

J.P.Morgan

J.P. Morgan Payments Mobility Series

Mapping the road ahead for electric-vehicle charging providers

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Table of contents

Introduction 3

Customer journey 5

How to consider the customer journey in the age of electric vehicles—moving from analog refueling to digital charging

Ecosystem perspective 7

Shifting the debate around electric-vehicle charging infrastructure from quantity towards quality—the role of an eMSP in connecting customers and charge point operators

Smart-charging technology 9

Emancipating the function of eMSPs to provide grids with demand response capacity while giving the consumer meaningful financial incentives

Fleets perspective 12

Exploring the challenges in providing an eMSP dedicated to fleet operators

Conclusion 14

J.P. Morgan Payments Mobility Solutions 15

Driving the consumer mobility experience

Introduction

Within the paradigm of the energy transition, the decarbonization of transportation plays a critical role. For this shift to electrify transportation to take place, the nascent electric vehicle (EV) ecosystem requires a significant build-out of charging infrastructure, both hardware and software, to support customer adoption and provide a seamless experience.

This ecosystem in Europe comprises a wide range of players, including incumbent operators such as auto original equipment manufacturers (OEMs) and oil & gas majors, in addition to newcomers such as e-mobility service providers (eMSPs) and dedicated charge point operators (CPOs), with an increasingly complex web of interaction between these participants.

Although EV adoption continues, over the past 12 months we have witnessed growing headwinds facing the industry including higher interest rates, geopolitical pressures and shifting political and business priorities. These factors combine to create challenges for the EV ecosystem and its market participants going forward.

At this pivotal juncture for the EV industry in Europe, this paper spotlights commentary from several market players to analyze key trends and strategies for the future. We observe that despite current concerns for the ecosystem, there are several strategies that eMSPs are adopting which will likely pave the path for improved customer adoption and sustainable industry growth in the coming years.

“Each part of the energy ecosystem contains more complexity than meets the eye, and EV charging is no exception. At J.P. Morgan Payments, our role is to enable our clients to navigate this complexity and provide future-ready solutions to help ensure a connected customer experience.”



Tristan Attenborough
Global Head of Energy, Power, Renewables, Metals & Mining
Payments and Global Head of Advisory

While the quantity of EV chargers is often cited as a key issue, the quality of the charging infrastructure is equally critical for the consumer to enjoy a seamless experience—providing incentives and recommendation systems that can guide consumers towards quality will be a key determinant for winners in the market.

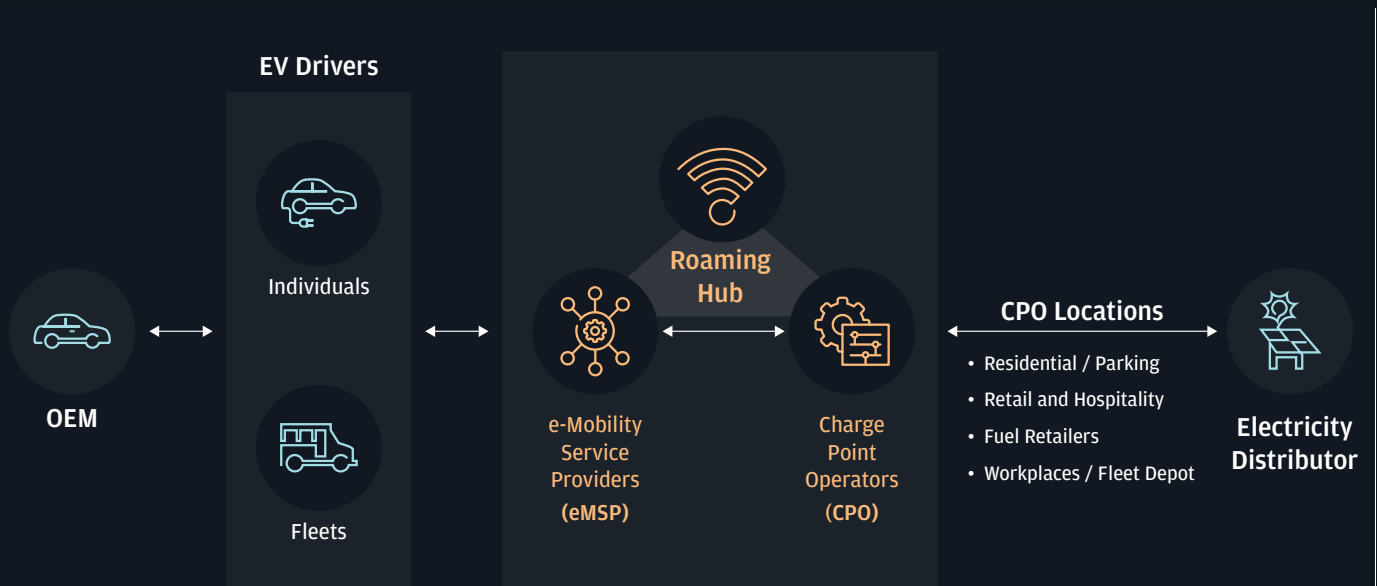
In addition to a high-quality charging experience, consumers want certainty over their charging costs, with contracts more closely resembling a mobile phone subscription than a transactional petrol station refuel.

Market participants are looking to negotiate with electricity grids to enable EV owners to earn money from their battery asset via smart charging. This is doubly beneficial as it not only reduces the total cost of ownership for EV drivers, but it also supports the balancing of the grid, which is seeking to cope with increased intermittency as the mix of renewables supply grows.

We observe that the payments experience for consumers remains complex and cumbersome across multiple apps and payment methods. Simplifying this interaction will be a key consideration for market participants to grow the overall ecosystem.

We believe the EV charging ecosystem in Europe will surmount present-day challenges as adoption and infrastructure grows. When incentives from smart energy become more apparent to consumers, we envision an electric-vehicle becoming a “battery asset on wheels.” This will change not just the cost of ownership, but become a key enabler for the energy transition beyond the decarbonization of transport through its function in demand management. In this paper we will review these opportunities and the implications for the ecosystem.

Electric-vehicle ecosystem



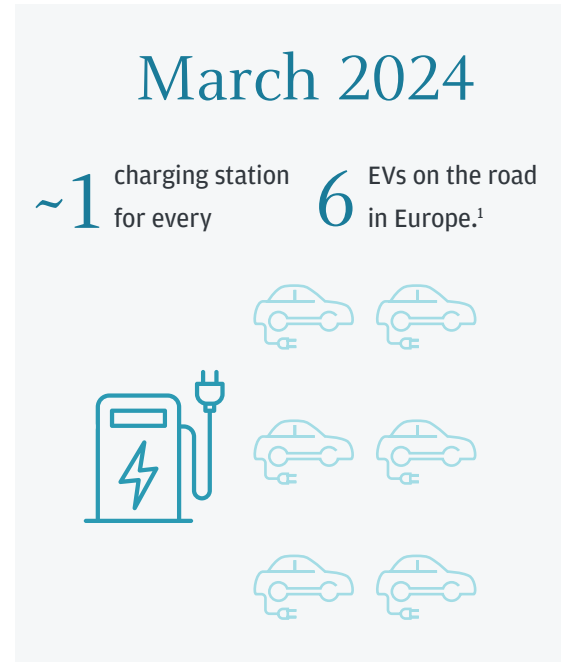
Customer journey

The EV market in Europe is undergoing a significant transformation, driven by a combination of technological advancements, policy shifts and changing consumer behaviors. As the EV adoption rate accelerates, the charging infrastructure is scaling up to meet new customer demands and preferences. Understanding these evolving trends from the perspective of the customer journey is crucial for stakeholders in the EV charging ecosystem.

Increased demand and network expansion

The surge in EV adoption is mirrored by a growing need for extensive and accessible networks for charging on the go. We are witnessing a robust expansion in both public and private charging stations across Europe, indicating a move towards a more EV-inclusive infrastructure. In fact, as of March 2024, there is one charging station for roughly every six EVs on the road in Europe.¹

However, this rapid growth can come at the cost of customer experience, with multiple charge point operators, difficulty in finding the best prices, differentiating fast vs. regular charging speeds and missing or unreliable chargers. These challenges add to the underlying range anxiety that still exists for EV owners.



Industry insight from Digital Charging Solutions

When considering the customer journey for EV charging, we view the user experience through the lens of charging contracts rather than individual charging transactions. With refueling, customers have historically examined the price at each individual refuel, but with electric charging, it makes more sense to consider the price across an extended period with multiple refuels. Charging, therefore, has more in common with a mobile phone contract than with classic refueling.

As a mobile phone customer, you don't want to constantly check before making a call which carrier is offering the cheapest rate—instead, once basic availability and reliability issues are addressed, it is much more practical, and ultimately cheaper, to secure price advantages with a contract that suits your own behavior and needs. This is the type of structure we foresee with EV charging.

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¹ European Alternative Fuels Observatory.

Advancements in charging technology

The deployment of ultra-fast charging stations is a game-changer, significantly cutting down charging times and addressing range anxiety issues, making EVs more practical for longer journeys. To facilitate a smooth, cross-border EV experience, there is a growing emphasis on standardizing charging systems and protocols. This approach is essential for creating a cohesive and user-friendly network across Europe.

Seamless charging solutions

The EV charging market focus has shifted towards delivering a seamless charging experience. Innovations required include simplified payment processes, real-time charger availability updates and user-friendly interfaces, all aimed at reducing friction for EV users.

EV customers face an overwhelming choice of apps, payment options and charging services, with 23% of EV owners having 4+ charging apps for accessing public chargers in 2023.² Simplifying this customer journey for EV owners presents both a problem and a meaningful opportunity for participants in the EV charging ecosystem, spanning CPOs, eMSPs and those that operate as a hybrid, in addition to payment operators.

Recent studies from BCG and McKinsey identify paying for EV charging as a top consumer concern. Solving for the friction in the customer journey is a key priority for all parties involved, and would likely encourage uptake of EVs overall.³

Payment methods most commonly used at charge points for EV vehicles in the EU⁴



7.5%

App Based



2.5%

QR Code Scan



1.5%

Plug & Charge



88.5%

Radio-Frequency Identification

Industry insight from Digital Charging Solutions

The user experience around charging must be seamless, simple and convenient across the board. In addition to non-discriminatory accessibility, a user-friendly design of all processes is critical. Charging infrastructure operators must be able to offer high quality data for optimal service as well as fair and transparent pricing, which can then be guaranteed to the drivers via an eMSP.

The payments processing experience plays a vital role in shaping the overall customer journey for EV charging—by prioritizing convenience, security, transparency, flexibility and innovation in payment processing systems, charging station operators and service providers can improve the customer experience and drive greater acceptance of electric-vehicles.

“We should stop equating charging and refueling – refueling is analog, charging is digital.”

Markus Bartenschlager,
CCO Digital Charging Solutions

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² Shell Recharge, EV Driver Survey Report 2023

³ BCG, What Electric-Vehicle Owners Really Want from Charging networks; McKinsey, Exploring Consumer Sentiment on EV Charging 2024

⁴ Digital Charging Solutions data, July 2024

Ecosystem perspective

Purchasing an EV is just one step in a consumer's broader journey toward a green and sustainable lifestyle. This journey includes EV charging at home and on-the-go, generating renewable energy with solar panels, directing solar energy into home storage systems and enjoying a seamless, integrated experience with mobile apps.

Sustainable EV charging

For many consumers, an EV represents a commitment to sustainability that extends to their entire energy ecosystem. This includes generating energy from renewable sources, managing power with home EV chargers and battery storage, and accessing digital information about charging status, pricing and demand flexibility events from power providers.

On the road, customers expect their sustainable charging journey to continue seamlessly. They need reliable information about the location and availability of public charging stations and convenient access to these chargers to complete payments easily.

Given the complexity of managing various data inputs and outputs, customers often prefer a single provider for an end-to-end, holistic charging and energy management experience. This provider can help them drive their energy transition, covering hardware, software and energy needs.

Industry insight from Elli

As Elli looks to expand its service offering, how does the experience across the brands shape Elli's perspective on the evolving ecosystem?

Elli began in the EV charging hardware space, later expanding to include home charging and eMSP services, and, most recently, smart energy solutions for energy trading and storage. As Elli evolves into a true software-driven energy company, the challenge will be transforming hardware infrastructure into smart energy services.

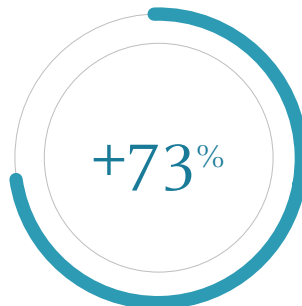
As the market shifts from early adopters to the mass market, significant scale is critical for charging solutions. While the quantity of charging infrastructure was initially a primary concern, the focus is now shifting to infrastructure quality. EV drivers increasingly demand reliable and premium charging options.



Within the last 12 months (June 23' to June 24'), the charge point ecosystem has grown significantly in Europe.⁵



Growth in overall charge points in eMSP network



Growth in high performance charging (HPC) and growth in eMSP network (150kW+) charging



Growth in HPC charge points operated by Elli's select partner network (SPN) partners

Industry insight from Elli

Much like how consumers distinguish between budget and premium airlines, EV drivers are learning to differentiate between charge point operators (CPOs). The best eMSPs will guide customers toward quality by helping them find chargers that offer the best experience. Elli identifies selected partners with superior quality infrastructure using a crown symbol. These partners meet specific criteria, including high uptime, good location, high-power fast charging, multiple charge points and ancillary services such as toilets or cafes. Features like plug-and-charge and roof coverage further enhance the comfort provided by these selected partners. Elli's premium subscription includes these selected partner CPOs at a competitive, reduced kW price.

By focusing on high-quality infrastructure and comprehensive services, Elli aims to lead the market in providing a superior experience in EV charging and energy management.



“Only 1% of our network are selected partners, but these make up over 25% of charging sessions.”

Brendan Koehler
Vice President, Elli eMSP

⁵ Elli data, July 2024

Smart charging technology

As the EV charging ecosystem evolves, the provision of a great customer experience is becoming a key differentiator for auto OEMs, power & utilities companies and charge point operators alike. We are seeing an emergence of white-label eMSP apps that can service this growing need for corporates to uphold their brand reputation while rolling out ambitious electric-vehicle charging infrastructure.

Smart charging white-label offerings typically include single sign-on capabilities, integration software, APIs and electricity price discovery; with the latter likely to become an increasingly prominent priority for eMSPs as they look to devise dynamic electricity tariffs and provide incentives for customer to join and stay within their ecosystem.

Smart charging and the grid

As the energy transition continues to evolve, grid operators will come under pressure to support growing electrification across transport, industries and households. Dynamic charging through smart technology gives eMSPs and their customers the opportunity to both support the grid and provide economic benefits to the end users.

Industry insight from Deftpower

Deftpower is accelerating the evolution of eMSPs from an intermediary between EV drivers and charge point operators to an enabler of demand management focused on rewarding EV drivers for use of their battery asset in a smart energy ecosystem.

While European regulation to mandate tap-and-pay at EV charging locations is putting the role of eMSPs under pressure, Deftpower is emancipating the role of an eMSP from a simple access and payments processor to a central gateway between the flexible assets and the energy market parties, which are in sore need of this flexibility. In the past, electric-vehicles were solely consumers of electricity. In the future, the power grids will see them as distributed storage devices, which will transform the role of the EV driver from a pure purchaser of electricity to a seller of flexibility.



We foresee a future in which the charging of a batch of thousands of EVs can be remotely managed to align with the needs of the grid. Typically, the grid reaches peak supply in the middle of the day, when solar PV production is at its highest; but this must match with peak demand, which typically occurs between 6pm-10pm. This “duck curve” challenge will become a pressing issue for grids to manage in the coming decade.⁶ EV charging will add further pressure to the grid if charging takes place during peak demand periods. However, EV charging can benefit the grid during times of excess supply in the middle of the day, or at times of extremely low demand in the middle of the night.

It is likely that aggregators will emerge to enable this smart charging, acting as an intermediary between the grid and the end consumer. These aggregators can partner with grids to ensure charging takes place at times of grid surplus, while passing economic benefits to the end consumer, either through cheaper charging rates or rewards.

Industry insight from Deftpower



The energy transition is creating several pressures on grid operators, which combined puts the security and sustainability of national electricity networks at risk. These pressures include the continued growth of renewable energy in the electricity mix and the resulting intermittency of their generation output; second, the push to decarbonize is growing demand for electricity, as households switch from ICE vehicles to EVs and from gas boilers to electric heat pumps; third, industry is looking to electrify their processes, including the creation of hydrogen through electrolysis; lastly, the rapid growth of data centers due to AI demand will further put pressure on grids.

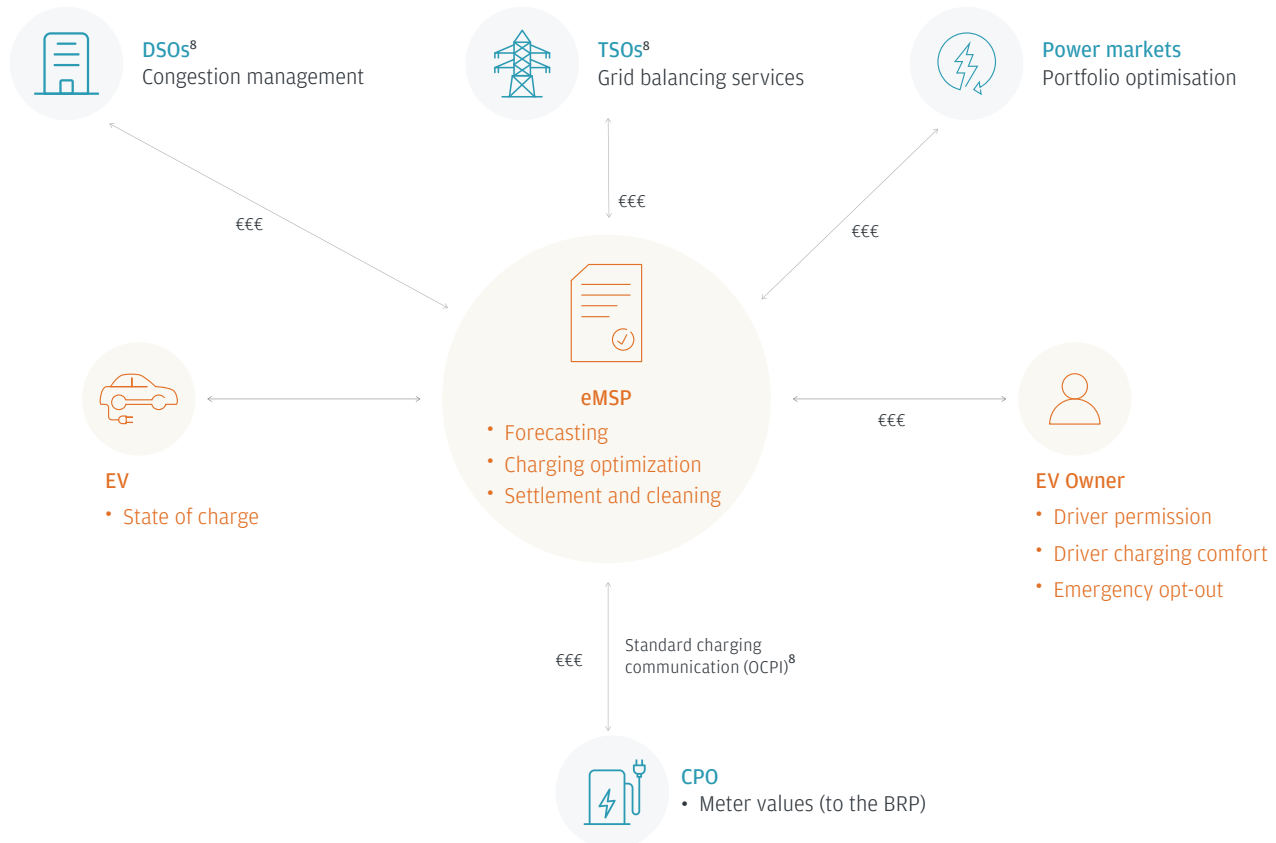
Given the aforementioned challenges for grid operators, there is a growing opportunity for eMSPs to offer the EV battery capacity of their customer bases in return for payments that can be redistributed. This “smart energy” ecosystem would both reduce the cost of grid electricity for the whole network and reduce the total cost of charging for EV customers. This concept is wholly based on demand response (the timing-specific adjustment of energy consumption), and does not require vehicle-to-grid capabilities, which are still a futuristic proposition.

“Deftpower believes that Demand Response schemes could save EV Charging customers up to €1,000 per annum.”

Jacob van Zonneveld
CEO & Founder of Deftpower

⁶ Energy Information Administration

Smart-charging technology ecosystem⁷



Industry insight from Deftpower

Demand response opportunities for eMSPs

Demand response, while technically achievable today, requires reform on behalf of the regulatory environment to provide customers with incentives to modify their behavior. In Europe, we see the UK as a leader in this space, with the Netherlands and Nordic regions following. To really manage the issues of renewable intermittency, regional grid pricing would be required, which is very nascent across European markets. In addition to grids, we also see utilities playing the role of intermediaries, using eMSPs to better predict usage and adjust portfolios to avoid additional charges by grids.

The question of optimal payment methods for demand response schemes has yet to be concluded. Reconciliation could take place either daily or monthly, with work required on behalf of the eMSP to conduct calculations and report and pay out to customers. Another option would be to pay drivers upfront, which would simplify the payments process but increase the risks for eMSPs in managing flows. The question of taxation requires consideration, and likely partnership, with regulators and local authorities to ensure alignment and fairness for customers.



⁷ Deftpower, July 2024

⁸ DSO: Distribution System Operator; TSO: Transmission system operator; OCPI: Open Charge Point Interface

| Fleet perspective

The charging ecosystem for fleet charging requires its own unique set of solutions compared to private ownership electric-vehicles. We believe that the electrification of fleet is a dynamic area, with several overlapping factors leading to adoption.

We are observing an increased adoption of electric-vehicles by fleet operators caused by environmental goals, regulatory pressures and the total cost of ownership (TCO) benefits. Governments worldwide are offering incentives and subsidies for fleets to migrate towards electric-vehicles, which combined with enhanced range from improved battery technology is increasing practicality for commercial use.⁹

However, managing a fleet of electric-vehicles comes with new challenges, particularly from a payments perspective. For example, electricity costs can vary based on location, time of day and provider, making cost management and budgeting challenging. Additionally, managing different billing systems from various networks can be a complex process. Ensuring sufficient charging infrastructure is in place on the road, at depot and at home can become logistically difficult for fleet companies to manage.

Industry insight from ChargePoint

What are the specific nuances of fleet, and how does the service need to be developed for fleet use cases?

Every fleet using electric-vehicles has unique requirements, but one consistent trend among all fleets is the need for payments infrastructure to manage pay-in, manage funds and manage pay-out to suppliers and individual fleet drivers. Given the emphasis on total cost of ownership, fleet companies will look to incentivize their drivers to charge at the most cost-effective location. Companies will typically prioritize charging at work, followed by home, then followed by public charging; however, nuances subject to company structure and location remain.



⁹ Mer UK

“Take-home fleets are becoming more popular as fleet managers realize their intrinsic benefits, but how fleet managers effectively manage a take-home fleet of electric-vehicles often complicates matters. Organizations that manage take-home fleets can utilize the ChargePoint Home Amenity Program and Driver Management Solution, enabling a remarkably simple home charger installation process along with reimbursement for home charging. With this integration, company EV drivers can conveniently charge at home, eliminating the time and labor costs of stopping during the workday to fuel, and simultaneously reduce costs thanks to lower residential electricity rates.”

Rick Wilmer
CEO at ChargePoint

Conclusion

Acknowledging the headwinds faced by the EV charging ecosystem in Europe, we remain cautiously optimistic around the opportunity for the landscape to evolve into a mature, seamless offering for consumers. This will likely require some level of consolidation across the industry, in addition to further policy support from governments and investment from large incumbents. Our optimism for the ecosystem is supported by four key themes outlined in this paper, namely:

- 1 Incentivizing quality of charging infrastructure**
The quality of the charging infrastructure is critical for the consumer to enjoy a seamless experience. Providing incentives and recommendation systems that can guide consumers towards quality will be a key determinant for winners in the market.
- 2 Predictable and affordable pricing**
Consumers want certainty over their charging costs, with contracts that more closely resemble a mobile phone subscription than a transactional petrol station refuel.
- 3 Smart energy**
Mobility service providers are looking to negotiate with electricity grids to enable EV owners to earn money from their battery asset via smart charging.
- 4 Payments experience**
The payments experience for consumers remains complex and cumbersome via multiple apps and payment methods. Simplifying this interaction will be a key consideration for market participants to grow the overall ecosystem.

“Our dedicated mobility payments solution, combined with our deep industry expertise, provides clients a compelling payments offering that is well positioned to adapt and evolve as the EV charging industry matures.”



Rob Abrams
Global Head of Payments Solutions for Mobility Sector

J.P. Morgan Payments Mobility Solutions

Driving the consumer mobility experience

J.P. Morgan recognizes **payments** as a key enabler for the future of mobility experiences, be it on-the-go charging or in-vehicle purchases. Given the complexity of use cases, there is a vital need for enhanced collaboration between multiple participants across mobility. Today, the consumer is having to navigate a **highly fragmented experience**, resulting in a constant need to re-key payment details.

From a payments perspective, J.P. Morgan has recognized this consumer need for a **frictionless, embedded, secure checkout experience** across all merchants, whether in-store, in-app, online or on-the-go. This close alignment to consumer needs is also reflected in how J.P. Morgan can support clients in the shifting role of payments, from a complex fixed commitment to a flexible variable component. Shifting from an upfront fixed burden to a variable component enables our clients to **innovate and trial different use cases** while scaling winning propositions with a market-leading bank.

Mobility Clients



3 Broader capabilities - J.P. Morgan and beyond

2 Global capabilities - J.P. Morgan Payments

1 Core capabilities - J.P. Morgan Mobility Payment Solutions

Channels (web, mobile and in-car)

Onboarding

Pay-in

Manage funds

Pay-out

Reporting and billing

Value-added services

Merchant services acquiring
J.P.Morgan

Treasury services cash management
J.P.Morgan

Pre-Integrate / Partner

Fleet Mgmt.	Fuelling	Charging	Insurance
Mobility	Parking	Tolls	User Mgmt.
Dealer Services		Software	

J.P. Morgan Payments Mobility Solutions provides a unique combination of capabilities; split and pay-out to multiple merchants and automate reconciliations, combined with in-depth mobility expertise and live use-cases across the entire value chain. We continue to scale and develop the platform by pre-integrating with leading ecosystem operators. This offers our clients the ability to leverage an off-the-shelf solution with a lower up-front investment and potential improvement in speed to market.

Our solutions are uniquely designed to help ensure we cater to our clients' specific requirements and the role they play within the mobility ecosystem; from automotive OEMs, energy majors and logistic companies, to technology infrastructure leaders, all can benefit from the mobility payments solutions platform.

Driving EV charging payment experiences

Shared future vision



Smart Charging



V2X / Bi-directional



In-Car Payments

The EV charging marketplace is still in its nascency and continues to evolve at a rapid pace, with many future use cases yet to be defined. This growth is propelled by new innovations across smart charging, fleet solutions, bi-directional and in-car payments.

J.P. Morgan Payments will continue collaborating with leading partners across the sector, ensuring that we are positioned to support our clients scale as the EV ecosystem revolutionizes.

Split and chain payments



Merchant onboarding



Split and chain payments

The Mobility Payments Solutions (MPS) platform has been developed to support the fund management challenges that arise as a result of demand for collaboration between multiple participants. The MPS platform hosts split and chain payment functionality, enabling the eMSP to more effectively manage third-party funds and allocate payments to their third-party merchants (Charge Point Operators).

As the industry scales, the challenges of reconciling and settling across multiple CPO grows exponentially. The MPS solution, which manages pay-ins and settlements according to predefined rules to individual CPO accounts with automated reconciliation, alleviates this additional complexity.

Consumer payment methods



In App



QR Code



RFID Card



Plug & Charge

J.P. Morgan Payments Mobility Solutions are designed to cater to the comprehensive set of eMSP use cases from in-app, QR code, plug and charge and RFID-triggered payments, collected via a subscription or pay-as-you-go models.

We see the importance of creating consumer payment wallets, where customers can store the preferred method of payment once and enjoy a frictionless payments experience through a single integration.

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