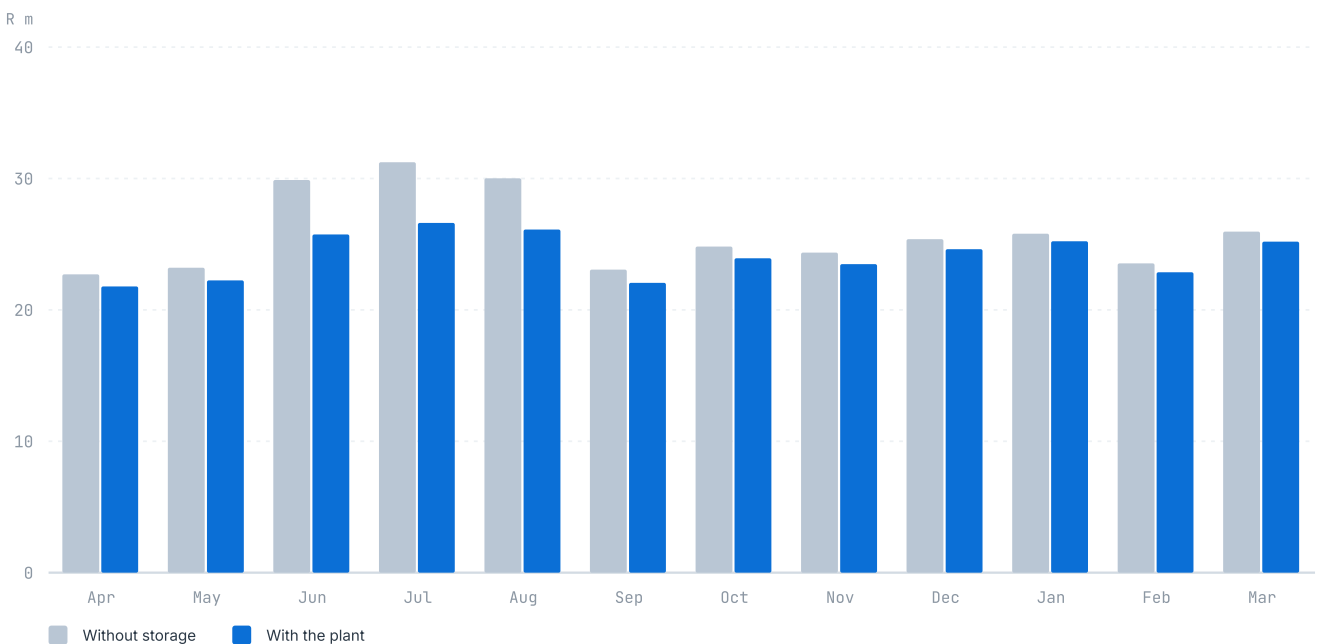
MVA, ANY HOUR



VALUE STREAM	HOW IT IS EARNED	PER YEAR
Peak energy shifted	Peak kWh bought at off-peak and standard prices, net of 12 % losses	R19.7 m
Notified demand	NMD renewed at 18 000 kVA: generation, network and transmission capacity	R1.6 m
Power factor	PCS holds 0.99 at the board; high-season reactive charge falls away	R0.3 m
Network demand	Monthly peak in chargeable periods held under the ceiling	R0.2 m
Total		R21.9 m

FIG 05-3 • MONTHLY BILL, BEFORE AND AFTER

R m EX VAT, FY2026/27 RATES



Bills are rebuilt line by line from the Megaflex schedule (500 V – 66 kV, zone 0): active energy by period and season, legacy, subsidy and ancillary charges, capacity charges on the notified demand, network demand on the monthly chargeable maximum, reactive energy in the high season and daily service charges. The notified-demand saving starts in year two, once the reduction is accepted at renewal. Keeping the 20 MVA instead leaves about 1.5 MW of new IT load inside it. A wheeled solar contract does not reach the evening peak, so this case holds with or without one. Diesel saved is not counted.

06 · FIFTEEN YEARS

Less than four years to pay back. Then it saves.

06

The operator buys the plant turnkey and we run it. The saving rises with the tariff, which has outpaced inflation for fifteen years; O&M and one augmentation block are the only costs after day one.

<4 yrs

SIMPLE PAYBACK

39 %

PROJECT IRR

140 Rm

NPV AT 12 %

8.4 x

THE INVESTMENT, RETURNED

FIG 06-1 · SAVING, RUNNING COSTS AND CASH RETURNED

NOMINAL R M · TARIFF +8.83 % IN YEAR ONE, THEN 7 % A YEAR

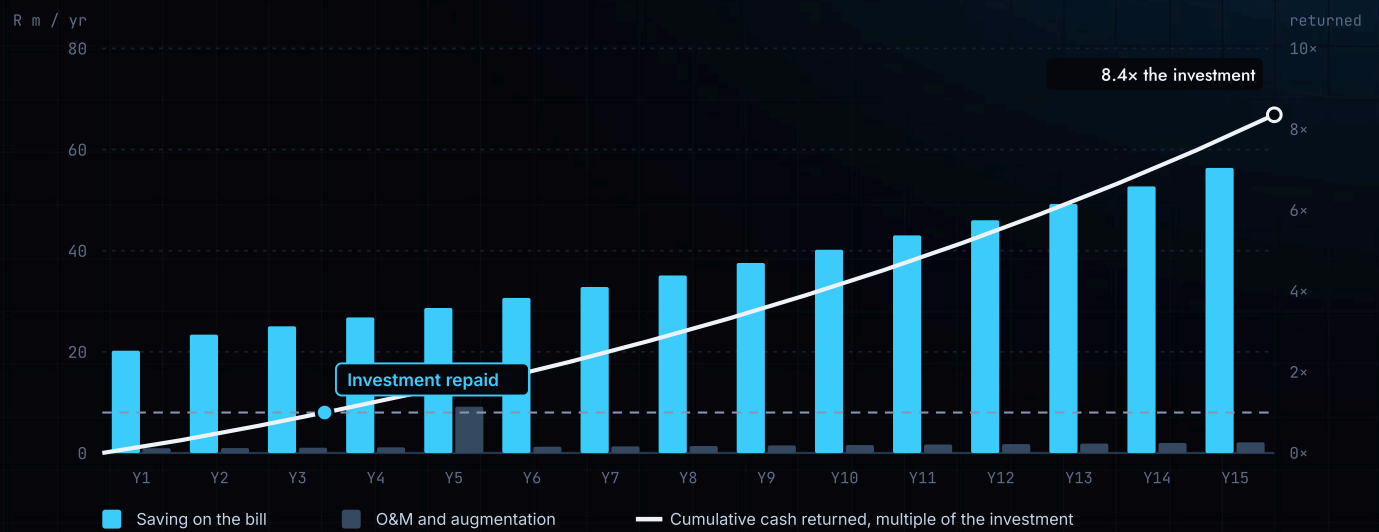


FIG 06-2 · WHAT MOVES THE NPV

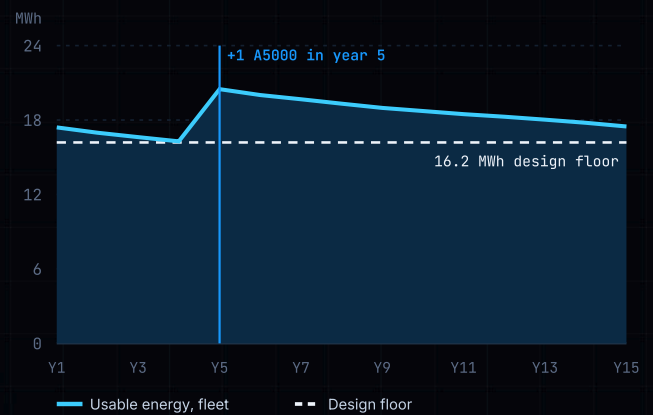
R M AT 12 %



Even the worst single case leaves an NPV of R111 m.

FIG 06-3 · USABLE ENERGY

MEASURED CURVE · MWh



On the cell maker's measured curve at 1.00 cycles a day. One more A5000 in year 5 keeps the fleet above 16.2 MWh for the term.

INDICATIVE OWNERSHIP TERMS

FINAL TERMS IN THE SITE PROPOSAL

Structure	Turnkey supply, install and commissioning
Ownership	The operator, from commissioning
O&M	15-year service agreement, AMPROTEQ
Availability	≥ 97 %, measured monthly

Capacity	Tested yearly; ≥ 16.2 MWh usable
Augmentation	One A5000 in year 5, in the plan
Monitoring	Solaris, 24 / 7, to the BMS and NOC
Alternative	Service agreement: fixed monthly fee

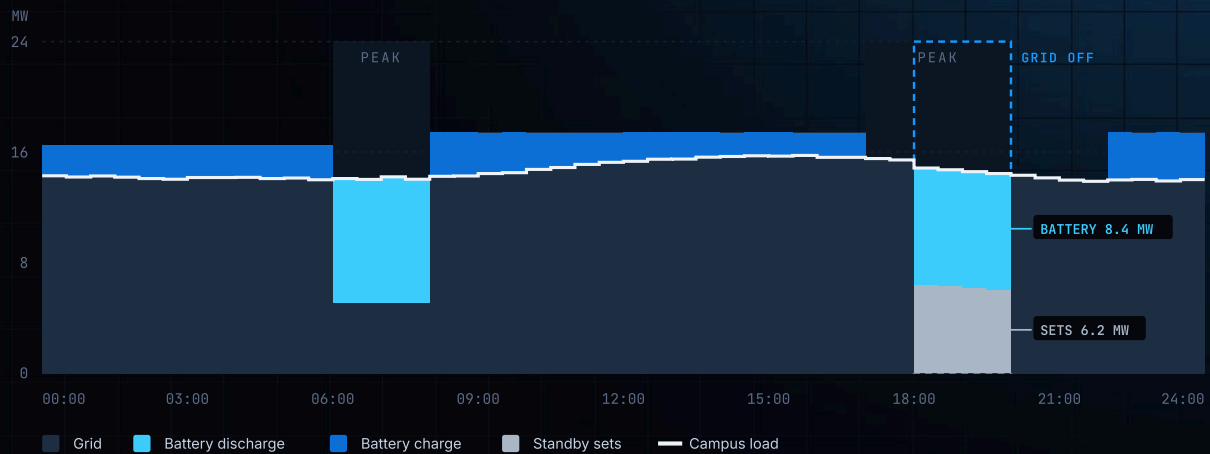
07 · RESILIENCE & DELIVERY

When the grid goes, the sets do less.

The UPS and the sets keep their roles. On a published outage Solaris holds the charge, and once the sets have taken the 22 kV bus the battery carries part of the campus beside them.

FIG 07-1 · A SCHEDULED OUTAGE, TUESDAY 14 JULY: GRID OFF FROM 18:00 TO 20:00

MODELLED · MW



LAYER	CARRIES	IN THIS PLANT
UPS	The IT load, from the first millisecond	Unchanged
Standby sets	The whole campus, for as long as there is fuel	Start on every outage, as now
APEX + NEXUS	Shares the campus load with the sets; carries curtailment alone	New

≈ 4 100 litres

DIESEL SAVED PER BLOCK

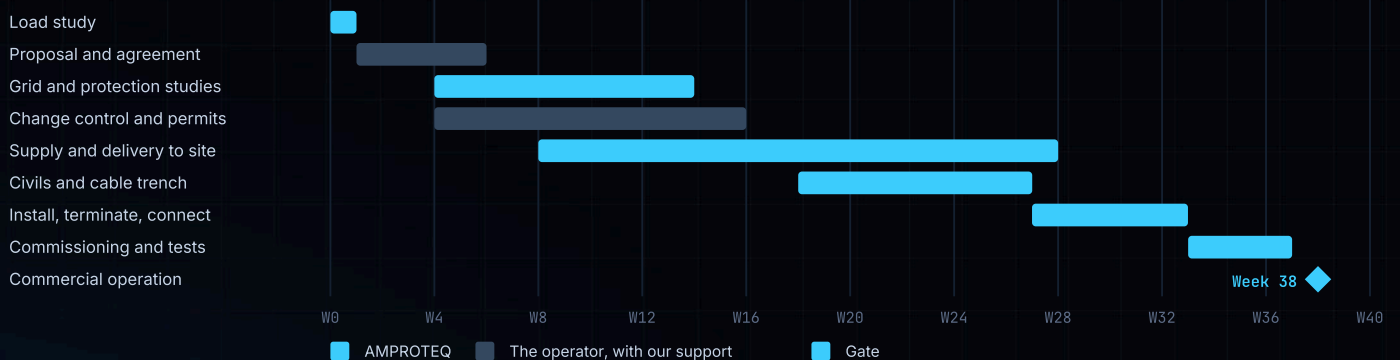
57 %

LOAD ON THE BATTERY

Against ≈ 10 500 litres with the sets alone. All ten sets stay on line, as the site's rules require; each runs lighter. Fuel on a generic set curve. A two-hour curtailment of 3 MW needs no set at all.

FIG 07-2 · FROM LOAD STUDY TO COMMERCIAL OPERATION

INDICATIVE, WEEKS



Your campus, your numbers.

Send twelve months of half-hour data, your tariff, your NMD and your standby plant. Within five working days we return the sizing, the dispatch, the bill before and after, the fuel saved and the payback.

info@amproteq.energy

+27 82 552 6696 · amproteq.energy

Grid-code or protection change

Studies before order; settings agreed with your engineer

Work near live halls

Yard and cable outside the secure perimeter; change control

Cell ageing

Measured cell data; augmentation in the plan from day one

AMPROTEQ (Pty) Ltd · Agone House, 53 Adriana Crescent, Gateway Industrial Park, Centurion 0157. Illustrative case on a composite site; not a client project and not an offer. Modelled with Eskom's Schedule of Standard Prices 2026/27 (Megaflex, 500 V – 66 kV, zone 0) and APEX A5000 / NEXUS N2500 ratings. Tariff escalation beyond 2027/28, the installed cost, the set fuel curve and all site data are assumptions.