

The Charging Data Handbook

The numbers that run a network, and how to trust them

Utilisation, realisation, availability and failed sessions — what each means precisely, and how each is derived.

FOR Operations and finance teams, and anyone reporting to a board

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What a board, a lender and a site partner each need — and why they are not the same document.

WHAT YOU GET

- Definitions precise enough that two people compute the same number
- Deriving availability from connector state timelines
- The eight failure classes and how to tell them apart in the data
- Report templates for a board, a lender and a site partner

Utilisation

Utilisation is the number every charging conversation reaches for and almost nobody defines the same way twice. Two operators quoting utilisation figures are frequently measuring different things, which makes the comparison worthless and the benchmark misleading.

A definition precise enough to be reproduced

Utilisation is the share of available connector-time spent delivering energy. Three parts of that need pinning down.

- 01 Available connector-time, not wall-clock time. A connector that was faulted for a week did not have the opportunity to be used, and counting it as idle conflates a reliability problem with a demand problem.
- 02 Delivering energy, not occupied. A vehicle plugged in and finished is occupying the bay without using the connector, and that distinction is what idle fees exist for.
- 03 Per connector, not per station. A four-connector station where one connector does all the work is a different situation from four evenly used connectors, and the station-level figure hides it.

THE TWO DEFINITIONS TO STATE EXPLICITLY

Whether the denominator is wall-clock or available time, and whether the numerator is charging time or occupied time. Every quoted utilisation figure should carry both, and almost none do.

Realistic ranges

Offered as orders of magnitude rather than targets. A site's own trend against itself is far more informative than a comparison to somebody else's number.

SITE TYPE	TYPICAL	CONSTRAINED BY
New public DC, first months	Very low	Awareness
Established public DC	Low double digits	EV density on the route
Corridor DC at a good location	Higher, and peaky	Weekend and festival traffic
Destination AC at a mall	Low	Dwell time, not demand
Workplace AC	Moderate but concentrated	A single arrival window
Depot	High in-window, zero outside	The duty cycle

A depot illustrates why the headline number misleads: it may be near zero across twenty-four hours and near saturation during the nine that matter. The daily average describes nothing anyone would act on.

Always look at the shape

Utilisation by hour of day, across a month, is the version that supports decisions. Three shapes, three different responses.

- A broad plateau across many hours: real sustained demand. Add capacity.

- Two sharp peaks with empty hours between: a scheduling problem. Try time-of-day pricing before capital.
- One growing peak: demand arriving. Wait a month, then add.

The number utilisation cannot tell you

How much demand you turned away. A driver who finds every connector occupied and leaves creates no record at all, so a site at its ceiling looks the same as a site that is merely busy. Proxies — the share of hours at full occupancy, app views of a full site with no session following — are imperfect and are the only thing available.

Realisation per kWh

The most useful pricing metric in charging, and the one almost nobody computes: total revenue collected divided by total energy delivered. It should be close to your headline rate. Where it is not, the gap is money you intended to earn and did not.

Where the gap hides

CAUSE	SIGNATURE
Group rates spread wider than intended	A large share of energy at a discounted rate
Promotions still running	A gap that started on a date
Sessions never billed	Energy with no matching revenue
Refunds	Revenue reversed after the fact
Roaming at wholesale	A gap proportional to partner volume
A tariff not applying where assumed	One site or connector out of line

The third row is the one that matters most and is hardest to see. Sessions that delivered energy and collected nothing do not appear in a revenue report — they are absent from it, which is exactly why nobody notices.

Computing it

01 Sum energy delivered for the period, from session records.

- 02 Sum revenue net of tax for the same sessions.
- 03 Divide. Compare to the headline rate.
- 04 Then split by site, by driver group and by whether the session was roaming, to locate the gap.

A TEN PERCENT GAP IS COMMON AND ALWAYS WORTH INVESTIGATING

Not necessarily wrong — group rates and roaming are deliberate. But an operator who cannot account for the gap does not know what their pricing is actually earning, and should not be changing the headline rate until they do.

Realisation against landed cost

Realisation per kWh minus landed cost per kWh is contribution per unit, which is the number the business actually runs on. Tracking both monthly shows whether margin is moving, and which side is moving it.

A falling contribution with a stable headline rate means either discounts have spread or your electricity cost has risen. Those need different responses, and the trend tells you which.

Where to look first when it moves

- 01 The date it started. A step change points at a configuration change; a drift points at group membership growing.
- 02 The split by driver group. This finds most of it.
- 03 Unbilled sessions in the period, which should be a report you already have.
- 04 Whether a site was recently repriced and something did not take.

Availability

Availability is the metric most often quoted and least often defined. It is also the one you will eventually have to defend contractually, so it is worth computing properly before somebody asks.

Three things people call uptime

MEASURE	MEANS	USE
Connectivity	The charger is reachable	Never quote this
Availability	A driver could have started a session	Contracts and reporting
Serviceability	A driver could actually have charged	Internal, and it is the honest one

Connectivity is the easiest to compute and says nothing about the product, which is why the industry's uptime figures are widely disbelieved. Serviceability is the honest measure and cannot be derived from protocol data alone, because a blocked bay and a stolen cable are invisible to the charger.

Deriving availability

From the connector state timeline. Available, Preparing, Charging, SuspendedEV, SuspendedEVSE, Finishing and Reserved count as available; Faulted and Unavailable do not.

Aggregate by summing seconds, never by averaging percentages. A site with one connector at 99 percent and one at 50 is not 74.5 percent available, and averaging will eventually flatter you in a way you cannot defend.

The offline decision

A charger that stops communicating has not necessarily stopped working — with a local authorisation list it may serve sessions perfectly and report them on reconnect.

DECIDE BY EVIDENCE, NOT BY POLICY

If the charger later reports transactions from the offline window, it was available. If it reports nothing, treat the window as unavailable. Both are checkable afterwards, which is what makes the number defensible rather than merely favourable.

Carry the last known state forward with a cap — an hour is reasonable. Carrying it indefinitely is how a broken charger stays at 100 percent for a fortnight.

Exclusions

- 01 Declared before they start. A window created retrospectively is editing history.
- 02 Bounded. An open-ended exclusion is an off switch for the metric.
- 03 Itemised in the report, with duration, rather than silently removed from the denominator.

The outage list

The percentage is the claim; the outage list is the evidence. Each incident with start, end, connector, cause and any exclusion claimed. It is what turns a figure into something a counterparty can check, and it is the specific artefact most platforms cannot produce for an arbitrary period.

Confirm yours can, before committing to an SLA that depends on it.

Failed sessions

A driver who arrives and cannot charge costs far more than the session, because a meaningful share of them do not come back. Failed sessions are therefore a financial metric, and the single number is much less useful than the breakdown.

The eight classes

CLASS	SIGNATURE	YOURS?
Charger faulted or offline	Fault before or at start	Entirely
Authorisation rejected	Auth request, negative response	Usually
Payment declined	Auth ok, payment failed	Shared
Vehicle refused handshake	Preparing, never Charging	Rarely, but you lose them
Started then stopped early	Charging, then a stop reason	Depends on the reason
Driver cancelled in seconds	Very short session, no energy	Usually price surprise
Zero energy delivered	Session complete, meter delta nil	Investigate — this is the odd one
Never completed	Session opened, never closed	Yours, and it is a data problem

The three worth dwelling on

Vehicle refused

A meaningful share of "the charger did not work" reports are the vehicle declining the handshake. It is rarely your fault and you still lose the driver, so it is worth knowing which vehicle models it happens with — a pattern concentrated on one model is something you can raise with a vendor or work around.

Zero energy delivered

A session that completed normally and delivered nothing. Sometimes a driver plugging in and changing their mind; sometimes a metering fault; sometimes a charger that believes it delivered energy and did not. It is the class most likely to indicate a real defect and the one most often ignored because the session looks tidy.

Never completed

A session opened and never closed, usually because the charger disconnected and never sent the stop. It sits open indefinitely, distorts utilisation, and may never be billed. Every network has some; a growing count means a connectivity problem or a recovery gap in the platform.

THE MEASUREMENT THAT MAKES IT ACTIONABLE

Failed sessions as a share of attempted sessions, split by class, by site and by hardware model. One number is a KPI nobody acts on. That breakdown is a work list.

Putting a cost on it

Direct loss is one session of margin. Support handling is minutes of a person and sometimes a refund. The dominant term is the reduced return rate: a driver worth many sessions over two years, a share of whom do not come back after one bad experience.

Once that number exists, spending on reliability stops being a judgement call and becomes an arithmetic one.

Energy and load

Energy delivered is the simplest number in charging and the one that answers the most different questions — provided it is kept at a grain that supports them. A monthly total answers almost nothing.

The grain that matters

Energy by connector, by hour. Everything useful aggregates up from there, and nothing aggregates back down. An operator storing only daily totals has permanently lost the ability to answer the load questions below.

What the hourly profile is for

QUESTION	ANSWERED BY
Should we price by time of day?	The peak-to-average ratio
Would load management pay for itself?	The coincident peak against the sanction
Is a second charger justified?	The width of the plateau, not the height
What sanction does the next site need?	This site's observed peak per connector
What do we tell the DisCom?	The profile, which is what they will ask for

Coincident peak

The highest simultaneous draw across the site, which is what your demand charge and your sanction are about. It is always lower than the sum of connector ratings and usually lower than people expect, because vehicles taper and arrivals are staggered.

MEASURE IT BEFORE SIZING THE NEXT SITE

An operator with one running site has the single most valuable input to the next site's sanction: the observed coincident peak per connector, at a real location, with real vehicles. It is nearly always well below the figure a design would assume.

Energy versus revenue

Track both and compare their trends. Energy rising faster than revenue means discounts are spreading. Revenue rising faster than energy means price rises are holding, or the session mix has shifted toward higher-rate groups. Either is worth knowing, and neither is visible from one series alone.

The reconciliation

Sum of session energy against the site's metered consumption, monthly. The difference is losses, non-charging site load and anything unattributed. A stable small gap is fine; a growing one means a charger is not reporting, a session type is being missed, or a meter is drifting.

It is a two-line check and it is the only thing standing between you and a slow, invisible divergence between what you think you delivered and what you paid for.

Reporting to a DisCom

A distribution company assessing your load, or a regulator collecting data, wants the hourly profile, the coincident peak and the monthly energy — not sessions and not revenue. Having those available in a form you can hand over turns a request that would otherwise consume a week into an export.

Three reports

Most operators produce one report and send it to everybody, which means every audience receives a document mostly composed of things they do not need. Three audiences, three genuinely different documents, none of them long.

The board

Wants to know whether the business is working and where the constraint is. One page.

- Energy delivered and revenue, this period and trend.
- Realisation and landed cost per kWh, so margin per unit is visible.
- Connectors live, and connectors serviceable right now.
- Utilisation for the network and for the best and worst quartile of sites.
- Failed session rate, with the largest cause named.
- One paragraph on what changed and what you are doing about it.

What does not belong: fault counts, individual site detail, anything that cannot change a decision at that level.

A lender

Wants evidence that the assets earn and are maintained. Different emphasis entirely, and the maintenance half is the part operators forget.

Per-site monthly revenue, 12 months	The distribution, not the average
Utilisation by site and by hour	Whether growth needs capital or pricing
Availability by site, with outages	That the assets are maintained
Settlement statements to hosts	That the revenue share is real and current
Failed session rate	Operational quality, read as management quality
Site agreements with expiry dates	Security of the revenue

THE ONE THAT SURPRISES PEOPLE

Availability records. A lender financing physical assets wants evidence you look after them. Twelve months of availability by site is a story about management rather than about equipment, and very few operators can produce it on request.

A site partner

Wants to know what they earned and to be able to check it. Shortest of the three, and the one where trust is won.

- 01 The period, stated.
- 02 Sessions and energy at their site.
- 03 Gross revenue, tax, net revenue.
- 04 Any exclusion applied, itemised.
- 05 The contracted rate and the amount due.

06 Adjustments from earlier periods, each explained.

And ideally none of it, because they have a login and can look whenever they want. A host who can check stops asking, which is worth more than any report you could write.

What all three share

Every figure traceable to session records, and the same numbers in each document. An operator whose board report and lender pack disagree has a credibility problem that no explanation recovers from.

About this document

Written by the team building zevOS, the charge point management platform. We publish this kind of thing because operators who understand utilisation, demand charges and settlement make better decisions — including about us.

Corrections and disagreements are genuinely welcome. If something here is wrong, or true in most states but not yours, write to support@zevos.ai and we will fix it in the next revision.

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