



Brightspace | stratcon.ph

Fast Tracking Energy Efficiency Projects through IoT: An HVAC Case Study

EEAP Webinar 31, hosted by Energy Evaluation Asia Pacific

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Moderator: Dr Edward Vine

brightspace.ai / stratcon.asia

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THE CONTEXT | SOUTHEAST ASIA

Cooling is the fastest-growing use of energy in Southeast Asia's buildings.



80 → 300 TWh

Cooling electricity in
ASEAN buildings
2020 to 2040 (projected)

Up to 50%

of building energy goes
to HVAC
Singapore

Up to 30%

of peak power demand
from cooling
Southeast Asia, 2040
(projected)

Since 2023, tariffs have risen in several of the region's largest markets.

VIETNAM

+18%

Average retail price, four
rises since 2023 (EVN)

MALAYSIA

+14.2%

Base tariff from July 2025
(TNB)

SINGAPORE

+17.5%

Average tariff in Q3 2026,
partly reversed in Q4 (SP
Group)

PHILIPPINES

+35%

Meralco household rate
since Jan 2023. Highest in
Southeast Asia, June 2026
(DOE)

Sources: IEA, *The Future of Cooling in Southeast Asia* (2019); IEA, *ASEAN cooling roadmap* (2022); IEA, *Southeast Asia Energy Outlook 2024*; NCCS and NRF Singapore, citing NEA; EVN; TNB; SP Group; Meralco; DOE Philippines (July 2026).

THE PROBLEM | INSIDE THE BUILDING

Most buildings cool and ventilate for people who are not there.

01 The plant runs to a schedule

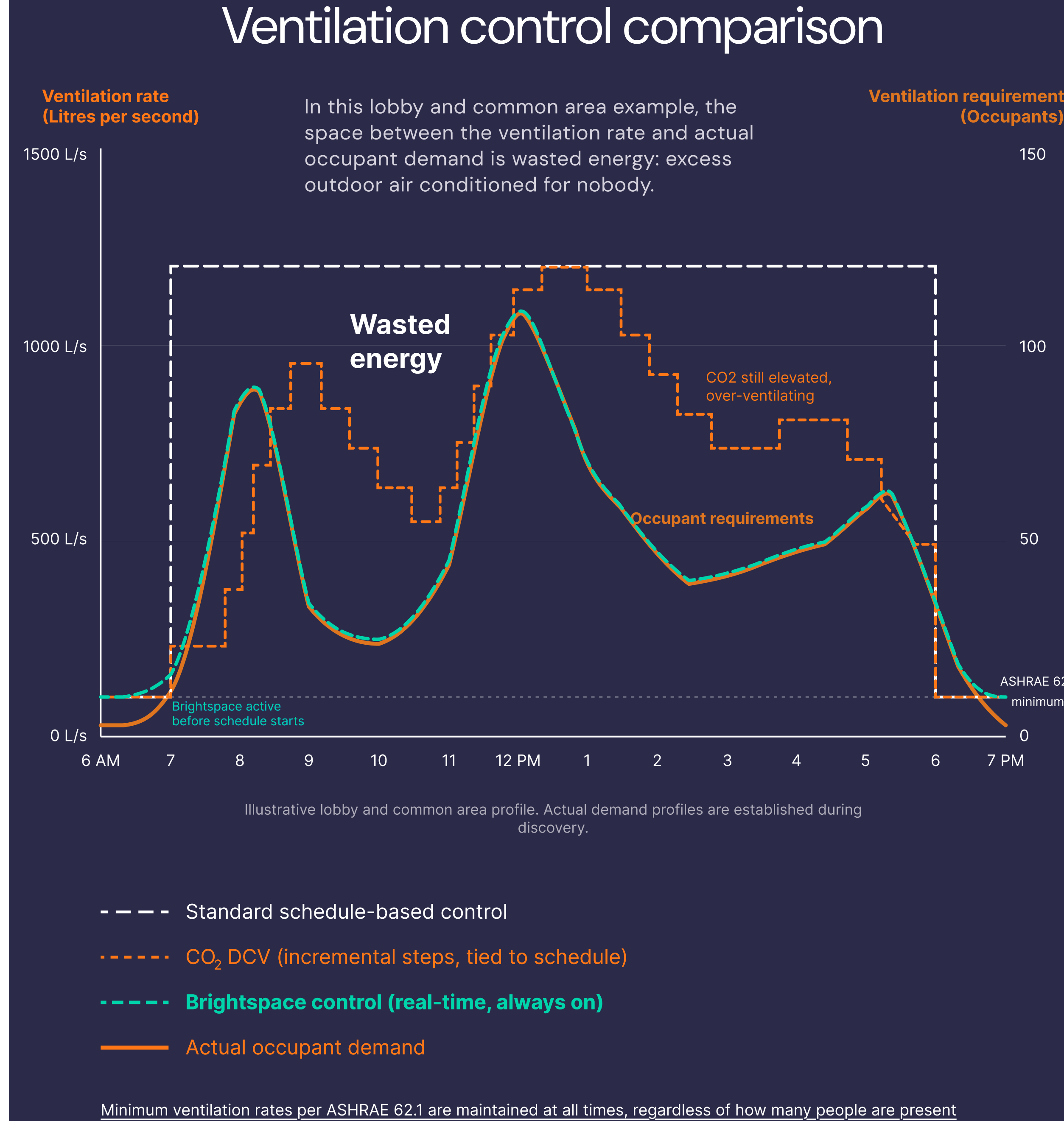
An airport terminal ran its HVAC from 04:00 to 21:00 every day, whatever the flight schedule. A convention room booked for 400 people held about 150 for most of the day.

02 Building controls cannot see people

The building management system (BMS) sees time, temperature and sometimes CO₂. CO₂ rises after people arrive, so ventilation follows the room late and keeps running after people leave.

03 Few buildings measure what they save

Energy Evaluation Asia Pacific (EEAP): efficiency investments are delayed by “reliance on estimated rather than continuously measured data.”



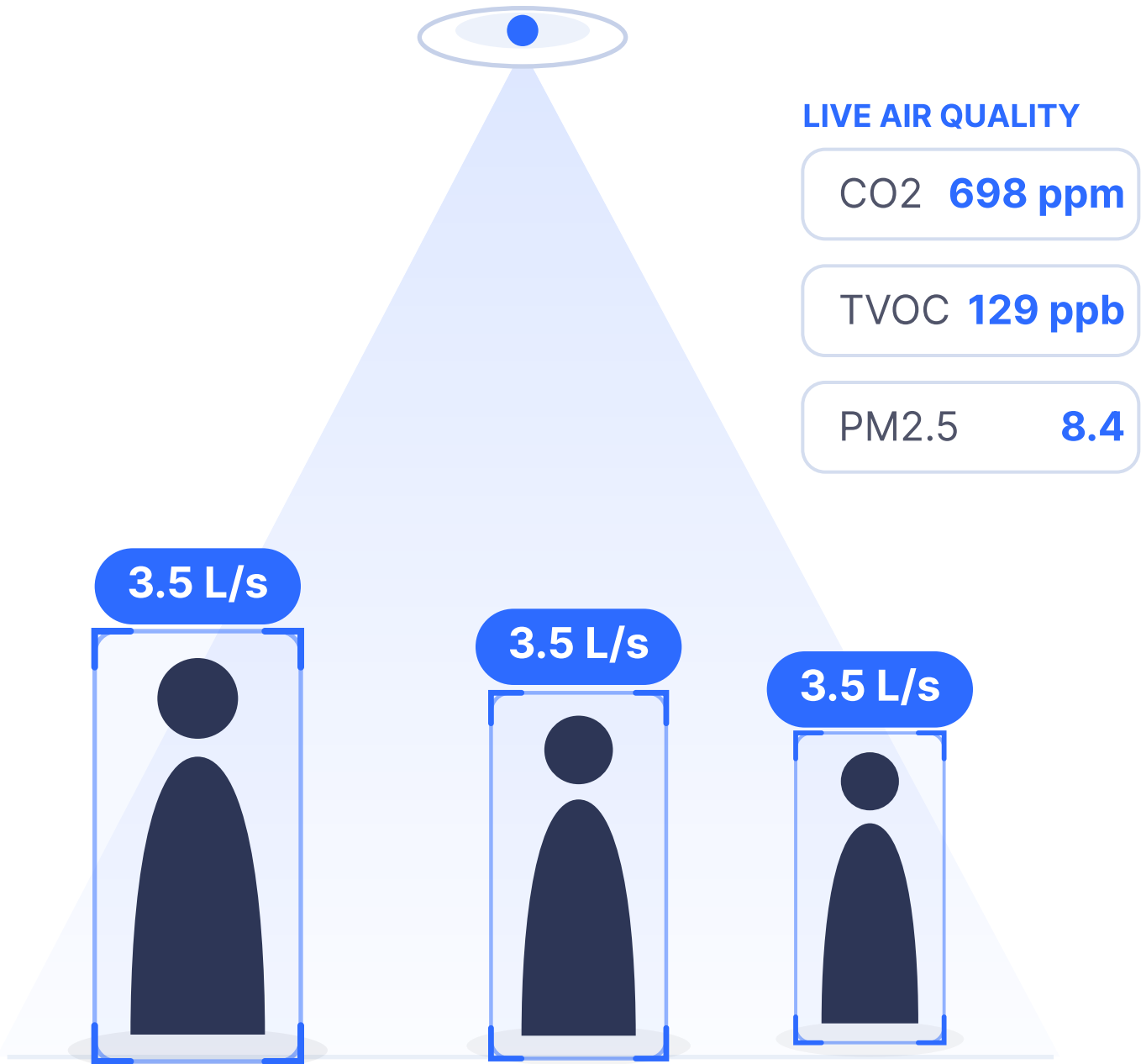
WHAT BRIGHTSPACE DOES

Brightspace makes your HVAC
respond to people, not schedules.

Purpose-built edge-AI sensors track every occupant in every zone and measure air quality, in real time, anonymously and on the device. The live digital twin then gives each zone the cooling and airflow it needs, through the BMS you have, or direct to the plant.

TWO OUTCOMES FROM ONE PLATFORM

HVAC energy savings that pay for the system, and an operational data layer of footfall, space utilisation and air quality from day one.



Founded in 2020. Commercial HVAC deployments since 2024.

How it works.

Sense, model, predict, act.



----- The twin measures the result and corrects, continuously. -----

- No BMS replacement
- No new plant
- Our own wireless mesh, no building Wi-Fi or IT integration

Purpose-built hardware, with privacy by design.

PRIVACY BY DESIGN

On-device processing. No video or identity stored or sent.

OCC-010 OCCUPANT TRACKER

Ceiling mount. 200 m² coverage. Built-in CO₂ sensor.

EVM-005 ENVIRONMENTAL MONITOR

Wall mount. 13 air quality metrics, including CO₂, TVOC and PM2.5.

GWB-002 GATEWAY

Connects to the BMS by BACnet, Modbus or REST API.

SEPARATE NETWORK

Own wireless mesh. No connection to corporate IT or Wi-Fi.

5-year warranty. 10-year design life. Factory calibrated.



EVM-005 Environmental Monitor

OCC-010 Occupant Tracker

Shellharbour Airport.

Sub-12-month return on investment.

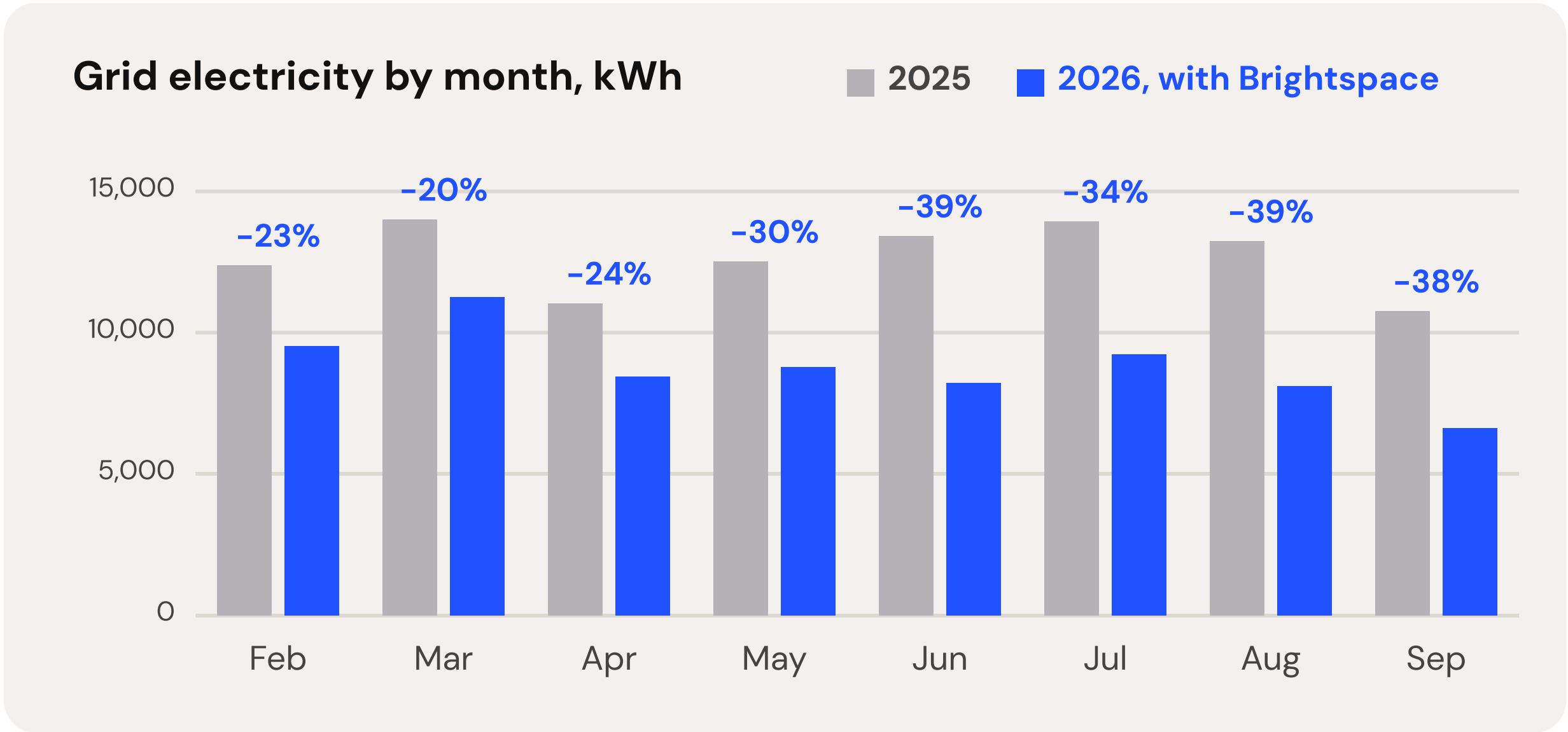
FEBRUARY TO SEPTEMBER 2026 vs 2025, AS BILLED

30.7% less grid electricity

40.1% lower electricity cost

32% less carbon (Scope 2, CO2-e)

5x return on capital.



Same airport. Same flights.

The plant runs 9 hours, not 17.

BEFORE

A fixed schedule for every possible flight

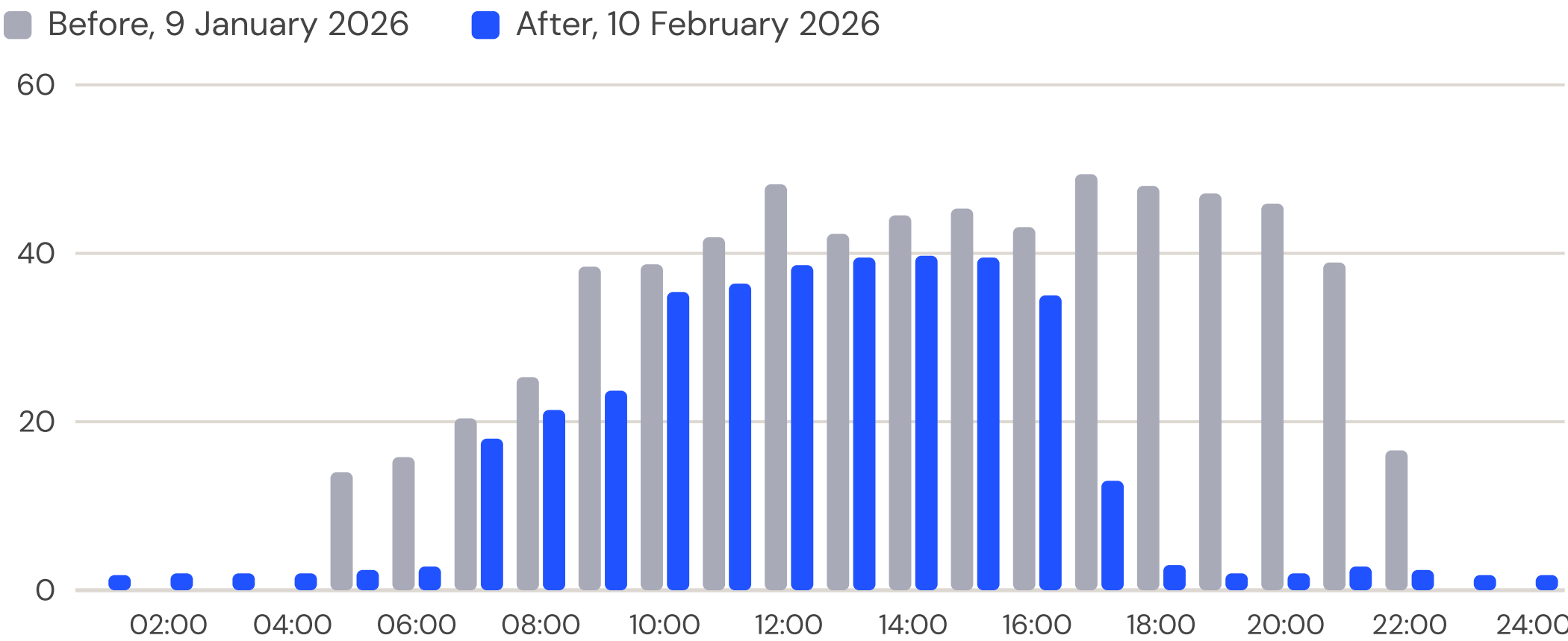
The plant ran 04:00 to 21:00, every day of the week.
~17 hours a day, whether a flight was due or not.

NOW

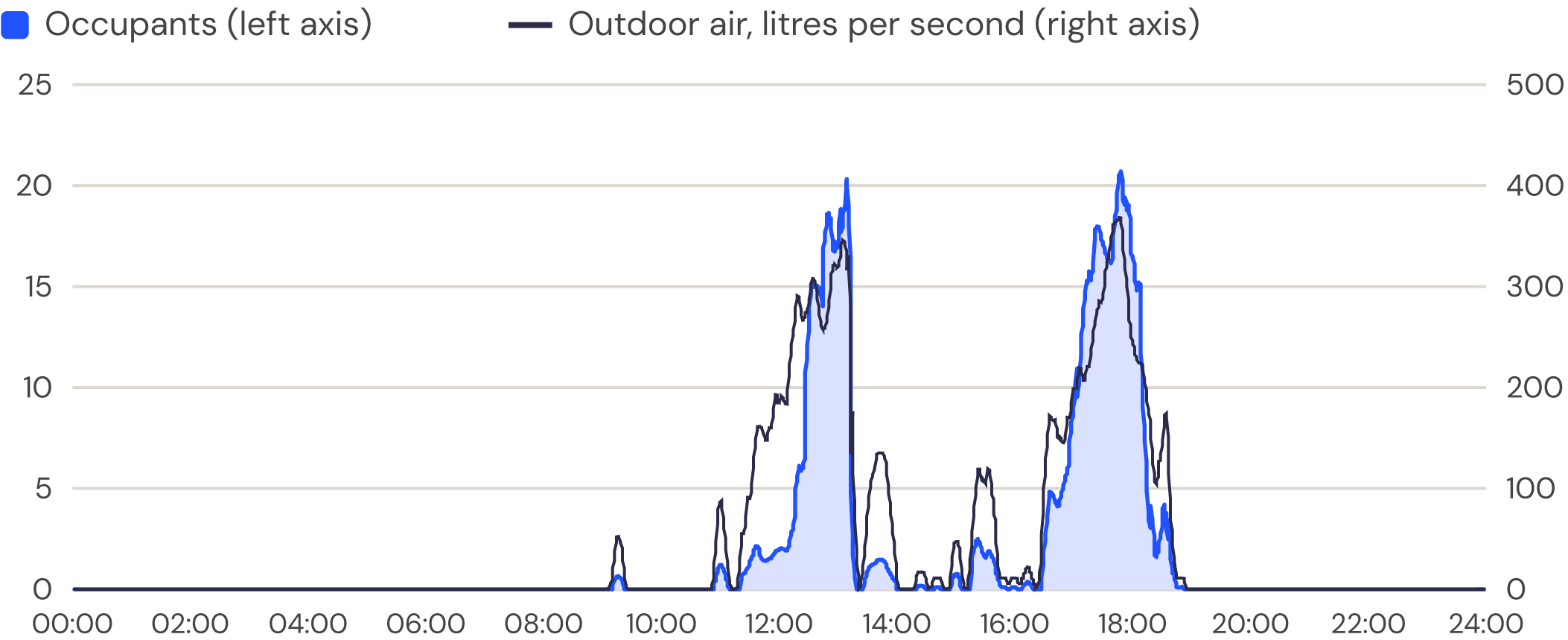
A rolling schedule, set by the people inside

The first person in starts the plant. It stops 15 minutes after the last person leaves. Lowering run time to ~9 hours a day.

Hourly HVAC energy, kWh. One warm day before and one after.



One flight day, 8 February 2026: occupants tracked and outdoor air delivered



ICC Sydney.

Trial zones: 45% less fan and cooling electricity.

45%

Fan + cooling down

Matched periods to Aug 2026

62%

Fan electricity down

Matched periods to Aug 2026

96%

Time in the 20 to 24 °C band

Comfort held through event peaks

99.9%

Time below 1,000 ppm

CO2, all trial zones

Stage 1 deployment (5,500 m²). Operators also get live crowd-flow data.



Previously driven by a bookings calendar. Now driven by occupants, in real time.

THE CALENDAR

The control ran on bookings

Rooms were pre-cooled and ventilated for the booking, all day.



OCCUPANT TRACKING

Every occupant, every zone

Booked for 400. About 150 measured in the room for most of the day.

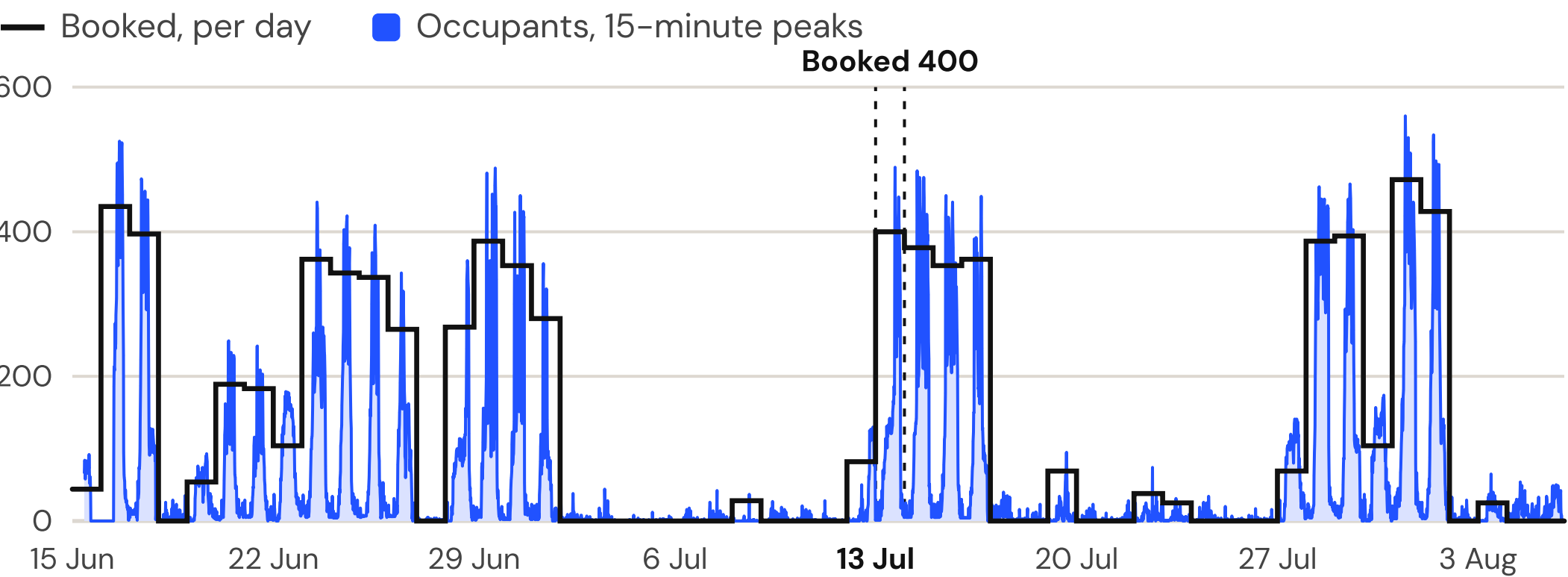


THE RESPONSE

Air goes where people are

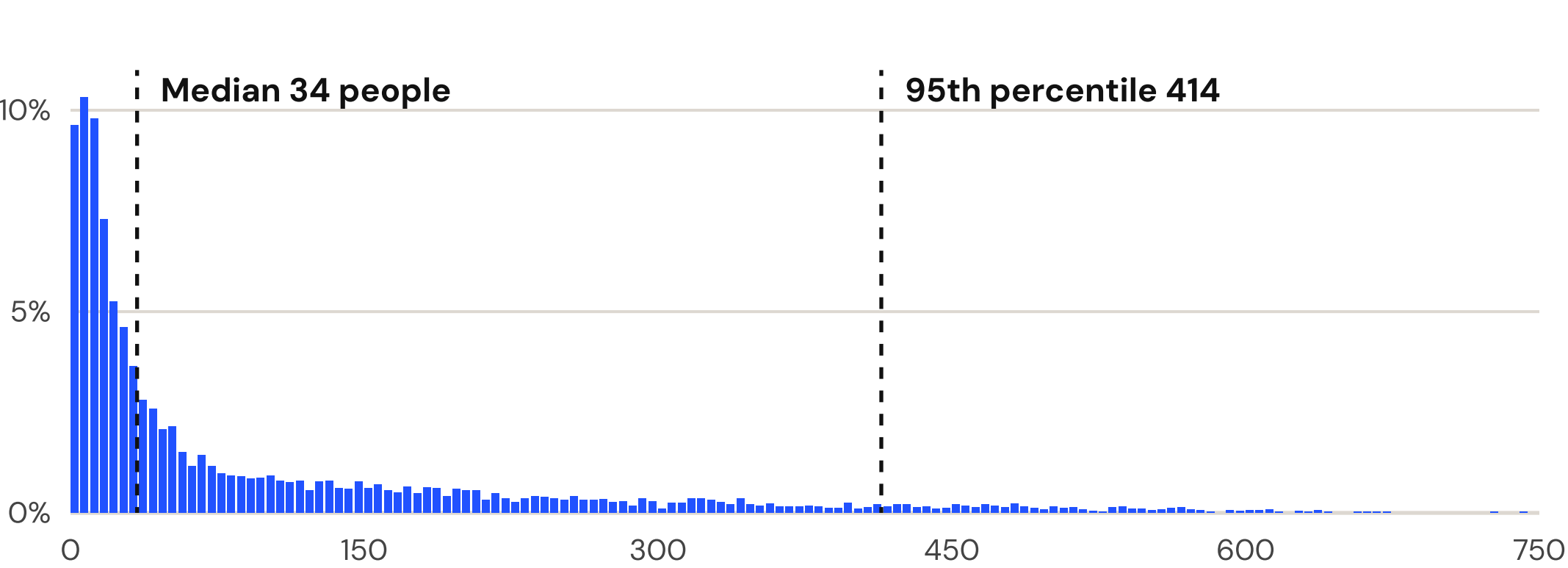
Cooling and airflow where they are needed, through the existing BMS.

Gallery: above the booking for minutes, below it for hours



Bookings from the venue calendar. Occupants from Brightspace tracking, 15 June to 5 August 2026.

How often one area holds how many people



People on site, 15-minute peaks. Share of time in 5-person bins, 15 June to 5 August 2026.

Fan electricity fell 62%.

One manual override raised fan power 4.9 times.

INTERIM M&V | MATCHED PERIODS TO AUGUST 2026

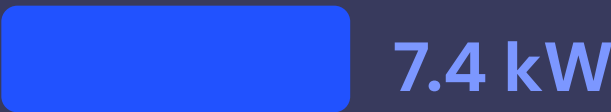
	2025	2026	Change
Fan electricity	12,718 kWh	4,841 kWh	62% lower
Cooling electricity	276 kWh	2,277 kWh	+2,001 kWh
Total, fan + cooling	12,994 kWh	7,118 kWh	45% lower

5,876 kWh and 3.76 t CO2-e avoided. Cooling baseline is provisional; heating is separate.

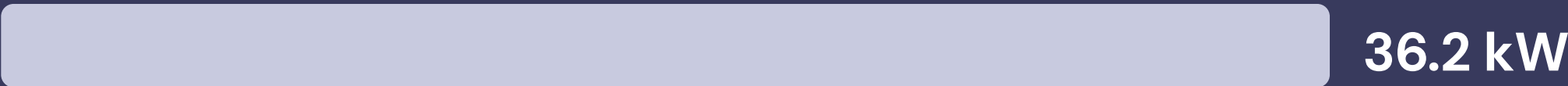
SAME EVENT DAY | 15 AUGUST 2026

4.9× more fan power
when site staff overrode the optimised control in the BMS.

Optimised control, 08:30 to 16:00



Manual BMS override, 17:00 to 18:30



Fan power rises with the cube of fan speed: 80% speed draws about 51% of full power.

ROOM CONDITIONS

41%
fewer AC requests
16.9 to 10 a month, Jun to Aug 2026

21.7 to 22.2 °C
Level 2, all day on 15 August
ICC criterion: 21 to 23 °C

799 ppm
CO2 with 548 people on site
ICC limit: below 900 ppm

WHAT IT MEANS FOR AN OWNER

Capex pays back in 12 to 24 months.

Opex needs no capital.

Capex (capital expenditure) or opex (operating expenditure): both paid from the savings, both metered.

CAPEX

YOU OWN IT

Return on investment in 12 to 24 months

YOU PAY	Hardware, installation and licence, up front.
YOU KEEP	All of the savings, from day one.
PAYBACK	12 to 24 months. Under 12 months at Shellharbour.

OPEX

WE FUND IT

No upfront cost. Savings from the first month.

YOU PAY	Nothing up front. A monthly fee, paid from the savings.
YOU KEEP	A guaranteed saving, plus a share above it.
FUNDED BY	Brightspace and its deployment finance partners.

TYPICAL COST

SGD 2 to 8

per m² per year

TYPICAL SAVINGS

SGD 8 to 22

per m² per year

Fast tracking; achieve more sooner through Measurement, Not Estimating

Smart power monitoring as Step Zero brings measurable benefits forward from Year 7+ to Week 4, and puts every later decision on evidence

EXHIBIT | Time-to-benefit: audit-led vs measurement-first

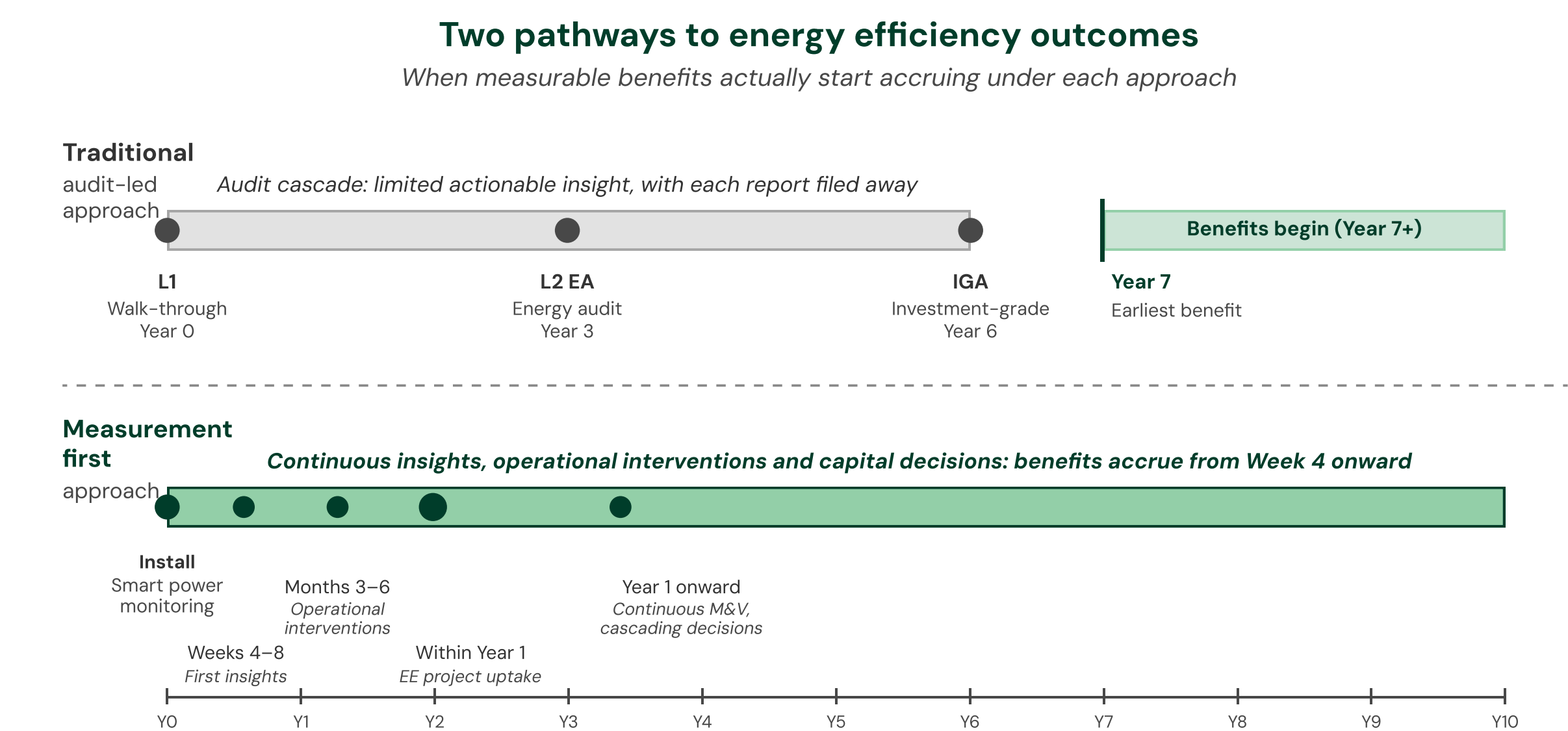


Figure 1. Time-to-benefit under the traditional audit-led approach versus the measurement-first approach. Stratcon analysis.

So what: the audit cascade produces reports, not results. Measuring first means the facility starts saving while the business case is still being written, and the IGA arrives with a baseline already in hand.

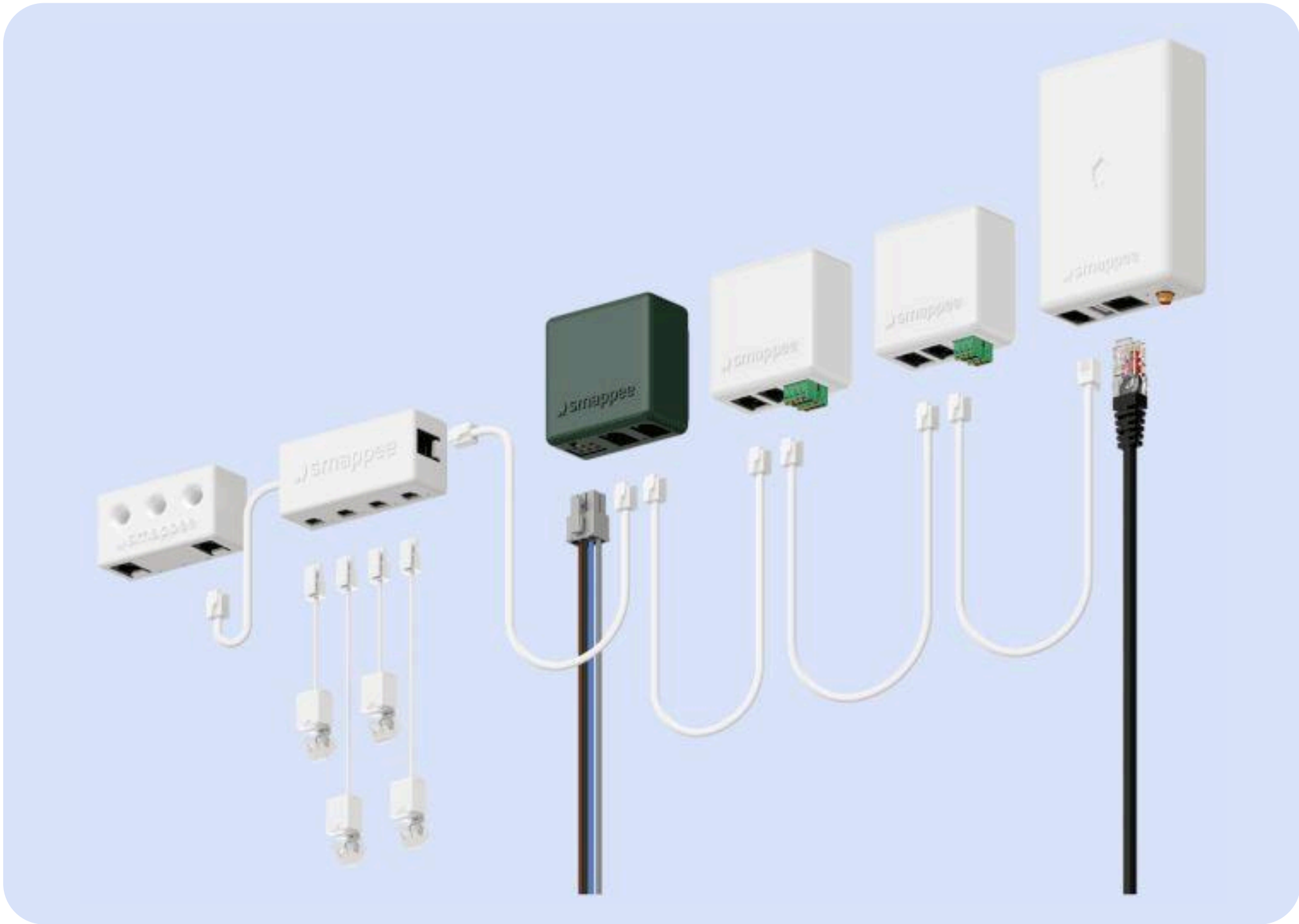
Why smart power monitoring must be Step Zero

- 1 Visibility from day one, not year seven**
Managers get immediate insight, and FMs see daily performance (or the lack of it) instead of a report filed away.
- 2 Data quality is what makes AI work**
AI diagnostics are only as good as the data beneath them. Accurate, continuous measurement is the real asset.
- 3 Cost is no longer the barrier**
IoT manufacturing has eroded hardware costs and AI has eroded software costs and barriers. The choice now is a stable, accurate, sustainable data source, local or online.
- 4 Baseline every CAPEX-heavy asset**
Continuous monitoring tracks equipment over time and shows whether a full retrofit is truly needed, or whether an operational fix will do, or another alternative, for example Brightspace.ai.
- 5 Less grey, stronger evidence for savings**
A measured baseline narrows the room for ESCO error or gaming. Once the IGA is approved the retrofit can proceed, and IPMVP draws on longer data that captures real seasonality.

Comprehensive smart power monitoring.

Modular, scalable, cost efficient.

European made, Smappee provides the best value for money in comprehensive smart power monitoring.



Smappee Infinity. Gateway, power modules and CT clamps.

PLATFORM

- Modular
- Cost efficient
- Management and control
- Scalable
- Simple to complex

METERING

- Water, gas and other inputs
- 28 loads per unit and 17 virtual loads
- 50A to 10,000A CT / Rogowski coils
- Class A billing option

DATA AND LICENCE

- Remote monitoring
- 4 choices to connect
- FREE basic user licence for 5 years
- 2 days local data storage
- API data grab options

Tailored data access and visualisation.

Actionable data in the right format.

A variety of ways to connect to and visualise the data, for easy and affordable integration.

01



Smappee Dashboard

Web dashboard

02



Smappee App

Mobile app

03



Smappee API

API data access

04



Smappee MQTT

Real time data stream

05



MODBUS ready

Direct to BMS and controls

Five routes into the same metered data. Choose the one that fits the site and the team.

WHAT THE DATA DOES FOR A BUILDING

The same sensors that cut the HVAC bill run the building better.

Occupant tracking and live air quality data, per zone and per second, for every team. No extra hardware.

ARRIVALS AND QUEUES

See the peak before it forms

Live counts at entries, check-in and security lanes.

CLEANING

Clean where people have been

Footfall per washroom and per zone starts the cleaning round.

STAFFING

Roster to the real curve

Hour-by-hour profiles per zone, by weekday and by season.

SPACE AND BOOKINGS

Measure how each space is used

Actual people against bookings in halls, meeting rooms and tenancies.

COMFORT AND AIR QUALITY

Prove the space was comfortable

Temperature, humidity and CO₂ kept in band, with a record for every complaint.

SECURITY AND SAFETY

Know how many people are inside

Anonymous headcount for evacuation and capacity limits.





Edge-AI building intelligence.

Connect with us to learn more



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