ZEVOS

The Fleet Electrification Handbook

Depot charging, duty cycles and cost per kilometre

For fleet operators moving from diesel: sizing the depot, managing the load, attributing the energy and knowing what it actually costs per km.

FOR Fleet, logistics and transport operations leaders

UPDATED 15 May 2026

Contents

WHAT YOU GET

- How to size a depot connection against duty cycles rather than nameplate charger capacity
- The load-management arithmetic that avoids a sanction upgrade
- Attributing energy cost per vehicle and per route
- Handling opportunity charging on public networks under one account

CHAPTER 01

Starting from the duty cycle

Almost every depot that ends up oversized started the same way: someone counted the vehicles, looked up a charger, multiplied. That arithmetic produces a connection you cannot afford and will never use, because it assumes every vehicle charges at full power simultaneously — which is exactly what a depot does not do.

Work backwards instead. The duty cycle is the input; the charging requirement is the output.

Four numbers per vehicle type

01 Energy consumed per day, in kWh. Measured from telematics if you have it, or from distance multiplied by a consumption figure you have actually observed rather than the brochure number.

02 The window: when the vehicle returns and when it must leave. This is the constraint, and it is usually longer than people assume.

03 The state of charge on return, and the state of charge required at departure. Rarely zero to a hundred.

04 How much flexibility exists in the departure time. Fifteen minutes of slack across a fleet is worth a surprising amount of connection capacity.

The arithmetic

Energy required per vehicle, divided by the hours available, gives the average power per vehicle. Multiplied by the number of vehicles charging in that window, that is the site load — not the sum of the charger nameplates.

INPUT	EXAMPLE
Vehicles returning at 20:00	30
Energy needed each	45 kWh
Window until departure	9 hours
Average power per vehicle	5 kW
Site load if perfectly spread	150 kW
Sum of 30 × 22kW charger nameplates	660 kW

The gap between the last two rows is the whole argument for load management, and it is more than four to one on a very ordinary depot.

THE WINDOW IS LONGER THAN PEOPLE THINK

Depots are asked "when do the vehicles need to be ready" and answer "in the morning". Pushing for the actual departure times usually reveals a staggered schedule, which is worth more capacity than any hardware decision.

Where the arithmetic breaks

- A vehicle that returns mid-shift and must leave in ninety minutes needs real power, not an average. Size for the exceptions separately.
- Charging rate is not linear. A battery above roughly eighty percent charges slowly, so plan on filling to a level rather than to full.
- Cold or very hot batteries accept less. If your depot is outdoors in a Delhi summer, the derate is real.

- A vehicle that fails to charge overnight cascades into the next day. Build in one spare bay rather than exactly enough.

Choosing charger power from this, not before it

Once the window and the energy are known, the charger rating falls out. Overnight depots almost always want many modest AC points rather than few DC ones: they are cheaper per bay, they draw less, and the window does the work that power would otherwise have to.

DC belongs where the window is short — mid-shift top-ups, a vehicle turning around between routes — and it should be sized for those cases rather than for the whole fleet.

CHAPTER 02

Sizing the connection

A public charging site benefits from diversity: vehicles arrive at random, and it is unlikely every connector is in use at once. A depot has no diversity at all. Every vehicle returns within the same hour and every driver plugs in immediately, which is the worst possible load profile and the reason depots are where load management stops being optional.

What the connection actually costs

Two costs, and they behave differently.

COST	WHEN	BEHAVIOUR
Connection / sanction charges	Once	Roughly proportional to the sanction
Demand charge	Every month, forever	Levied on capacity, not consumption
Upgrade works	Once, if required	Transformer, cabling, sometimes a substation
Time	Once	Months, and outside your control

The second row is the one that compounds. An oversized sanction is not a one-off mistake; it is a monthly payment for capacity you never use, for as long as the depot exists.

What load management is worth

Take the depot from the previous chapter: 660kW of nameplate, 150kW of actual requirement. Sanctioning 660kW and sanctioning 200kW differ by a monthly demand charge on 460kW, every month, plus the connection charges and quite possibly a transformer.

Load management is what makes the smaller sanction safe. It is a software cost against a permanent infrastructure cost, and the ratio is not close.

ASK HOW DEMAND CHARGE IS ASSESSED

On sanctioned load, on recorded maximum demand, or the higher of the two? If it is recorded demand, load management saves money every single month. If it is sanctioned load, the saving comes from sanctioning less in the first place — a decision you make once and cannot easily revisit.

How to size it, then

01 Compute the required site load from duty cycles, as in the previous chapter.

02 Add the exception cases — the mid-shift chargers that need real power — at their actual concurrency, not their nameplate.

03 Add non-charging site load: workshop, offices, lighting, compressors. Depots forget this and then trip the main breaker on a Monday.

04 Add headroom for the fleet you will have in three years, because a second sanction application is another six months.

05 Sanction that, not the sum of the chargers.

Designing so the limit actually holds

- The site ceiling is pushed to the chargers as a profile and enforced on the unit, so it survives losing contact with the platform.
- A charger the platform cannot reach is assumed to be drawing its full profile. Optimism here trips the main breaker.
- Protection is sized as if load management does not exist. Software is the optimiser; the breaker is the safety system.
- Reallocate on session start and stop rather than on a short timer — vehicles do not change their draw every thirty seconds, and rapid changes make some of them stop.
- Respect a per-connector minimum. Below roughly six amps most vehicles simply stop charging, and a stopped vehicle misses its departure.

Solar and storage

A depot roof generates during the day and the fleet charges at night, so the direct match is poor. Solar still helps — it offsets daytime site load and any mid-shift charging — but a depot that expects rooftop generation to feed overnight charging without storage is going to be disappointed by the arithmetic.

Storage changes that, and it also shaves the peak, which is worth real money where demand charge is assessed on recorded demand. It is a genuine option rather than a green gesture, and it should be evaluated against the demand charge rather than against the energy price.

CHAPTER 03

Authorisation without payment

A depot has no payment leg. Nobody is buying anything — the organisation already owns the electricity and the vehicles. What it needs instead is attribution: which vehicle, which driver, which department, which route. That is an authorisation problem, and it is solved quite differently from public charging.

Tags, and what they should identify

The common mistake is issuing tags to drivers when the cost needs to be attributed to vehicles. Drivers change vehicles; a tag that identifies the driver then attributes a truck's energy to whoever happened to be driving it.

- Attribute by vehicle where the cost centre is the vehicle — which is almost always, for cost per kilometre.
- Keep the driver identity as a second field on the session, for accountability rather than costing.
- Where a vehicle-mounted tag is impractical, tie the driver tag to the vehicle at the point of allocation, and make that mapping part of the session record.
- Group tags by department, route or contract so reporting rolls up without a spreadsheet.

The offline requirement

This is the part that separates a depot from a public site. A public charger that cannot reach the platform declines a session and the driver goes elsewhere. A depot charger that declines a session leaves a vehicle uncharged and a route uncovered in the morning.

LOCAL AUTHORISATION LIST IS NOT OPTIONAL HERE

It is the OCPP feature that lets a charger authorise a known tag with no network. Confirm your hardware implements it and your platform maintains it. Without it, a connectivity outage at 22:00 becomes thirty vehicles that do not leave at 06:00.

Two related settings deserve a deliberate decision rather than a default: whether unknown tags are accepted offline, and what happens to a session in progress when the link drops. For a depot behind a gate, accepting known tags offline and letting running sessions continue is almost always right.

Limits and controls

Attribution without limits invites the problem it was meant to prevent. Per-vehicle and per-driver caps on energy and on frequency are cheap to configure and catch both errors and misuse.

CONTROL	CATCHES
Daily energy cap per vehicle	A stuck session, or a vehicle charging twice
Tag valid only at this site	A depot tag used on a public network
Time window restriction	Charging in an expensive tariff period
Authorisation log	Every declined attempt, which is where problems surface first

The authorisation log is the underrated one. Declined attempts are the earliest visible symptom of a tag that has not synced, a vehicle that has changed hands, or a driver trying to charge a personal car.

Mixed depots

Many depots eventually serve three audiences on the same hardware: fleet vehicles at no charge, employees at a subsidised rate, visitors at the public rate. That works cleanly when the rate follows the driver group rather than the connector — and it is impossible when pricing is per-station, which is worth checking before the second audience appears.

CHAPTER 04

Cost per kilometre

The number a fleet actually wants is cost per kilometre. Charging data gives you the numerator and telematics gives you the denominator, and joining them is the whole exercise. Most fleets have both and have never put them together, which is why energy remains the least understood line in their cost base.

Getting the numerator right

Energy cost per vehicle for a period, and it is not simply energy multiplied by the tariff.

01 Session energy from meter values, attributed to the vehicle by tag.

02 Priced at the landed cost per unit for that period — the whole electricity bill divided by units delivered, including demand charges — not at the energy charge.

03 Plus any public charging that vehicle did away from the depot.

04 Losses matter: energy drawn from the grid exceeds energy delivered to the battery. If you meter at the charger, you are already measuring delivered energy and the site total will be higher.

THE RECONCILIATION THAT CATCHES EVERYTHING

Sum of session energy across the month, against the site's metered consumption. The difference is losses, non-charging site load and anything unattributed. If it is large or moving, something is wrong — a tag not mapped, a charger not reporting, or a meter drifting.

Joining to distance

The join key is the vehicle, and it needs to be the same identifier on both sides. This sounds trivial and is the single most common reason the analysis never gets done: charging knows a tag, telematics knows a registration or a VIN, and nobody maintains the mapping.

Maintain it as a first-class record — tag, vehicle, registration, VIN, cost centre — updated when a vehicle changes hands. It takes minutes and it is the difference between having this data and not.

What the numbers tell you

COMPARISON	REVEALS
Cost per km across identical vehicles	Driving style, or a vehicle needing attention
Cost per km by route	Which contracts are actually profitable
kWh per km trend for one vehicle	Battery degradation, or a developing fault
Depot cost per kWh versus public	What opportunity charging really costs you
Charging cost against the diesel it replaced	The number your board asked for

The comparison people skip

Two identical vehicles on similar routes with a persistent fifteen percent difference in kWh per kilometre is a finding. It is usually driving style, sometimes tyre pressure, occasionally a fault developing months before it becomes a breakdown.

It is invisible without this join and obvious with it.

Getting it out of the platform

Session-level data with vehicle, energy, timestamps and cost, available through an API or a scheduled export, is all that is required. If producing that needs a support ticket, the analysis will be done once and never repeated — which is the same as not doing it.

CHAPTER 05

Charging away from the depot

However well a depot is designed, some vehicles will charge elsewhere: a long route, a vehicle that could not return, a driver who ran the battery lower than planned. Handled well this is a minor cost line. Handled badly it is petty cash, paper receipts and no attribution at all.

The three ways it gets paid for

METHOD	ATTRIBUTION	PROBLEM
Driver pays, claims it back	Poor	Receipts, delay, no energy data
Fleet card at particular networks	Good on those networks	Only where you have an agreement
Roaming under one account	Good everywhere it reaches	Needs an eMSP relationship

The first is where most fleets start and it is the one worth leaving quickly. It attributes nothing, it delays reimbursement, and it produces a rupee figure with no kWh behind it — so the vehicle's energy record has a hole in it exactly where the expensive charging happened.

What roaming gives a fleet

One account, one invoice, and — critically — the session record with its energy, attributed to the same vehicle as the depot sessions. That is what keeps cost per kilometre honest.

- The same tag or app works on partner networks.
- Sessions appear in your own reporting alongside depot charging.
- Per-driver and per-vehicle limits still apply, which matters more away from the depot than at it.
- You can see where drivers are actually charging, which frequently suggests where your next depot or contract should be.

What it costs

Public charging is several times depot cost per unit — retail pricing, no demand-charge amortisation, often a peak-hour tariff. That is not a reason to prevent it; a vehicle that cannot complete a route costs far more. It is a reason to measure it.

TREAT THE TREND AS A SIGNAL, NOT A COST

A route whose vehicles increasingly charge publicly is telling you the duty cycle has changed, or the depot window has shrunk, or the fleet has grown past the site. That is a planning finding arriving through an expense line.

Controls worth setting

01 A monthly cap per vehicle on public charging, high enough not to strand anyone and low enough to be noticed.

02 Notification when a vehicle exceeds it, to the depot manager rather than to a report nobody opens.

03 Preferred networks where you have negotiated a rate, surfaced in the driver’s app.

04 A simple rule drivers can follow — charge publicly only below a stated state of charge — which removes the judgement call at the roadside.

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.

White Stripe Innovations Private Limited. Last updated 15 May 2026. This document is general information about running a charging business, not legal, tax or financial advice.