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The Challenges of Integrating Payment Terminals into EV Chargers

Introduction

Forecourt retailers and motorway service operators are increasingly required to equip EV charging stations with payment terminals for ad-hoc credit and debit card payments. New regulations such as Europe's AFIR mandate contactless payment on public chargers, pushing Charge Point Operators (CPOs) to integrate card readers into their systems. However, this integration is far from simple[2].

Traditional payment set-ups tend to be fragmented - involving separate e-mobility service providers (eMSPs), charge point management systems (CPMS), standalone charger user interfaces and independent payment terminal hardware[2]. This fragmentation creates challenges from both a technical aspect and with the user experience. In contrast, emerging vertically integrated solutions (such as WILLBERT's PayBERT) promise a seamless approach to payments, combining charger and payment systems into one cohesive platform. This report examines the key pain points of the fragmented approach - from pre-authorisation confusion to hardware incompatibilities - and compares them with the benefits of integrated solutions like PayBERT.

The Fragmented Payment System Architecture in EV Charging In a traditional EV charging payment set-up, the payment process involves multiple independent components: an eMSP platform (for user accounts or apps), a CPMS (cloud software managing charger operations), the charger's on-screen Uf and an attached payment terminal (card reader) with its own backend. These components often originate from different vendors. For example, a forecourt operator might use a third-party CPMS to run chargers, integrate an external card reader device for payments and allow various eMSP cards or apps - all loosely coordinated. There is currently "no standard way of implementing" such payment terminal integrations. This lack of standardisation means each installation can be viewed as a bespoke project, leading to extra costs and administrative work for the CPO. Different payment terminal models and software versions add further complexity to this already fragmented landscape.

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The problems with EV charging payments

Pre-authorisation holds and driver confusion

When using a credit/debit card at an EV charger, the system typically performs a pre-authorisation - a temporary hold of funds to ensure the customer can pay for the session. This is similar to how traditional fuel dispensers work, except the charger doesn't know upfront how much energy will be dispensed. Many networks default to a conservative high hold (e.g. €30 or €50) to cover a full charging session. Once charging is completed, the actual amount is charged and any excess hold is released back to the customer's account[7].

Refund delays - The delay in releasing unused pre-authorised funds further exacerbates the issue. Ideally, the charging system should void or adjust the hold immediately when the session ends or fails. In practice, some networks instruct immediate cancellation of the hold - for example, GRIDSERVE in the UK notes that their software immediately triggers release and "for most customers, the money returns within minutes". However, not all systems are this fast. Some banks are slow to remove holds, taking 5 to 7 days to return the money. Evie Networks in Australia faced backlash when it introduced a $30 hold, with many drivers perceiving the hold as an actual charge due to these bank delays. Evie acknowledged the negative driver feedback and the "perception that pre-authorisation is a payment". Such confusion erodes trust and triggers a form of "payment anxiety" where drivers worry they've been charged incorrectly[6].

Confusion and "payment anxiety" - In practice, this process often confuses drivers. They might check their bank balance and see a large pending charge (e.g. €30 or €50) from the charging session and mistakenly believe they were overcharged. Because the final charge might post days later (and the hold release can lag behind), drivers can be left in suspense. Some EV drivers have reported ending up with multiple €30 holds totalling over €100 on their cards after a series of charging attempts. This typically happens if the first charging attempt fails or times out as each restart triggers a new authorisation hold - a scenario more common in EV charging than in fuelling due to network or charger glitches. Unlike a traditional fuel dispenser (where a single authorisation is usually sufficient), EV chargers sometimes require multiple attempts.

Minimal feedback on the card reader - Many contactless payment terminals on EV chargers display only basic messages (such as "Authorising" or "Approved - you may charge now"). Once the session starts, the card reader may go idle or show a static message, providing no further updates on energy dispensed or cost. The driver must switch attention to the charger's main UI for session information. If an error occurs (charger unavailable, or cable not connected properly), the payment terminal may not clearly convey this information to the customer, potentially leading to multiple payment attempts. In a fragmented set-up, the charger's UI and the payment screen are not a unified experience - unlike a traditional fuel dispenser where the card reader and pump display are integrated.

Managing pre-authorisation better - Fragmented systems often struggle to optimise the pre- authorisation process. The payment terminal might rigidly apply a fixed hold amount and can not dynamically adjust or reuse it across multiple station uses. If the charger UI and payment terminal aren't in sync, a driver may not be clearly informed about the hold or any refunds. This lack of transparency is a pain point. Industry voices recommend improvements such as only pre-authorising when a session is definitely starting, immediately voiding unused holds, reducing the hold amount, and providing clear on- screen messaging about holds and refunds. Implementing these is complex in a non-integrated system where the payment device and charging controller operate semi-independently[6].

Lack of session awareness on terminals and UI gaps

When the payment terminal is a separate system, it often has little "awareness" of the ongoing charging session beyond the transaction itself. This can lead to a disjointed user experience. The driver interacts with a card reader (often a small screen or just LED indicators) for payment, and this operates independently from the charger's display for charging status. Because the two may not be fully synchronised, drivers can be left guessing how the payment correlates with the charging progress.

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Multi-charger sites - Some service areas attempt a kiosk-style approach, where one payment terminal serves multiple charging stations to save on hardware costs. This is workable only if the system guides the user effectively - e.g., the driver might select their charger number on a central payment kiosk.

In a fragmented scenario, implementing this type of system is tricky. For instance, Etrel's solution allows one "master" charger with a terminal to act as a payment station for others, instructing the user via on-screen prompts to go to that unit to pay. Such set-ups rely on communication capabilities between the chargers and the payment system. If this is not well-integrated, users could be confused about where to pay or whether their session on a different stall is properly linked. Ensuring the payment kiosk knows which session to charge also requires tight back end coordination[9].

No real-time cost visibility - In a perfect scenario the driver should be able to see the mounting cost or consumed kWh associated with their session. In a fragmented system, the charger knows the KWh and duration, but the separate payment system knows the money authorised. If they aren't tightly integrated, real-time price calculation might not be shown on either interface. Drivers will only learn the final cost after the session has completed and their card has been charged. This lack of transparency can be frustrating, especially if pricing is complex (time-of-day rates or idle fees) and not communicated upfront on the charger.

Overall, a lack of deep integration means the payment interface cannot easily be "session-aware." It treats the transaction and charging session as separate, forcing the driver to bridge the gap mentally. Any issues - like the session not starting after payment - leaves the driver unsure whether they'll be charged or whether they need to pay again. This fragmentation is a clear usability issue noted by operators and often observed in early implementations of card payments on chargers.

Difficulty Providing Receipts and Invoices

Another pain point in non-integrated systems is issuing receipts or invoices for charging sessions. Drivers (especially commercial fleet users) often need an official record of the transaction - including the energy consumed, cost, date/time and taxes - much like a traditional fuel station receipt. In fragmented setups, providing this is cumbersome for several reasons:

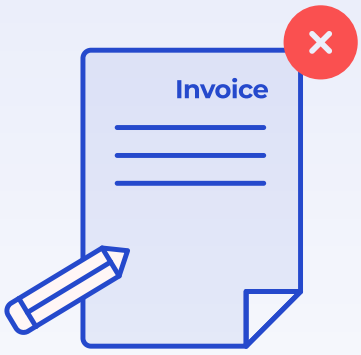
No on-site receipt printing - Most EV charging stations do not include printers (to avoid maintenance issues such as paper refills or jams). If the payment terminal is stand-alone and not connected to the CPO's user account system, it may have no way to issue a receipt.

The U.S. National Institute of Standards and Technology (NIST) has provided guidelines (Handbook 44) for EV charger receipts, recommending digital receipts via text, email, or web because printed receipts are impractical in unattended environments. However implementing these types of receipts requires additional integration between the payment transaction and a customer contact method[3].

Manual retrieval processes - Some networks resort to solutions that require additional 'clunky" steps for users. For example, drivers might visit a web portal and input the last 4 digits of their card and session details to download a receipt later. Gridserve, offers a "Receipt Portal" on their website for credit card transactions. This requires the user to know the card number used and session time in order to access the invoice. In an age where convenience is king, this is not a particularly user-friendly system, especially if the driver is on a long trip or not aware of the process. This issue is a direct consequence of the payment system being separate from the charging data.

Invoicing for business needs - In many countries, an invoice with tax breakdown is needed for business expense reimbursement. Non-integrated systems struggle here. The CPMS might log energy and cost, but it doesn't have the card payment details to generate a proper tax invoice.

Conversely, the payment processor has the transaction details but not the kWh data or tax info. Without integration, CPOs often cannot easily invoice drivers on behalf of the CPO in real-time. This requires later reconciliation - matching a payment record to a charging session record - which is labour-intensive. Some operators simply forego offering invoices for ad-hoc transactions, which can deter commercial EV drivers. In short, fragmented set-ups introduce friction in obtaining receipts. This is a clear contrast to integrated solutions that can automatically email a receipt or provide one via the charger's interface as soon as you finish charging[4].



Hardware and Compatibility Limitations

Integrating a payment terminal into an EV charger is not just a software challenge - it has hardware and mechanical constraints as well. Forecourt operators often discover that retrofitting payment hardware onto existing chargers or aligning new chargers with preferred payment systems is difficult:

Physical and Electrical Integration - Not all card reader hardware is compatible with every charger model. The terminal must physically fit onto the charger body (or pedestal), meet environmental ratings and interface electrically with the charger's controller. According to a recent consortium report, "integration of [a] credit card reader into [an] EVSE has been challenging, largely due to software issues," and moreover "not all card readers are compatible with a specific EVSE's hardware and software"[3]. This means a CPO can't simply select any payment terminal off the shelf; it has to be one that the charger's firmware can communicate with and that can endure outdoor conditions (heat, cold, rain).

If a retailer has a preferred payment terminal vendor (for example, to match their in-store systems or banking provider), that device may not work with the charger without custom development. This limits choice and can force operators into a specific hardware ecosystem.

Mechanical and Weather Considerations - EV charging stations are often outdoors or in minimally sheltered areas, so the payment device must be sturdy and fit for the environment. Many off-the-shelf payment keypads are designed for indoor retail, not for enduring rain or sub-freezing temperatures.

Best practices recommend using "weather-resistant card readers designed for outdoor use" and ensuring they meet appropriate ingress protection (IPS4/1P66) and temperature ranges. Ensuring this adds cost - heavy-duty enclosures, heating elements for screens in cold climates, etc. Some older chargers simply don't have space or panel provisions to add such hardware, making retrofits complex. Retrofitting card readers into existing stations, if not anticipated in the original design, can be complex, and data security requirements make this challenging[3].

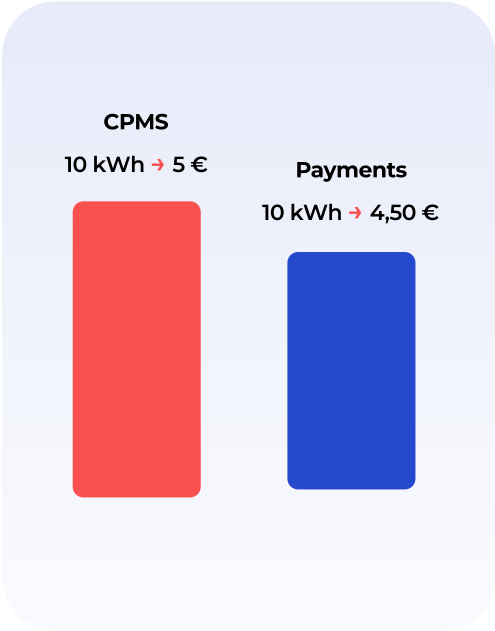
Compatibility with Payment Providers - Beyond hardware, there's the issue of the payment backend. Many CPOs have a relationship with a Payment Service Provider (PSP) or acquiring bank that processes transactions on their behalf. The chosen payment terminal must be supported by that PSP's system. This adds another layer of verification and can limit your selection[4]. For example, a petrol station chain might want all payments (fuel and EV charging) to go through one merchant account. If the EV charger's terminal cannot be integrated with that account or uses a different PSP, the operator might have to switching providers or manage two separate payment channels. Deploying terminals that match a retailer's existing payment provider can require custom integration work or specialised hardware, delaying rollout.

Regulatory Compliance - Payment hardware must comply with Payment Card Industry (PCI) security standards and often needs certifications (EMV, contactless protocols, etc.). Integrating a card reader into a charger means the charger itself may be subject to compliance audits if card data passes through it. This complicates software updates and security: charger firmware updates now must be coordinated with the payment module's software updates to maintain compliance[3]. The fragmented approach might involve two independent update cycles (one for the charger, and one for the terminal), which if not carefully aligned, could break the integration. Ensuring both systems remain PCI-compliant and certified adds an ongoing maintenance burden.

Operational and Maintenance Inefficiencies

Fragmentation doesn't only affect the user experience and installation - it also impacts day-to-day operations for the charge point operator:

Dual System Administration - In a typical non-integrated setup, the CPO ends up managing two separate backends - the CPMS for charging data and a payment portal for the terminal. This means pricing, fees, and session info might need to be configured in both. For instance, the CPO might set the charging tariff at $0.40/kWh in the CPMS so that the charger display shows the correct price and calculates session costs. But the payment terminal often has its own price logic or preset for authorisation (especially if it directly triggers the session). As a result, the operator must also program the price into the terminal's system. This dual configuration is error-prone as any updates to the tariffs need to be done in two places. If you miss updating it in one system, you end up with discrepancies. Industry experts cite this "dual system support" as a major drawback of loosely integrated terminals. It not only doubles the workload for price changes but also complicates promotional pricing or complex tariffs (one system might not support nuanced structures like time-of-use pricing that the other does)[4].



Inaccurate Financial Reporting - Revenue accounting becomes more complicated when charging session data and payment transactions are siloed. The CPMS will record how much energy was dispensed and theoretically how much should be charged, while the payment system records what was actually paid. If the two aren't perfectly reconciled, the CPO can face discrepancies. For example, a session might not complete due to the driver unplugging early - the CPMS might log a certain fee, but the payment captured might be less (or vice versa if a hold wasn't fully captured)[4].

Using two systems "can lead to inaccurate settlement reports," especially when sharing revenue with site hosts or partners. This would mean someone has to aggregate data from both systems to know total earnings. Automated features like consolidated reporting or revenue share calculations in the CPMS become unusable if some transactions happened outside of it. This introduces manual reconciliation work, reducing operational efficiency.

Maintenance and Uptime Monitoring - A fragmented payment terminal can be a blind spot in maintenance. Many CPOs have service contracts to maintain chargers, but the payment system is generally not included in the EVSE service and maintenance plan. This means issues with the card reader (card slot jams, PIN pad failures, communication faults) might go unnoticed until drivers report them. Regular charger technicians might not be trained or authorised to fix the payment hardware. The NREL consortium noted that wear, tear, or vandalism can cause card reader malfunctions, and operators should plan for timely support and repairs for payment systems, including things like cleaning card slots or reboots. In practice, with separate systems, this can fall through the cracks. A charger could be operational but unable to take payments if the terminal is offline - effectively out of service for ad-hoc users, despite appearing "up" in the CPMS. This fragmentation in monitoring can hurt uptime. CPOs end up having to monitor two system dashboards - one for charger status and one for payment device status (if available) - to ensure everything works[3].

The problems with EV charging payments

Vendor Coordination - With separate charger and payment suppliers, there can be finger-pointing when issues arise. If a session fails to start after a customer taps their card, is it a charger fault or a payment transaction fault? Troubleshooting requires expertise in both systems. Software updates need coordination. If the CPO wants to switch payment processors or update their pricing strategy, they might need to involve both the CPMS vendor and the payment terminal vendor for changes. This slows down business agility; for example, implementing a new discount or an idle fee could require a firmware update on the terminal if it wasn't originally supported. In contrast, a more unified system could handle it in one place.

Cost Overheads - Non-integrated approaches often necessitate one payment terminal per charger for full coverage (especially on DC fast chargers where each station is a stand-alone unit). This hardware cost is significant - the card reader, PIN pad, and related electronics can add a few hundred dollars to over a thousand dollars per charger. One industry analysis notes that "in the integrated approach, one payment terminal is usually limited to one charger," which "increases the total cost of ownership" for the CPO[4]. Whilst solutions such as kiosk mode offer a workaround, this also adds user complexity,. Additionally, each terminal may incur its own monthly service fees and cellular data plan costs. All of this means fragmented set-ups can be expensive to deploy and operate, especially across large networks.

In summary, the traditional fragmented model can be operationally inefficient and harder to maintain at scale. It requires juggling multiple systems, ensuring consistency between them, and handling more vendors - all of which drive up cost and complexity for charge point operators.

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Mainstream Approaches to Payment Integration

Hardware and Compatibility Limitations

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Platform-Level Integration (CPMS-centric) - Many CPOs leverage their backend software (CPMS) to mediate between chargers and payment terminals. For example, platforms like GreenFlux and Etrel's OCEAN are hardware-agnostic software solutions that support various payment terminal models via cloud integration. Instead of the terminal talking only to the charger hardware, it communicates with the CPMS, which in turn controls the charger. This is essentially a "cloud-to-cloud" integration. The CPMS handles pricing, authorisation logic, and session control centrally. GreenFlux supports well-known payment terminal hardware like the Payter Apollo and can integrate it so that price information and session start/stop commands flow through their system. With the OCPP 2.0 (Open Charge Point Protocol v2.0, which has specific messages for payment) such integrations can be done automatically, whereas older OCPP versions require custom work. This approach mitigates some fragmentation as pricing is configured once in the CPMS, and the terminal uses that data. The CPMS also knows when a card transaction starts a session and when it ends, enabling it to pair the data[1].

Roaming and Mobile Payments - Another mainstream approach, particularly in Europe, has been relying on eMSP roaming networks and mobile apps for "ad-hoc" payments, instead of physical card readers. While not a physical integration, it's worth noting that many CPOs initially avoided hardware by using smartphone web apps or QR-code payments to satisfy open-access requirements. For instance, scanning a QR code on the charger that opens a web payment page (with Apple Pay, Google Pay, or card entry) is one method.

GreenFlux[2] offers a "Direct Pay via Web" solution for lower-power stations (AC chargers) as a cheaper alternative to installing terminals. This avoids hardware fragmentation but shifts the burden to software. Drivers need a working phone and internet connection, and the user experience can suffer if apps glitch or cell signal is weak. Nonetheless, it's a common interim solution globally, including the U.S., to meet requirements for credit card acceptance without installing physical readers on every unit.

"Kiosk" or Shared Terminal Models - To reduce hardware costs and complexity, some providers allow one payment terminal to serve multiple chargers. The CPMS or a "master" charger coordinates this. As mentioned, Etrel's system can cluster chargers so that one unit with a terminal acts as the pay station for the entire charger group[9]. GreenFlux also highlights "kiosk mode" as an efficiency opportunity. In practice, this resembles parking garages or petrol forecourts where you might pay at one machine for a specific bay[1]. The success of this model hinges on a well-designed user interface to select the charger and clear communication (usually on the chargers' screens) directing users where to pay.

If executed well, it can significantly cut hardware costs and simplify compliance (one device to certify instead of many). However, it requires a robust backend integration - the central terminal must be aware of each charger's status and be able to start/stop sessions remotely via the CPMS. Platforms like OCEAN (Landis+Gyr/Etrel) claim to allow one terminal to even handle payments for third-party chargers in the cluster, emphasizing cross-compatibility.

Lack of session awareness on terminals and UI gaps

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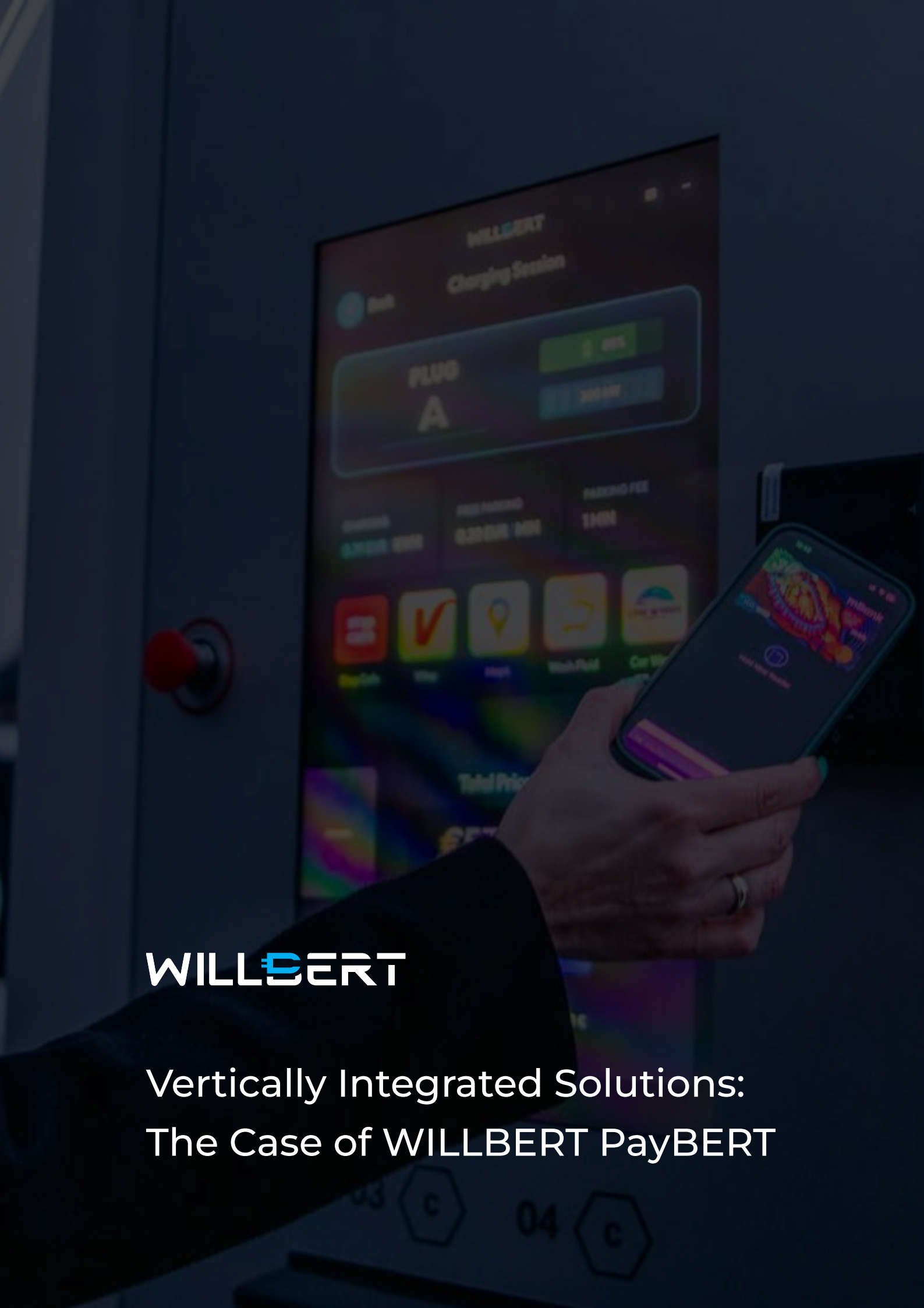
Global Examples - Adapting to Local Needs - Around the world, different strategies highlight the integration challenge. In the U.S., some states, such as California, are beginning to require credit card readers on public fast chargers. Networks like Electrify America and EVgo installed readers early on, but even they faced issues like fixed $50 pre-authorisations that confused customers. NREL's 2024 report on EV charging payment emphasizes making payment "a core focus" for reliable public charging and notes that multiple payment methods (NFC tap, RFIDmembership, apps, Plug& Charge) each add their own technical hurdles to an already complex system[3].

The U.S. experience has shown that software integration is the hardest part - the report explicitly states that "poor software integration of the credit card reader into the EVSE can affect overall reliability," urging that any EVSE+reader combo be thoroughly tested prior to deployment. In Australia, Evie Networks implemented a workaround to improve user experience by moving to an "Autocharge" system (recognising vehicles and linking to accounts) which bypasses the need for large pre-authorisation holds entirely.

In Europe, the AFIR regulation is forcing the issue. Networks that relied on apps are now adding card readers - often partnering with payment technology companies. Some charger manufacturers have started shipping units with fully integrated terminals (ABB, Tritium, and others offer models with built-in contactless readers to be AFIR-compliant out of the box). These typically come with a recommended payment processing partner and require the CPO to set up merchant accounts[5].

Standards and Protocols - Industry-wide efforts are underway to standardise payment integration. The latest protocols (OCPP 2.0.1 and OCPI 2.2) include features for handling pricing display, direct payment authorisation, and session reporting in a uniform way[1]. For example, OCPP 2.0 has a concept of a "Payment Module" and messages to handle customer-initiated transactions, which the older OCPP 1.6 lacked. OCPI (Open Charge Point Interface), used for roaming, is also being extended to carry real-time pricing and even credit card payment tokens between parties. The hope is that a standardised integration will enable quicker implementation of payment systems across chargers, reducing the current need for custom middleware for each vendor combo. While adoption of these standards is still in progress (many legacy chargers run OCPP 1.6), the trend is towards more uniform communication that can ease fragmentation issues in the future[2].

Despite these efforts, the mainstream approaches still often stop short of true vertical integration. They mitigate pain points but may not eliminate them entirely. A cloud integration can still fail if connectivity is lost (another frequent issue - if either the charger or the payment terminal loses cell signal, transactions fail), and even standard protocols can't prevent all delays (banks will still be banks, sometimes holding funds for days). This is where vertically integrated solutions aim to go one step further, by designing the entire stack - hardware and software - in concert to deliver a smoother experience.



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Vertically Integrated Solutions: The Case of WILLBERT PayBERT

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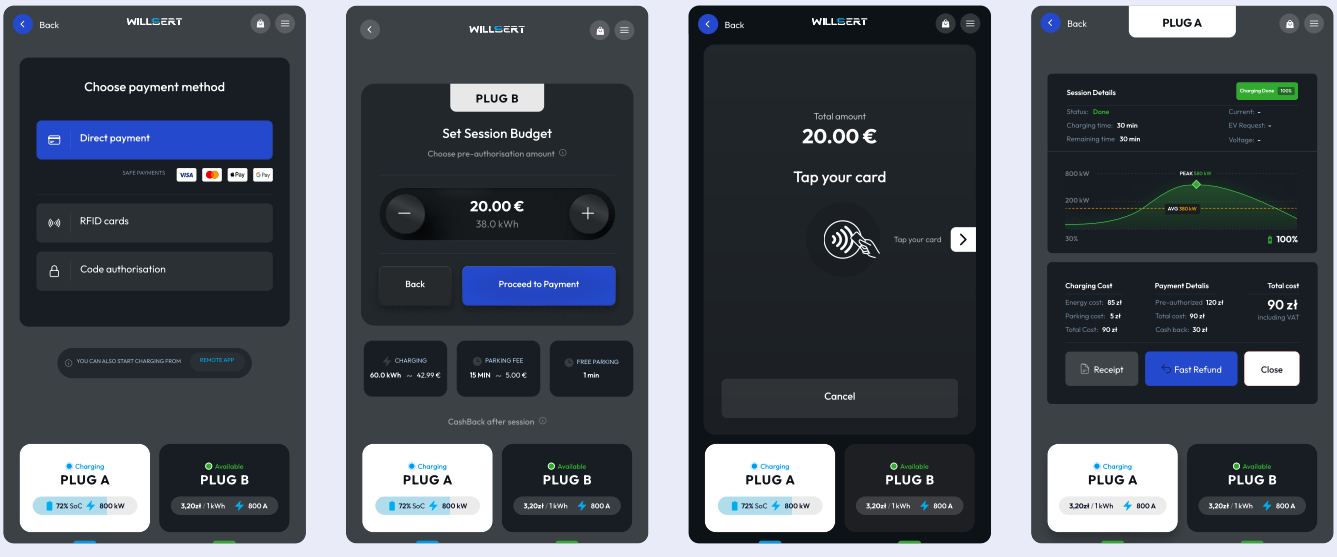
Vertically integrated payment solutions embed the payment functionality deeply into the charger's own hardware and software, rather than bolting it on as an extra. WILLBERT's PayBERT module, tailored for roadside retailers, is a leading example of this approach. In a PayBERT- enabled charger, WILLBERT provides a fully integrated package: The charger comes with a built- in contactless payment terminal, and the charger's firmware and backend (HAWKe) handle all payment logic internally. This means no separate hardware or software integration is needed by the operator - PayBERT chargers arrive payment capable out of the box.

Key features and benefits of this integrated approach include:

Unified User Experience - With PayBERT chargers, the payment process is part of the charger's own touch-screen interface. Drivers are guided through a simple flow on a single screen. Before charging starts, the driver sets a budget for the session on the charger UI. For example, a driver might choose €20 as the maximum they're willing to spend. The system then immediately places a hold for that amount via the internal payment module. This approach turns a mystery hold into a user-chosen, transparent step. The driver knows exactly how much will be reserved and can tailor it to their needs - eliminating the shock of an unexpected large hold.

Immediate Refund - Once the charging session proceeds, the charger keeps track of the energy used and cost in real- time against the fixed budget. If the driver stops early - say they only spend €15 out of the €20 - the system automatically unblocks/refunds the difference immediately when the session ends. The result is far less confusion. The hold is both initiated and adjusted in a single unified flow, all communicated on the charger screens.

Session Awareness and Transparency - Because the payment is integrated, the charger's interface can display session status and cost updates tied to that specific payment. The PayBERT system can show the user how much of their pre-authorised budget has been used as charging progresses (e.g., "€12 of €20 used"). Even if not displayed continuously, the important part is that the payment module and charger controller share data in real time. This means if a charger stops due to an error, the payment can be voided or paused instantly without the user having to take extra steps.



Essentially, the charger and payment terminal are one unit, so there is never a question of one not knowing what the other is doing. This session awareness extends to features like charging interruption handling - if a session doesn't start, PayBERT will recognise that and void the authorisation (preventing the issue of multiple holds). The integrated screen can also present any error messages in context (e.g.,"Card not authorised" or "Charger fault, payment cancelled"),which is far clearer than a silent failure on a standalone terminal[3].

Automatic Receipts and Invoicing z A major advantage of vertical integration is the ability to seamlessly generate receipts. Since the PayBERT backend (HAWKe) contains both the transaction information and the charging session details, it can automatically settle payments and issue invoices to drivers on behalf of the CPO[8]. As soon as the session is finished, the system can compile an invoice with the energy delivered, price, timestamp, VAT, and payment method.

WILLBERT's solution allows the driver to enter their details for the receipt in a convenient way - either directly on the charger's screen or by scanning a QR code with their phone that links to a form[8]. This way, a receipt can be emailed or downloaded immediately. This is a huge improvement over fragmented systems where receipts are an afterthought.

Faster Deployment and Compliance - A vertically integrated product can drastically shorten deployment time. With WILLBERT's Amber chargers (which include PayBERT as standard) a site can be upgraded to direct payments in just weeks. This is because the usual hardware/ software integration steps are already completed[8]. The CPO doesn't need to coordinate between a charger vendor, a payment terminal supplier and a software integrator; they simply install the charger and configure their pricing.

This plug-and-play style integration also ensures regulatory compliance straight out of the gate - for example, AFIR compliance (for contactless payments and price transparency) is built-in[8]. The operator doesn't have to worry about PCI certification of the payment device or EMV testing as these have already been handled.

For retailers, this addresses the challenge of aligning with preferred payment providers. An integrated solution comes with a ready-made acquiring service that deposits funds directly to the ePO's account. While this method may not use the retailer's existing bank contract, it does mean the CPO doesn't have to negotiate and integrate on their own. It's worth noting that some vertical solutions can be flexible here: they might partner with major payment processors to offer choice, or at least use standard settlement reports that can tie into the retailer's finance systems. In any case, the heavy lifting of compatibility and compliance is done by the solution provider.

Single Backend for Pricing and Policy - In an integrated solution like PayBERT, the CPO uses one backend interface (HAWKe) to set prices, session time limits, idle fees, and other policies. PayBERT gives operators the ability to control and regulate energy prices and fees for occupying a parking spot without an active session - all in one place[8]. Any pricing changes (such as a new kWh rate or a grace period for idle fees) are immediately applied to the charger and its payment logic simultaneously. There's no risk of mismatched configurations.

This centralised tariff management has been highlighted as an advantage of CPMS-integrated terminals in general[4] - PayBERT exemplifies it by tightly coupling the payment with the charger's own management system. It also means advanced pricing schemes are easier to implement: since the CPMS (HAWKe) is in full control. This gives retailers the ability to do things like happy-hour discounts, subscription- based rates, or loyalty card integration, and the payment module will simply charge whatever the CPMS calculates.

PayBERT even supports RFID loyalty and fleet cards in addition to bank cards, unifying those payment methods into the same system. This is beneficial for petrol station operators who often have their own fuel card or loyalty programs, allowing them to extend those offers to EV charging customers without bolting on another separate system.

Improved Reliability & Maintenance - With one integrated system, maintenance is simplified. The charger's monitoring system also keeps tabs on the health of the payment module. If the card reader malfunctions, it shows up in the same diagnostics as any other charger component, triggering a unified support process. There's no separate black-box device whose faults might go unseen.

Additionally, vertical integration often means the hardware design is optimised: the card reader is placed ergonomically (meeting accessibility requirements), shielded from weather by the charger housing, and tested for electrical interference alongside the charger. The result is often more robust than a retrofitted solution.

From a support standpoint, there's one single point of contact - the charger vendor - responsible for the entire station including payments, which can speed up issue resolution and firmware updates. The integrated approach can also enhance security, since the data flow is wholly within one system (there's less risk of insecure interfaces between the charger and a third-party device when one company designs the whole product).

In essence, solutions like PayBERT address nearly all the pain points felt by retailers and end users when using fragmented systems. Integrated systems make the payment process clear and user-friendly (no more mysterious holds - the driver is in control of their budget and immediately sees refunds), they ensure the payment is tightly linked to the charging session (the system knows when to charge and when to release funds, with no ambiguity), they automatically handle invoicing (saving headaches for both drivers and operators)[8] and they simplify the operational workload (one system to manage, far less duplication or reconciliation).

For an EV charger hardware specialist, the takeaway is that vertical integration like this essentially merges what used to be four systems (EMSP app, CPMS, UI, payment terminal) into one coherent system. The charger itself becomes a self-contained payment kiosk and energy dispenser, similar to what customers experience using a modern fuel dispenser with pay-at-pump capability. By designing this from the ground up, companies like WILLBERT eliminate the need for the CPO to play the role of "systems integrator."

Conclusion

Integrating payment terminals into EV charging infrastructure has historically been a complex endeavour fraught with fragmented systems and sub-optimal user experiences. Charge point operators, particularly those in the retail fuel and service station industry, have had to navigate a maze of separate eMSP platforms, backend software, and bolt-on card readers, leading to numerous challenges: drivers confused by pre-authorisation holds and delayed refunds, payment terminals that operate in isolation from the charger's session logic, difficulties in issuing receipts or invoices for charges, and significant hardware and software compatibility headaches. These pain points are not just theoretical - they have been observed globally, from the U.s. (where credit card integration issues have prompted federal attention)[3] to Europe and Australia (where high deposit holds and failed payment captures spurred customer frustration)[5].

Mainstream approaches are evolving to tackle these issues, with industry players enabling more cohesive integrations via cloud platforms and standards. Yet, many of these remain partial fixes, requiring careful coordination and leaving room for error. The vertically integrated model represents a significant step-change from the current model: by unifying the payment terminal and charging system into one solution, it addresses the root cause of fragmentation.

WILLBERT's PayBERT perfectly demonstrates how a well-designed integrated system can turn EV charging payments into a smooth, transparent process for the user and a manageable, efficient operation for the provider. Drivers benefit from a straightforward "tap, charge, and go" workflow without surprises - they know what amount is reserved, see their charging progress, and automatically receive an invoice for the exact amount charged[8].

Sources

[1] GreenFlux team, *"Payment Terminal Integration: From challenge to opportunity,"* blog (Dec 2023), discussing current challenges (varying models, cost, lack of standard) and integration approaches (hardware vs cloud, kiosk mode).

[2] GreenFlux blog, *"Fit for AFIR: How GreenFlux enables full payment compliance,"* (Apr 2024), noting support for popular payment terminals (e.g. Payter) and integrated manufacturer solutions, with OCPP 2.0 and OCPI standards facilitating this.

[3] NREL ChargeX Consortium, *"Best Practices for Payment Systems at Public EV Charging Stations,"* report (Apr 2024), highlighting software integration difficulties and compatibility issues between EVSEs and card readers, plus maintenance and reliability considerations.

[4] Ampeco, *"Payment Terminals for EV Charging: The Practical Guide,"* (2023), explaining two integration scenarios. Noted drawbacks of separate terminal +charger setups (dual configuration, limited pricing flexibility, reporting complexity) and advantages of CPMS-integrated solutions (central pricing, automated receipts, multi-charger terminals).

[5] The Driven (Giles Parkinson), *"Drivers committing fraud: Why EV fast charging network had to change payment system,"* (Sep 2024), on Australia's Evie Networks instituting a $30 pre-auth hold due to payment fraud, then facing driver backlash. Describes hold release delays (up to 5-7 days for some banks) and negative perception of holds as charges.

[6] LinkedIn - Eric Zhou, *"EV charging payment insights"*, (2024), outlining user experience issues with pre-auth: multiple holds from repeated session attempts and incomplete charges requiring second sessions . Suggestions to improve pre-auth handling and mention of drivers seeing $100+ in holds, causing frustration.

[7] GRIDSERVE (UK) Support, *"Pre-authorisation fees,"* (May 2023), detailing their policy of low £1 holds (or £10 at certain sites) and immediate release after charging, with most refunds in minutes. Emphasizes how software cancels holds promptly, reducing driver wait times.

[8] WILLBERT (Euroloop) blog, *"Do we really need multiple apps to pay for charging? WILLBERT HAWKe to the rescue,"* (Aug 2022), introducing the PayBERT module. Describes direct payment integrated into each charger: driver sets a budget, amount is pre-authorised, unused funds reimbursed post-session. Also notes PayBERT auto-settles and invoices drivers, with data entry via charger screen or QR code for receipts, and gives CPOs control over pricing and idle fees.

[9] Etrel (Landis+ Gyr) brochure, *"Contactless payment solution,"* highlighting a cluster payment setup where one INCH Duo charger with a terminal serves a group, enabled by OCEAN CPMS. Demonstrates how a single payment point can handle multiple chargers when properly integrated.