



ENERGY MANAGEMENT SYSTEM

Your plant's energy, all on one screen.

Apex watches your generators, solar, utilities and production lines at once. It shows you what's running, what it costs, and where money is slipping away.

Live

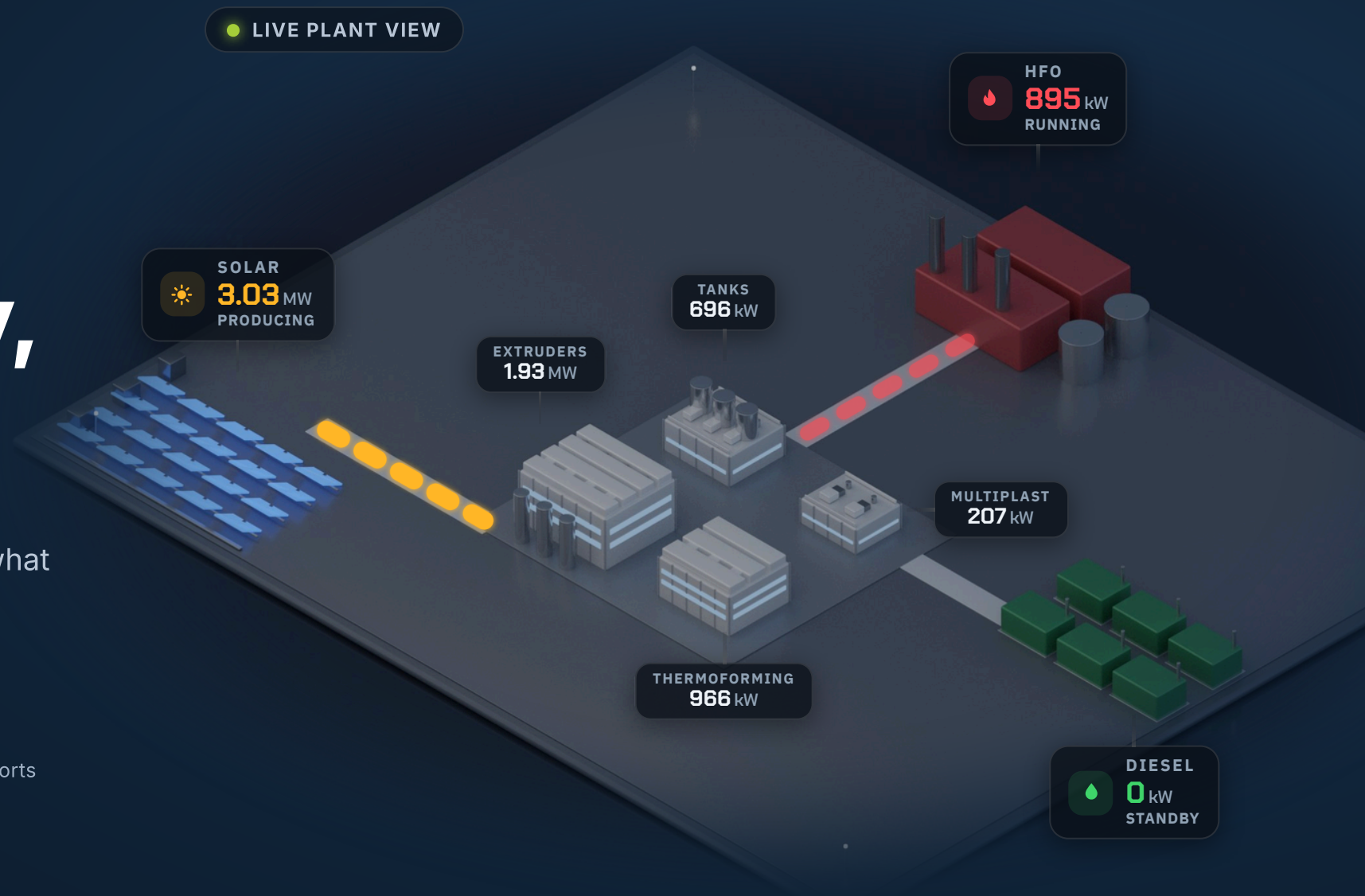
readings as they happen

Any brand

works with what you have

24/7

alarms & reports

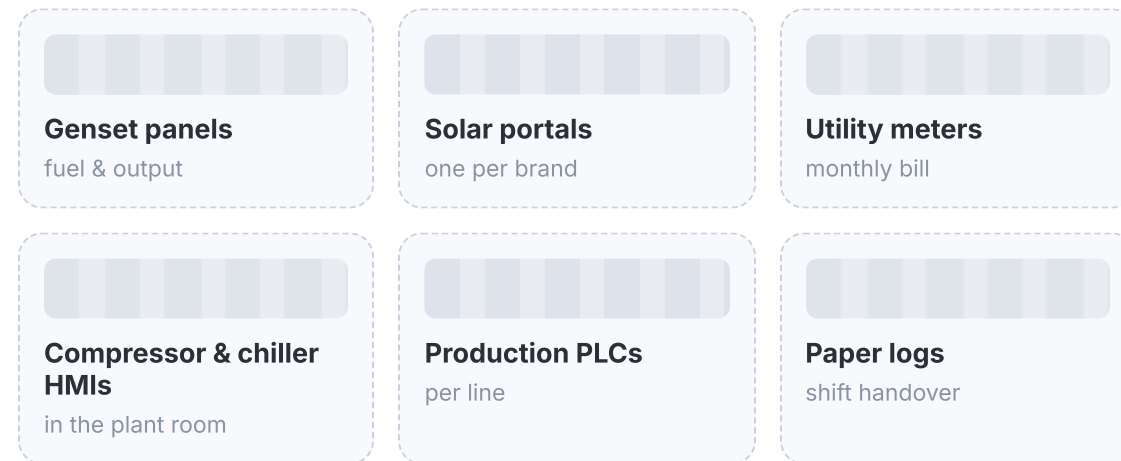


— WHY IT EXISTS

The data was always there. Nobody could see it in one place.

Every generator, inverter, compressor and chiller comes with its own controller and its own little screen. The numbers exist, but pulling them together takes a spreadsheet and half a morning.

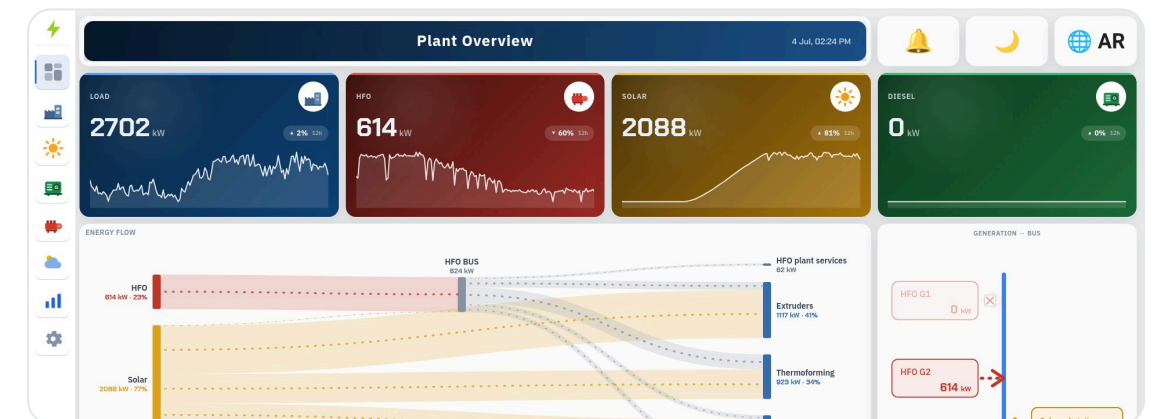
BEFORE



- A tripped inverter or a leaking air line could go unnoticed for weeks.
- Nobody could say what solar saved yesterday, or what a kWh really cost.
- Reports were put together by hand, when someone had the time.



WITH APEX

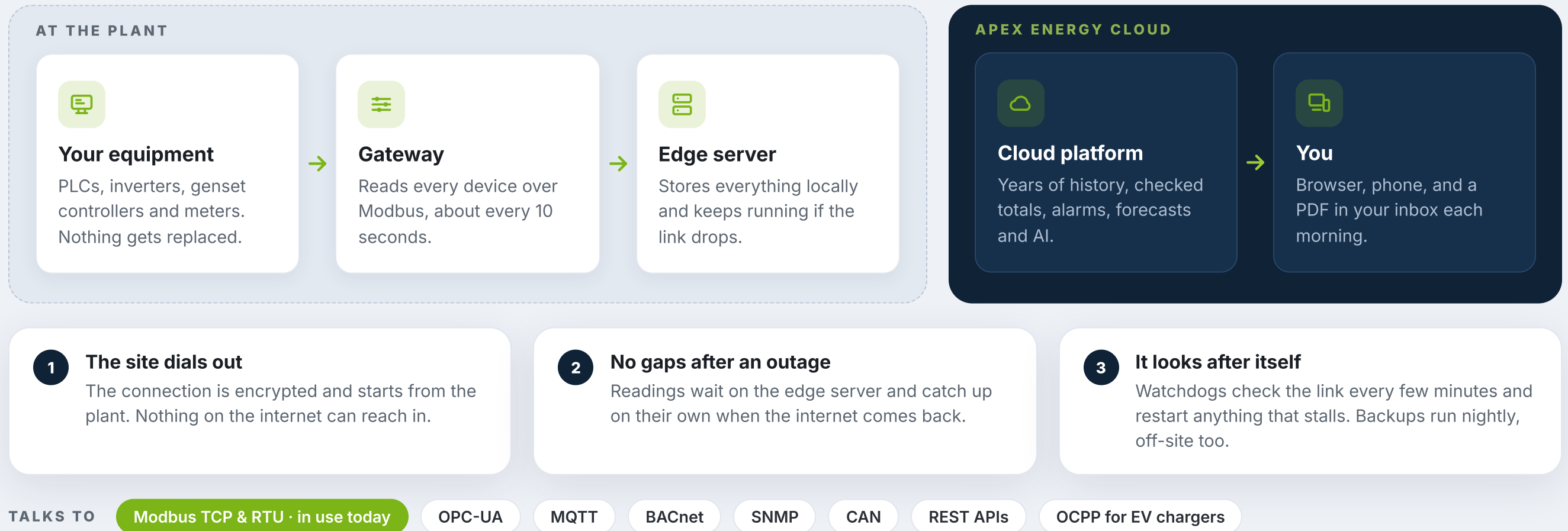


- ✓ Every source and every load on one live page, from the office or a phone.
- ✓ Faults raise an alarm within minutes, with the exact unit named.
- ✓ Cost, fuel and CO₂ worked out automatically, and emailed every morning.

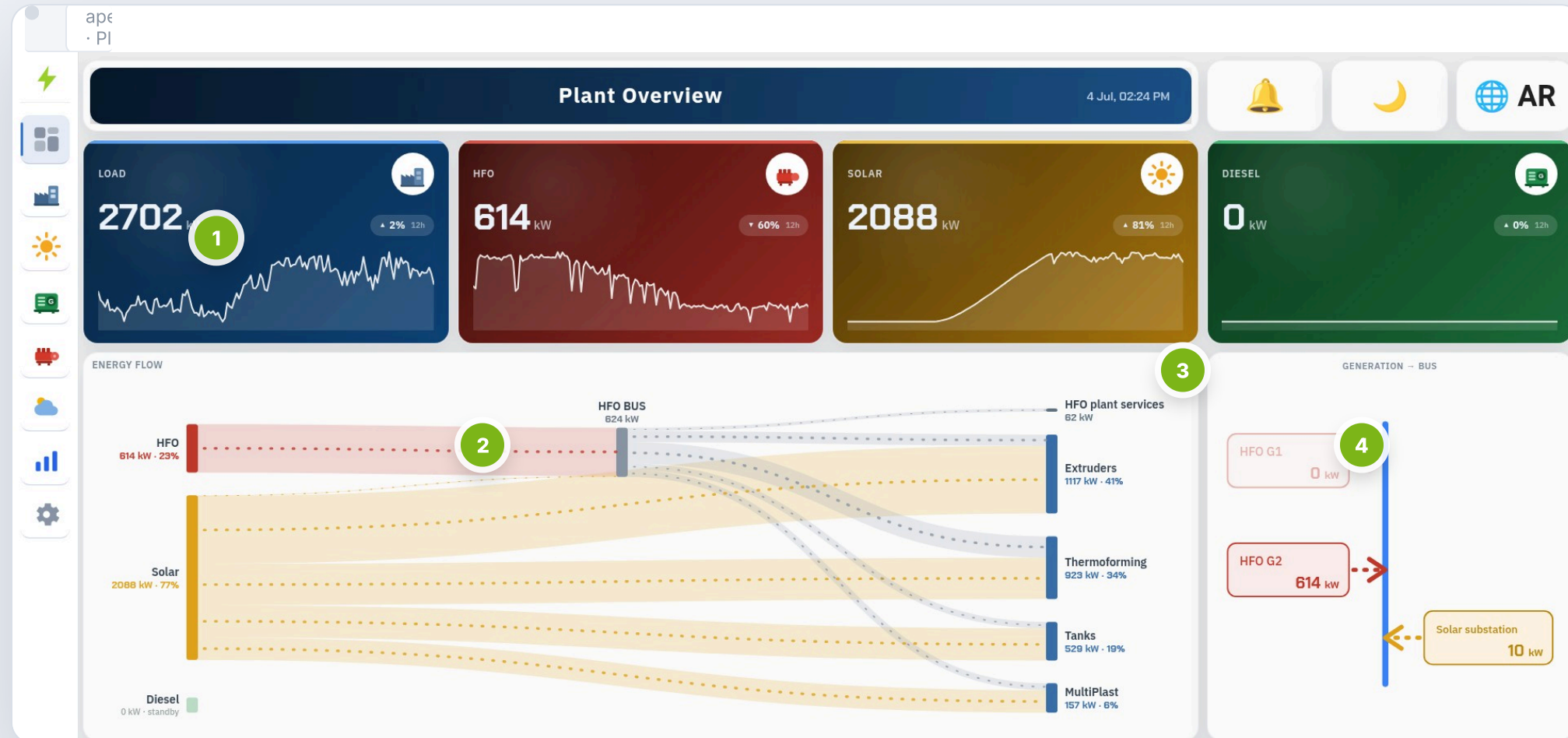
— HOW IT WORKS

A small server on site, the cloud behind it

The plant keeps its own copy of everything, so a bad internet day doesn't cost you any data. The cloud does the heavy lifting: history, calculations, alarms and the dashboards you open.



The whole plant, live, on the first page you open



- 1 **Where the power comes from**
Load, HFO, solar and diesel side by side, with the last 12 hours sketched under each number.
- 2 **Energy flow**
Follow each kilowatt from its source to the hall that uses it. The lines move with the plant.
- 3 **Who's using it**
Each production hall, with its share of the total and the source feeding it.
- 4 **Engine by engine**
Which HFO engine is carrying the bus right now, and how much solar is feeding in.

46 inverters, and you know how each one is doing



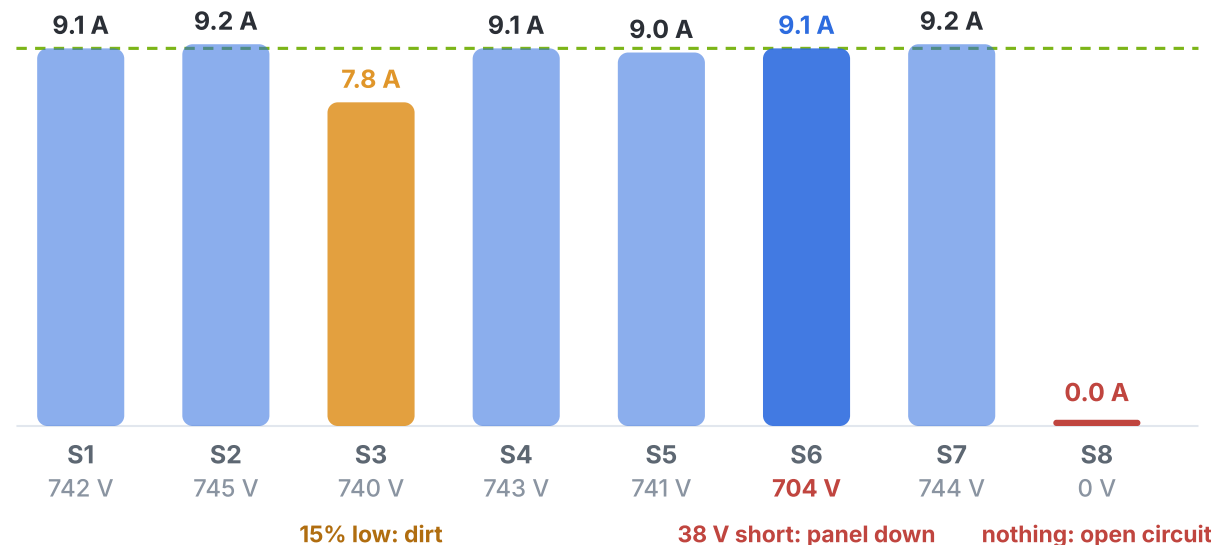
- 1 Today at a glance**
Output right now, energy so far, the day's peak and the CO₂ you didn't burn.
- 2 Who's actually producing**
"41 of 46" tells you straight away that five units need a look.
- 3 Any day, month or year**
Flip back through the production curve and export it to Excel in one click.
- 4 Array by array**
Each array's output and online count. Click through to the single inverter.

String by string: find the dirty panel, or the broken one

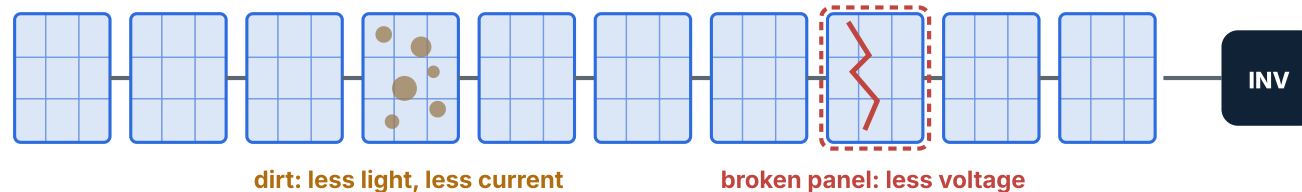
An inverter's total output hides a lot. Measure each string separately and compare it with its neighbours at the same moment. They see the same sun and the same heat, so any gap is down to the string itself.

Array 2 · Inverter 3 · 12:30 · sunlight 870 W/m²

Current (A) and voltage (V) of each string, same moment. Dashed line: the neighbours' average, 9.1 A



Illustrative example



One string = panels in series into one inverter input

- Dirty panels**
 Current a little low, getting worse over weeks, back to normal after rain.
Do: clean that row. The next readings show what it gained.
- A broken panel**
 Voltage short by one panel's worth, or part of one. Current is normal.
Do: send the technician straight to that string with a thermal camera.
- Shading**
 Current dips at the same hour every day.
Do: look for a new obstruction, a pole or a growing tree.
- Open circuit**
 Current at zero while the others produce.
Do: check the fuse, connectors and cable at the combiner box.

If every string drops together, it's dust across the whole array. That's where the weather station comes in.

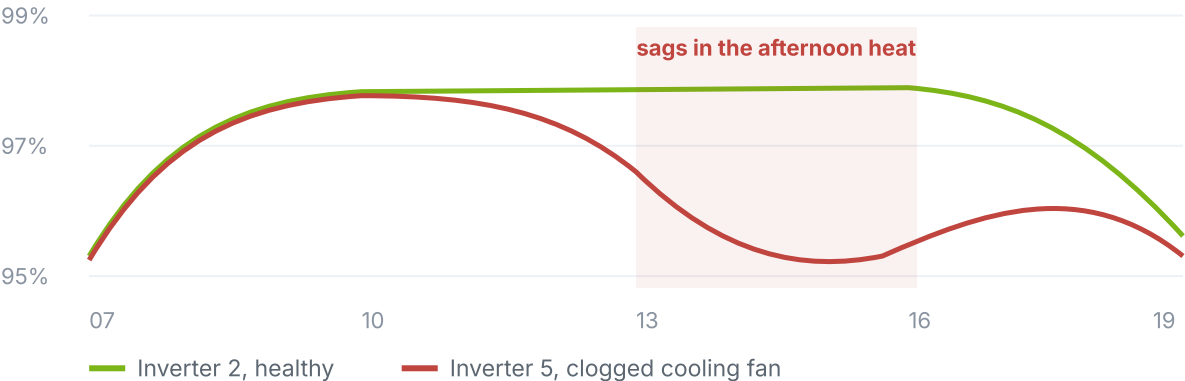
Is the solar producing what the weather allows?

Two checks run all day, on every inverter and every array. Together they tell you not just that output is low, but why.

Inverter efficiency, worked out all day

Each inverter reports the DC power coming in from the panels and the AC power it sends out. Apex divides one by the other every few minutes. Healthy units hold steady around 97 to 98%.

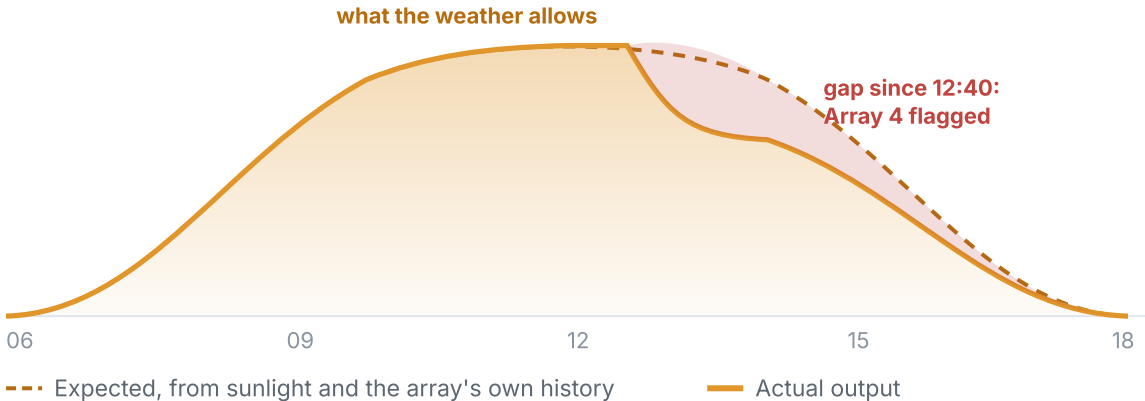
AC out ÷ DC in e.g. $61.1 \text{ kW} \div 62.4 \text{ kW} = 97.9\%$



Weather station plus history = expected output

A weather station on site measures sunlight, temperature and wind. Each array is calibrated against its own best recent days, so Apex knows what it should be producing right now and compares that with what it is producing.

Actual ÷ expected = performance ratio, per array



Whole plant low, good sun

Output held back on purpose, or a grid problem.

One array low

Dirt or a string fault. Check the strings.

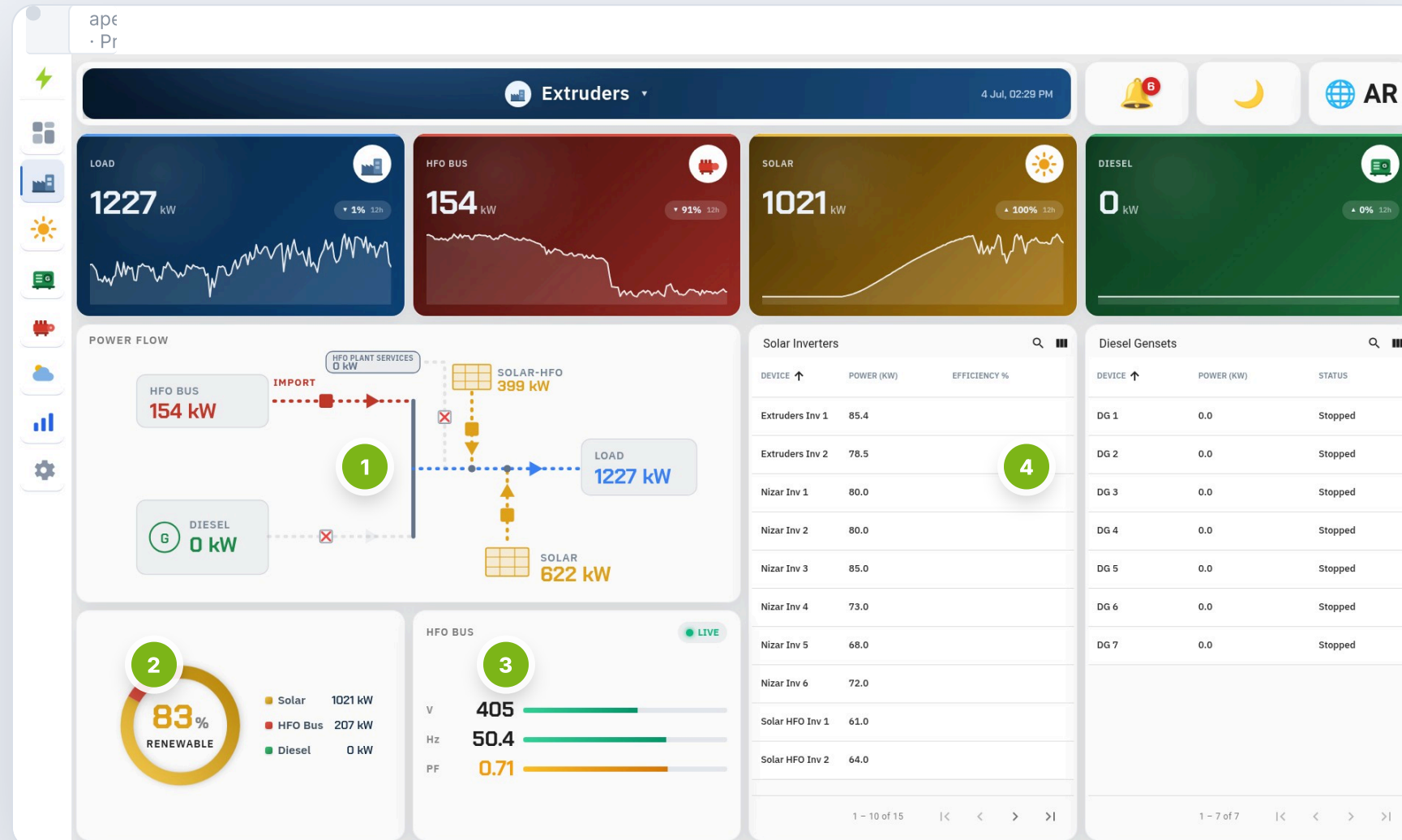
Low only in the afternoon

Heat derating or shading.

Low since a certain day

Something failed then. The history shows when.

Zoom into one hall and see what feeds it



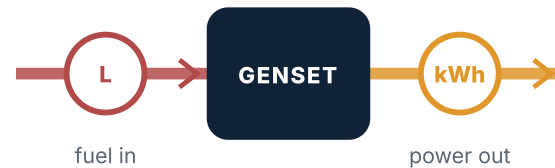
- The hall's own power flow**
HFO import, solar and diesel meeting the hall's load. Open breakers are marked.
- How green it's running**
The share of the hall's power coming from solar at this moment.
- Supply quality**
Voltage, frequency and power factor on the bus. Low PF shows up in orange before it becomes a bill.
- Every machine behind it**
Each inverter's output and each diesel genset's state, running or stopped.

— INPUT & OUTPUT METERING

Measure before and after every machine

One meter tells you how much a machine uses. Put one on the way in and one on the way out, and you know how well it's working. That ratio is its efficiency, and it's the number worth watching.

Generators



BEFORE · FUEL FLOW METER

On the fuel line to the engine. If there's a return line, a second meter takes off what flows back.

AFTER · ENERGY METER

On the alternator output, with current clamps on each phase. Gives kW, kWh and power factor.

INDICATOR

Fuel per kWh = litres ÷ kWh

A healthy diesel unit near 75% load uses roughly 0.25 to 0.30 L/kWh.

Air compressors



BEFORE · ENERGY METER

On the motor feeder. It also shows how long the machine runs loaded versus idling.

AFTER · AIR FLOW METER

On the main header after the dryer, with a pressure sensor next to it.

INDICATOR

Specific power = kW ÷ m³/min

A good screw compressor at 7 bar sits around 6 to 8. Flow at night, with production stopped, is your leak rate.

Chillers



BEFORE · ENERGY METER

On the chiller's supply, covering the compressors and fans.

AFTER · THERMAL ENERGY METER

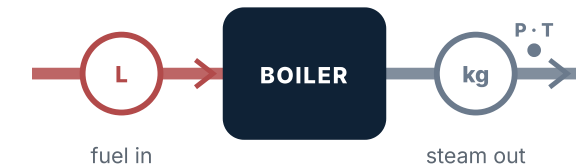
A flow meter on the chilled-water pipe and two temperature probes, supply and return. Cooling = flow × temperature difference.

INDICATOR

COP = cooling kW ÷ electric kW

Air-cooled units run around 3, water-cooled 5 or more.

Boilers



BEFORE · FUEL METER

Oil or gas flow to the burner. Times the fuel's heating value, that's the energy going in.

AFTER · STEAM FLOW METER

With pressure and temperature, to get the energy in the steam. Hot-water boilers use a heat meter.

INDICATOR

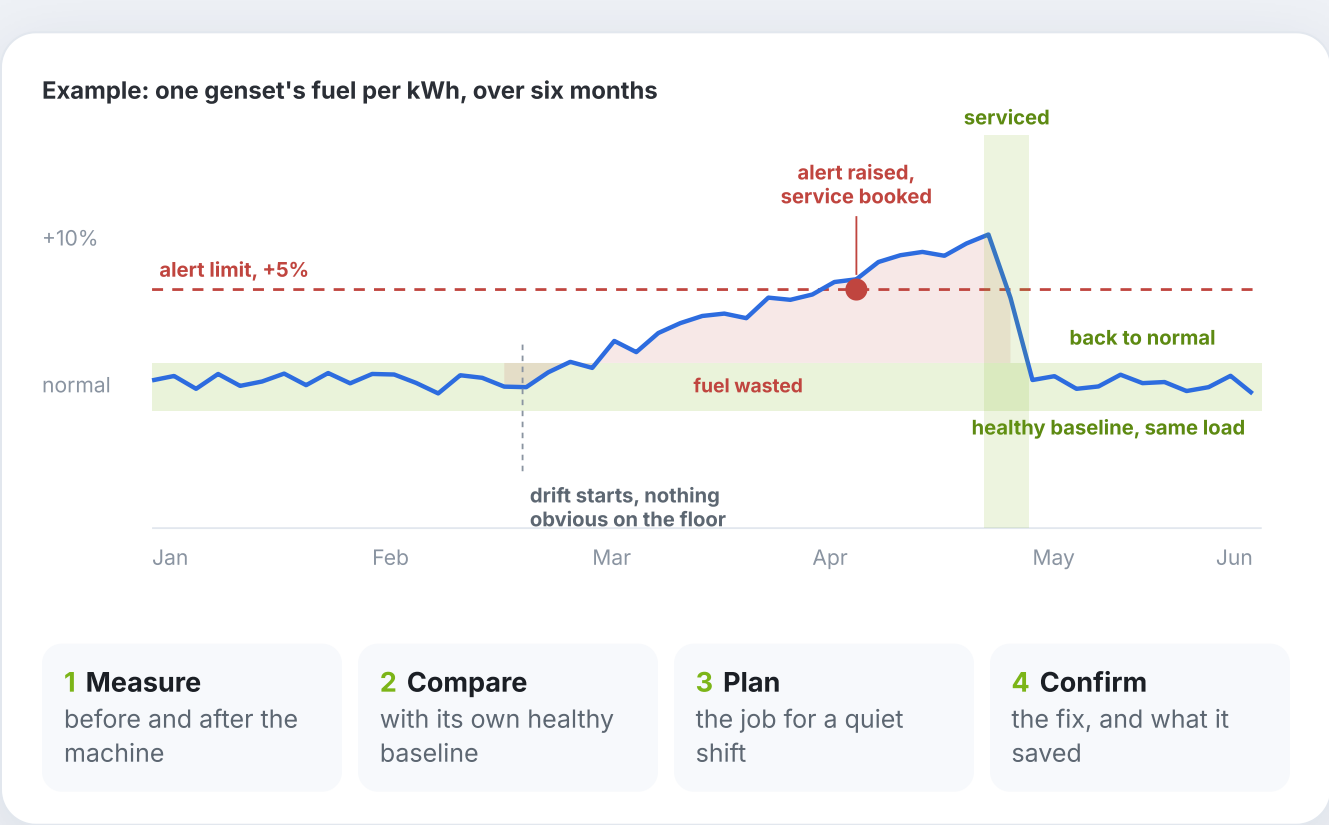
Efficiency = steam ÷ fuel energy

A well-tuned boiler manages 80 to 90%.

— PREVENTIVE & PREDICTIVE MAINTENANCE

When efficiency drifts, something is wearing out

Each machine gets a baseline: how it performs when it's healthy, at a given load.
Apex compares every day against it. A slow drift is the early warning, usually weeks before anything breaks.



MACHINE	WHAT DRIFTS	WHAT IT USUALLY MEANS
Generator	More fuel per kWh, hotter exhaust	Injectors, air filters, turbocharger
Compressor	More kW per m ³ , more air at night	Clogged intake filter, worn element, leaks
Chiller	COP falling, condenser running hot	Fouled tubes, low refrigerant charge
Boiler	Efficiency down, stack temperature up	Soot or scale on the tubes, burner out of tune

PREVENTIVE
Service by real running hours, starts and energy delivered, not by the calendar. Busy machines get attention sooner. Idle ones don't get serviced for nothing.

PREDICTIVE
Book the job when the trend says so, at a time that suits production, instead of waiting for a breakdown to make the decision for you.

It speaks up when something's wrong, and stays quiet when it isn't

Active alarms

Example of the alarm bell

MAJOR

Inverter offline

Array 3, inverter 4 stopped reporting while its neighbours produce

09:12

MAJOR

Supply voltage out of range

Hall B supply bus at 201 V (limit $\pm 10\%$)

10:47

WARNING

Inverter underperforming

Array 2, inverter 2 well below similar units in the same sun

11:40

WARNING

Low starter battery

Genset 6 at 23.9 V while stopped. Check the charger

13:05

WARNING

Energy data delayed

Plant link slow. Totals will fill in when it catches up

14:20



Alarms that name the unit

Inverter faults and dropouts, supply voltage per hall, genset starter batteries, and any efficiency that drifts past its limit. Each alarm clears itself once the problem is gone.



Built to avoid false alarms

Conditions have to hold for a while before anything fires, so a passing cloud or a single bad reading won't wake anyone up.



Numbers you can sign off on

A frozen or silent meter is left out of the totals rather than quietly padding them. Each hall's load is checked against its sources, and they add up.

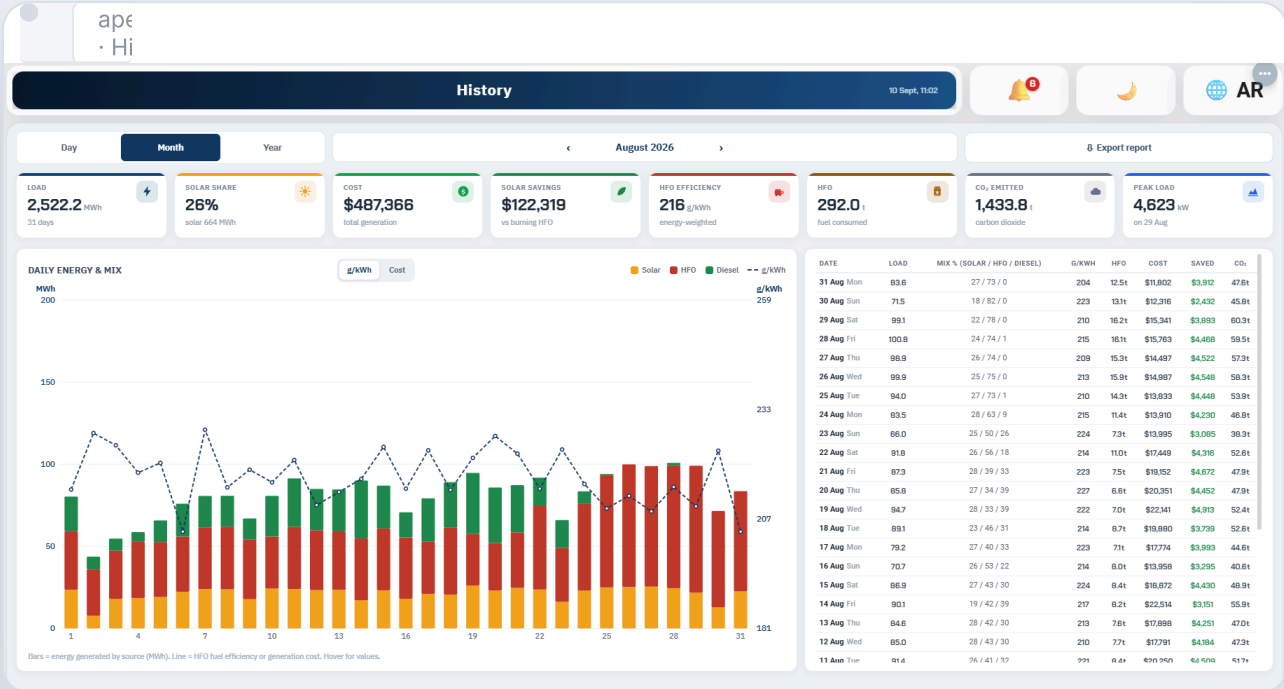
HISTORY & ANALYSIS

Any past day, month or year, one click away

Pick a day to see how power moved through it, or a month to compare every day side by side. Cost, solar savings, fuel efficiency and CO₂ are already worked out.



- 1 The whole day, minute by minute: load, solar, HFO and diesel on one chart.
- 2 Eight headline figures, each compared with the day before.
- 3 Energy mix and highlights, like peak solar and the solar window.



- 1 Daily energy by source, with fuel efficiency or cost drawn on top.
- 2 Every day in one table: load, mix, g/kWh, fuel, cost, savings and CO₂.
- 3 Export report turns the view into a document to share.

Sample report

Have a question? Ask the plant.

A chat assistant built into the dashboard. Ask about any figure, machine or alarm in plain English or Arabic. It looks the answer up in the plant's own records and does the maths before it replies.

How much diesel did we burn last week?

Which inverters were offline today?

Compare solar this month with last month

What did energy cost us per ton produced?

Answers from the data

Every figure is looked up and calculated, not guessed or made up.

Knows the whole plant

Machines, meters, alarms and the full history.

Look, don't touch

It can read everything, but it can't change a setting or switch anything.

Wherever you are

Its own tab in the dashboard, on a desktop or a phone.

Ask the Plant
English · عربي

What was our peak load yesterday?

Peak load was **2.94 MW** at 11:20. Solar was covering about 31% of it at that moment.

Which engine used the most fuel per kWh last month?

HFO engine 2, at 219 g/kWh on average. That's about 3% more than engine 1, and the gap has been growing since mid-June. Worth checking its injectors at the next service.

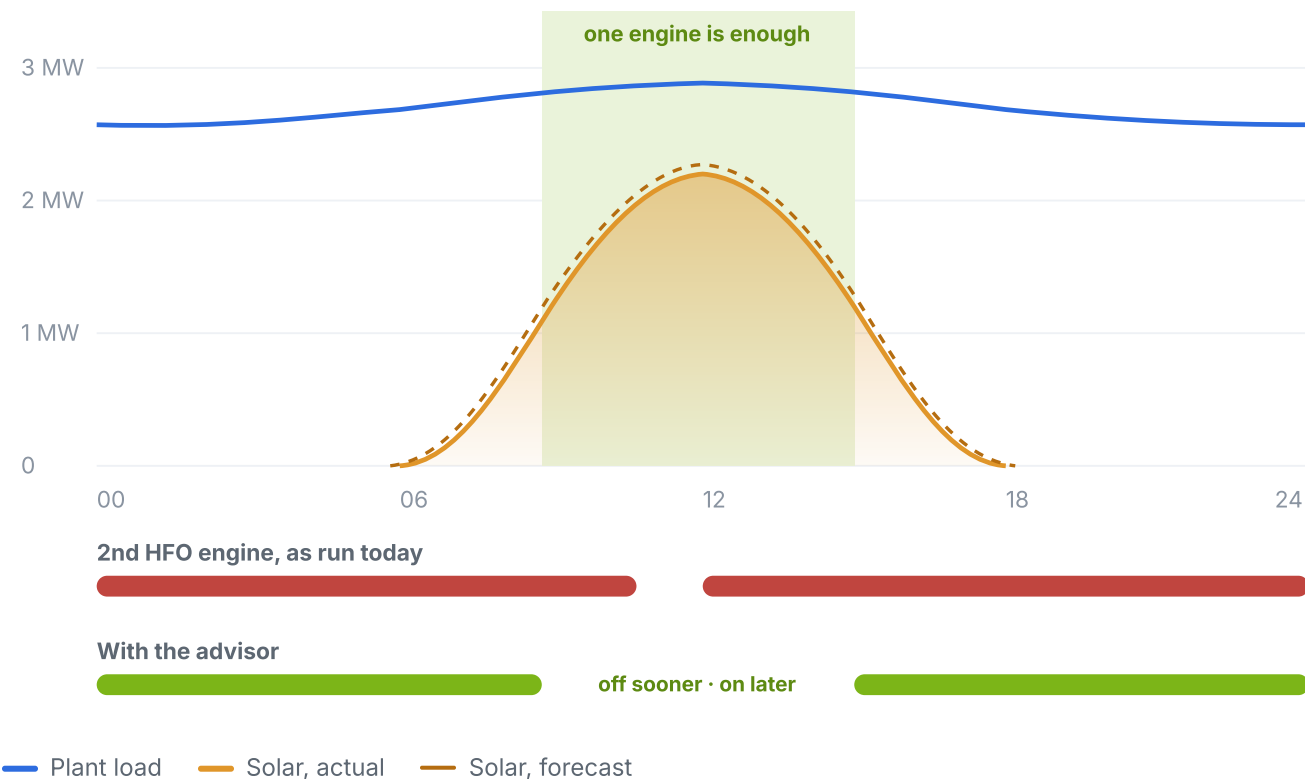
كم أنتجت الطاقة الشمسية هذا الأسبوع؟

أنتجت الطاقة الشمسية **124 ميغاواط ساعة** هذا الأسبوع، أي نحو 29% من استهلاك المصنع.

Ask anything about the plant...
→

Know what the sun will do, and run the engines to match

A typical day: load, solar, and the second HFO engine



SOLAR FORECAST

Tomorrow's sun, hour by hour

Weather forecasts, a sky camera and weather station on site, and the plant's own history. By early afternoon the end-of-day estimate is typically within about 2%.

DISPATCH ADVISOR

When the second engine can rest

The second HFO engine tends to stay on too long after the morning solar ramp and start too early in the evening. The advisor flags those windows. On June and July data, better timing works out to roughly **\$1,600 to \$2,200 a month** in fuel.

CURTAILMENT ADVISOR

Too much sun, handled safely

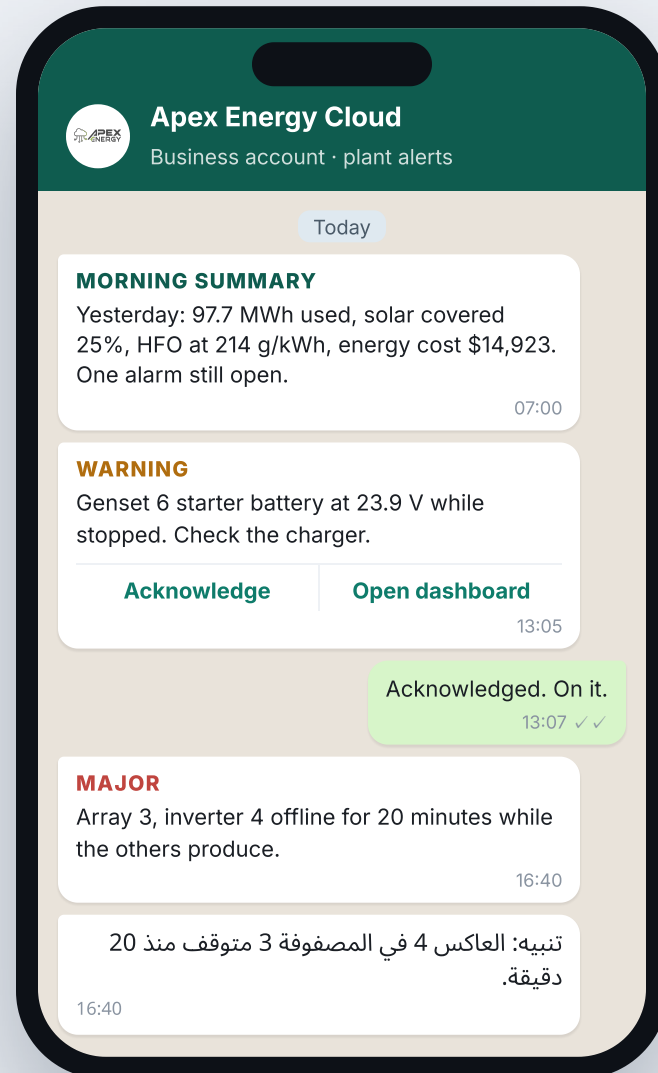
When solar would push the HFO engines below their safe minimum, it works out how much solar to hold back, plant by plant.

Both advisors only recommend. The operator makes the call, and nothing is switched without them.

— NOTIFICATIONS

The plant messages you, so you don't have to keep checking

Alarms and a short morning summary go straight to the phone people already use, WhatsApp first. Everyone picks what they receive, and when.





WhatsApp
 NEXT



Mobile push
 LIVE · ANDROID



SMS
 NEXT



Email
 LIVE



Dashboard bell
 LIVE



Teams / Slack
 NEXT

Your alarms, your way
 Pick by site, by machine and by severity. The maintenance lead gets the gensets, the owner gets the summary.

Quiet hours
 Warnings wait until morning. Faults that can't wait still come through at night.

Nobody left hanging
 If an alarm isn't acknowledged within a set time, it moves on to the next person on the list.

One tap
 Acknowledge from the message, or jump straight to the right page in the dashboard.

No message storms
 Repeats are grouped and alarms that flicker on and off are held back.

Morning summary
 Yesterday's energy, cost and open issues in one message, every day at 7:00.

— DESKTOP, TABLET & PHONE

Your plant on every screen you own

Apex runs as an app on the office PC, the tablet on the shop floor and the phone in your pocket. Same live plant everywhere, laid out to suit each screen.



Windows desktop app

One installer and it's done. Opens straight onto your plant, full screen, ideal for a control-room display.



Android phone & tablet app

Major alarms arrive as push notifications, with a count on the app icon. The app tells you when an update is ready.



iPhone & iPad

Add it to the home screen from Safari and it opens full screen, just like an app.



Any web browser

apexenergycloud.com, with nothing to install. Handy for a quick look from any computer.

One login, only your plants

Your logo & colours

English & Arabic

Light & dark

New sites appear without an update

MULTI-SITE CUSTOMERS

Several sites, one account

A group with several factories, farms or branches gets them all under one login. See the whole group at a glance, or open any site on its own.

Group overview

All sites · today

212.5

Load MWh

21%

Solar share

\$32.4k

Energy cost

3

Open alarms

Click any site to open its own dashboards, alarms and reports.



One login, every site

Switch between sites from a menu. Each keeps its own dashboards, alarms and reports.



Group totals

Energy, cost and CO₂ added up across the group, with each site's share.



A fair comparison

Per ton produced or per kWp of solar, so a big site and a small one sit on the same scale.



The right people, the right sites

A site manager sees their own site. Head office sees them all. Set per person.



Same setup everywhere

A new site copies the standard setup: dashboards, alarms and reports. Up and running in days.



One alarm list

Alarms from every site in one place, each labelled with its site, sent to the right people.

— WHAT YOU GET

Running today, with more on the way

Apex already runs a working industrial plant, every day. Here's what's live now, and what we're building next.

LIVE NOW

See and understand

- Plant, solar, hall and genset dashboards
- Apps for desktop, Android, iPhone and iPad
- Alarms in the app, pushed to Android phones
- Daily PDF report by email
- Ask the Plant, in English or Arabic
- Solar forecast and dispatch advice

NEXT

Act on it

- WhatsApp alerts and a morning summary
- Advisors switch from recommending to acting, with operator approval
- Efficiency tracking for compressors, chillers and boilers
- Maintenance planned from efficiency trends
- Peak-demand and power-factor management

LATER

More sites, less effort

- New plants connected in days, not weeks
- Several sites compared on one screen
- Batteries, EV chargers and building loads