



**D2.2.1 Report on the state of the market for mobility
business models today**

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Report on the state of the market overview for mobility business models

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1. Introduction

The electric mobility sector has rapidly evolved over the past decade, fueled by growing environmental concerns, advancements in electric vehicle (EV) technology, and supportive regulatory frameworks. This evolution has brought forth diverse business models that underpin the services associated with electric mobility. These models range from operators of charging infrastructure to integrative platforms and grid-support services. Understanding these models' maturity, revenue potential, and growth trajectory is essential for stakeholders looking to navigate this dynamic industry.

2. Charge Point Operator (CPO) Business Model

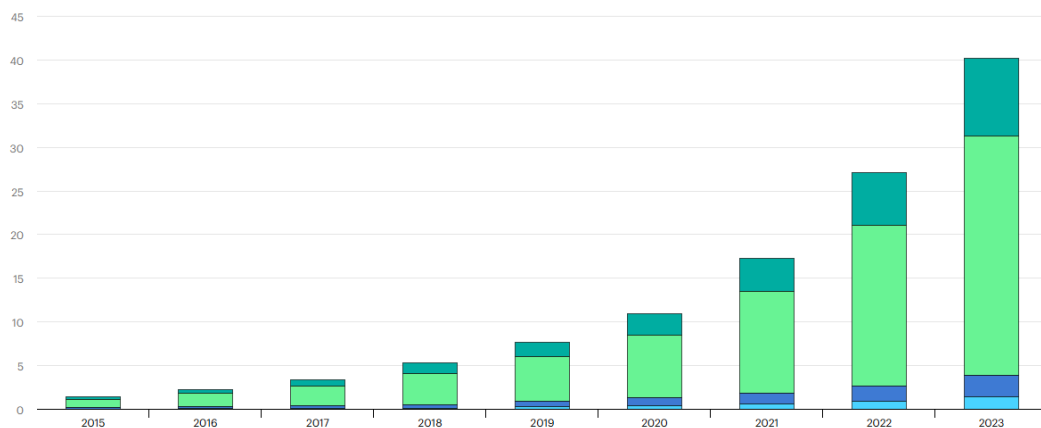
The Charge Point Operator (CPO) business model focuses on the installation, operation, and management of EV charging infrastructure. CPOs are responsible for ensuring that charging points are functional, accessible, and well-maintained, which is vital for fleet managers and public users alike. Notable companies operating in this space include Pluginvest, Stroom,

and larger CPOs such as EVBox and ChargePoint. These companies offer comprehensive services, including public charging, installation, and reimbursement solutions for fleet operators.

Revenue for CPOs primarily comes from charging fees, installation services, and subscription-based models tailored to fleet management. The market for CPOs is experiencing significant growth¹², driven by the rapid increase in EV adoption and the demand for widespread, reliable charging infrastructure. The graph below shows the globally installed amount of charging stations in millions. Although a majority of the installations is done in China, the European market has a strong runner up position in the ranking³.

Public and private installed light-duty vehicle charging points by power rating and by type, 2015-2023

Open 



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● Public - fast ● Public - slow ● Private - home ● Private - other

However, the market also presents challenges, including intense competition, a lack of skilled labour, and the need for integration with emerging smart grid technologies. Despite these challenges, the CPO model remains essential as the backbone of the electric mobility ecosystem, with promising prospects for continued expansion, especially when looking at public charging infrastructure.

The maturity of the CPO business model is evolving towards an early maturity. The main product is evolving towards a common standard, namely the installation service of charge pole at a one time cost, combined with the maintenance and operation at a monthly cost per

¹ <https://www.iea.org/reports/global-ev-outlook-2024/trends-in-electric-vehicle-charging>

² <https://www.fortunebusinessinsights.com/electric-vehicle-ev-charging-stations-market-102058>

³ <https://www.marketsandmarkets.com/Market-Reports/electric-vehicle-supply-equipment-market-89574213.html>

charge pole. Interoperability (OCPP compliance)⁴ is increasingly demanded by the customers, which reduces the liberty to diversify significantly in the product or service offering. The initial signs of the related price competition following this standardisation can be seen in the market, with the introduction of a separate maintenance fee for the initial installation period, and the continued maintenance after the initial pay-back period (often around 5 years).

CPOs don't usually develop their own IT infrastructure, yet outsource the specific CPO IT requirements to specialised IT SaaS companies, such as Greenflux, Optimile, Lastmilesolutions,... These platforms usually align their pricing model with the maintenance fee of the CPO, namely a service fee per month per charge pole, combined with an overall monthly licence fee model as is common for IT SaaS solutions. The CPO IT service providers are an essential stakeholder in the CPO business model, as their capabilities define mostly what products and services the CPO can offer with respect to interoperability, smart charging, and reimbursement services. Their contribution to the overall service cost is also significant, mounting to 50% of the overall maintenance value chain. The maintenance service regularly refers to the technical support and small fixes related to the hardware installed, the overall uptime monitoring and first line support in case of outages, as well as the reimbursement service for home or work related charging sessions. It is often largely based on a fixed monthly fee of X euro/charging installation/month, in which X tends to be in the order of magnitude of a couple euro (3 to 10 mostly), depending on the exact service delivery.

3. Mobility Service Provider (MSP) Business Model

Mobility Service Providers (MSPs) enhance the user experience compared to a simple EV charging solution by integrating public EV charging with other mobility services. This model ensures that users can access a range of transportation options through a single platform, promoting convenience and efficiency. Companies like Modalizy, XXIImo, and Plugsurfing have embraced this approach by incorporating charging services into broader mobility solutions that may include public transportation, car-sharing, and parking services.

⁴ OCPP , or Open Charge Point Protocol, is a standardized communication protocol that allows electric vehicle (EV) charging stations (charge points) to communicate with a central management system (CSMS) or backend software. It is widely used in the EV industry to enable interoperability between different charging hardware and software providers. <https://www.ocpp.be/>

The revenue model for MSPs typically involves subscription fees and per-use charges, as well as potential revenue from partnerships with transit providers and service integrations. The MSP business model is gaining momentum as more companies recognize the value of offering comprehensive mobility packages. However, the model's scalability depends heavily on forging strategic partnerships and maintaining customer loyalty. As cities and regions look to streamline transport services and improve user experiences, MSPs are well-positioned to become integral players in the mobility landscape. MSP are often a new business development of the existing fuel card service providers, yet attempts to recycle some of the business concepts of that proven model have not proven to be very easy, as the e-mobility charging is fundamentally different from the mature transportation fuel industry. The MSP business model is therefore still a bit less mature than the CPO business model, as it continues to lack a more intuitive standardisation of the services offered. It is equally more threatened by regulation, such as the article 5(1) of the AFIR which obliges regular payment methods (compared so sector specific RFID tags for instance), whereas the CPO business model is often still actively supported by regulation.

A large number of MSPs rely, just like CPOs, on external software companies to provide the specific infrastructure to connect to the e-mobility roaming platforms. In Belgium, the most popular roaming platform is e-clearing.net, like Hsubject in Germany or Gireve in France. These roaming platforms are based on the OCPI standard to exchange billing relevant information for CPO-MSP settlement services. As the OCPI standard is still rather limited, the type of services that can be implemented across the value chain are limited as well. An MSP cannot for instance, control the charging process directly, and therefore offer smart charging services⁵⁶. The MSP connects over OCPI to the CPO IT system of the respective charge pole operator that has installed the device. Depending on the functionality offered and enabled by the device and by the CPO IT system, a simple smart charging (stop & start command) could be passed along. The dependency on the 2 intermediate steps however create an entry barrier to a mass roll-out. The driver (client of the MSP) wouldn't know up front whether or not smart charging would be available, and neither does the MSP, so it would only be able to report ex-post on potential smart charging savings.

The MSP could connect to the charge pole directly using OCPP, like the CPO does, but it requires a OCPP 2.0.1 update, which is a major, non-reverse compatible, update of the

⁵ <https://www.edrv.io/blog/the-limits-of-ocpi-for-smart-charging>

⁶ <https://evroaming.org/ocpi/>

protocol compared to the existing OCPP1.6.0 standard which is the most common occurrence in the market today. It would also require often a local connection, or at least, the connection to the charge pole through OCPP is not foreseen as a temporary solution, but rather as a continuous input (like from a local energy management system). Because of the nature of the MSP business, namely to enable charging roaming across various charge poles, following the driver on his trajectory, these complications make it difficult for the MSP to pursue this route⁷.

Often, CPOs and MSPs are two business units of the same companies, although specific MSP or CPO stand-alone business examples exist as well.

The current traction on the market is with the fleet managers (B2B) as the primary focus area for both MSPs and CPOs. The B2C business models are often still quite limited, due to the fact that private individuals are not yet buying EVs on a large-enough scale.

A B2B business model is a service based transaction between an MSP and a fleet manager, in which the MSP distributes tokens to the drivers in the fleet, that allow them to charge at various locations. The MSP takes care of the cost accounting, as well as the payment to the charge pole operator for the procurement of the electricity. When charging sessions are done at home, this service would result in a reimbursement of the driver. The latter service (home charging reimbursement can be offered by a CPO as well, without the public roaming service which characterizes an MSP). The focus is merely on the cost control and monitoring of a fleet.

A B2C business model is a model in which the MSP interacts directly with the driver, to enable charging at various locations. As the individual owns the car, and is responsible for the cost of charging it, there is usually no 3rd party like a fleet manager involved in the process. The MSP pays the respective charge pole operator/owner whenever the driver chooses to charge elsewhere, and takes care of the administration. The driver has 1 single service provider to talk to for this charging service, regardless of where he wants to charge. The focus is on this service.

4. State of Health (SoH) Monitoring for EV Batteries

⁷ <https://openchargealliance.org/my-oca/ocpp/>, section 8.6 of the architecture document.

The health of an EV's battery is a critical factor in its performance and longevity, making state of health (SoH) monitoring an essential service for fleet managers, leasing companies and private owners alike. This business model focuses on monitoring battery performance and providing data-driven insights that help predict maintenance needs and extend battery life. Companies such as Bosch, TÜV Rheinland, and AVL are leaders in this space, offering diagnostic tools and long-term monitoring solutions that ensure optimal battery usage. So far, cars have not been disclosing this information pro-actively to the driver or car owner. Recent legislation however will impose the availability of this kind of information to the driver, as an obligation to the car manufacturer⁸.

Revenue streams for SoH monitoring providers include diagnostic service fees, long-term monitoring contracts, and comprehensive maintenance solutions tailored for large fleets. The demand for such services is rising as more vehicles hit the road and battery maintenance becomes crucial for cost-effective operations. While the market is still maturing, advancements in battery technology and the proliferation of EVs are expected to make SoH monitoring a standard service offering, especially for fleets focused on maintaining operational efficiency.

5. Mobility Platforms as solution service

Mobility platforms have emerged as aggregators that bring together various services, including CPO and MSP offerings, to create a seamless user experience. Companies like Shell Recharge Solutions, TotalEnergies, and BP pulse exemplify this solution service model, positioning themselves as comprehensive mobility hubs that cater to the diverse needs of EV users. By acting as intermediaries, these platforms enhance user convenience and foster an ecosystem where different mobility services can be accessed through a unified interface.

These platforms generate revenue through platform fees, commissions on integrated services, and subscriptions for users and partners. As the demand for integrated solutions grows, platforms that can effectively bundle charging, maintenance of the vehicles, and other transport-related services are poised to thrive. The maturity of this business model is tied to the expansion of partnerships and the adoption of platform technologies that prioritize user-

⁸ <https://www.europarl.europa.eu/news/en/press-room/20231207IPR15740/euro-7-deal-on-new-eu-rules-to-reduce-road-transport-emissions>

centric experiences. Currently, a fleet manager is mostly looking for a solution that fixes his problem at hand, which is the ability for his drivers to charge their cars. They often operate a dual ecosystem today, with the existing ICE vehicle fleet managed in the traditional ecosystem (fleet management software, leasing companies, fuel card suppliers...), and the EV fleet managed in a different ecosystem (specialized leasing firms, CPO/MSP software,...). Because of the emerging status of the EV fleet, a full integration of standardisation as is commonly known in the ICE vehicle fleet, is not yet a priority.

Next to this observation, fleet managers are often still looking for the alternative they know, namely a charge pole. Other services, such as smart charging cables, vehicle IoT integration, and other service models are not yet commonly requested by the fleet managers, due to a lack in experience and a lack in volume (EV volume in the fleet). Some first movers are however getting nowadays to a decent percentage of EV in their fleet, which triggers the need for a more holistic approach as well.

6. Vehicle IoT Services

Vehicle IoT services are at the forefront of modern EV management, offering capabilities for monitoring vehicle performance, analyzing charging behavior, and providing automated reimbursement services. Companies such as Enode, Smartcar, EEVEE, re.alto, and Geotab specialize in these data-centric solutions, enabling fleet operators and individual users to optimize their vehicle usage and lower costs through actionable insights.

The revenue model for vehicle IoT services typically involves subscription fees, analytics services, and customized fleet solutions. This model's maturity is growing as IoT technology advances, and more users seek efficient, real-time data management tools for their EVs. The integration of IoT in vehicles enhances not only the charging and reimbursement processes but also the overall maintenance and lifecycle management, making it an attractive solution for tech-savvy consumers and businesses alike.

The maturity of the business model is still rather low, mainly due to the technical barriers that still exist today. OEM mobile applications and back-ends are usually still in major development themselves, and often still lack basic functionality, if offered to third parties at all. The EU data act, namely article 5, pushes the OEM to enable 3rd party integrations via machine readable interfaces, yet a significant number of OEMs are still shaping and

organising this business unit. The main promise of the technology is its' easy mass scaling potential. In order to enable the service on a vehicle, like a smart charging service, there is no hardware installation involved. No smart charge pole needs to be installed, no OBD2 dongle needs to be added to the vehicle, no smart charging cable needs to be used. The only action required from the user is often a few clicks in a mobile application to enable consent and data access. Hardware has proven to be a major obstacle in the adoption of energy management services.⁹ In addition, the installation of hardware includes often a supplier lock-in effect, as the switch to a new service provider means the installation of a new hardware suite without sufficient interoperability already in place. A similar learning is expected on smart charging services, as already today, we see a first generation of smart charge poles which lack OCPP interoperability, and therefore cannot be used after a service supplier switch.

7. Balancing Service Providers (BSP)

Balancing service providers (BSPs) play a unique role in the energy ecosystem by leveraging EVs for grid-supportive services, such as demand response and frequency regulation. Companies like Jedlix, Lifepowr, and Nuvve offer services that optimize EV charging schedules to align with grid needs, enhancing grid stability and allowing EVs to contribute to energy balancing.

BSPs generate revenue through payments from grid operators for services rendered, participation in energy trading markets, and premium services that provide advanced charging control. Although still a niche segment, this model is expanding as grid operators recognize the potential of EVs as flexible energy resources. The growth of vehicle-to-grid (V2G) technology could propel BSPs into a more prominent role as this technology becomes mainstream, unlocking new revenue opportunities and contributing to a more resilient energy grid.

The maturity of the business model today is very low, due often to regulatory or technical requirements. Ancillary services are characterized by strong technical requirements that can be hard to meet with standard charging infrastructure, and are often still specific to each country. Regulatory barriers can still prevent the supply of ancillary services from low voltage grid applications. In Belgium for example, aFRR from low voltage applications was only recently enabled, and still requires a prequalification assessment by the DSO.

⁹ <https://www.emerald.com/insight/content/doi/10.1108/f-12-2023-0113/full/html>

Ancillary services will always be part of the European grid management, and are likely to be expanded with congestion management services towards distribution grids as well. Yet by nature of what they are used for (residual imbalance solutions), they will always remain more of a niche market compared to the overall energy applications. As a reference, Elia is procuring roughly 1 GW of ancillary services, on an average consumption basis of approximately 10 GW. It is very unlikely that this 10% market volume would increase to a higher share in the future.

Hence BSP naturally will seek to expand their services into other value chains as well, which can include smart charging. From a technological point of view, a BSP infrastructure is capable of handling down to 1 second data intervals at an industrial robustness and reliability, often with redundancy involved, as this is linked to the requirements of their core business. Much of the other value chains need much less high standing infrastructure, often running at significantly lower costs therefore as well. The flexible allocation of resources and opex control by a BSP will be a key enabler in their expansion to other business models.

8. Comparative Analysis of Business Models

The business models described above share similarities in their reliance on innovative technology and their focus on user-centric solutions. However, they differ in terms of revenue generation, market position, and scalability. For example, CPOs are infrastructure-centric, whereas MSPs and vehicle IoT services are more service-oriented, focusing on customer experience. Mobility platforms act as integrators, enabling cross-service access, while balancing service providers operate in a niche energy management space.

There is considerable potential for collaboration among these models. For instance, CPOs and BSPs can partner to optimize charging infrastructure for grid services, while MSPs can integrate vehicle IoT solutions to offer enhanced services. The continued convergence of these models, driven by consumer demand for comprehensive solutions, will shape the future of electric mobility.

BM	Customers	Revenue	Maturity	Examples
CPO	Fleet managers Public sector	Installation fee Service fee/device	Scaling	Pluginvest Stroohm

	Parking operators	Charging rates/session		Chargepoint
CPO-IT	Pluginvest Stroomm Chargepoint	Setup cost Licence fee Service fee/device	Scaling	Greenflux Optimile Lastmilesolutions
MSP	Fleet managers HR comp&ben	Service fee/device Charging rates	Scaling	XXimo
SOH	Fleet managers Leasing companies	Service fee/device Licence fee	Early	Bosch, TÜV Rheinland AVL
MP	Fleet managers HR comp&ben	Service fee Licence fee	Scaling	Shell Recharge Total energies BP
V-IOT	Utilities MSP	Licence fee Service fee/device	Early	Enode Geotab Re.alto
BSP	TSO DSO	Power reservation Energy activation	Scaling	Jedlix Lifepowr Nuvve

9. Policy impacts

The following section highlights a couple of policy impact analysis. It does not pretend to capture all policy relevant decisions. The various business models are each impacted by various policies applied over the last years.

Overall, on a European and national level the drive towards e-mobility has been obviously a major push forward. The AFIR in various versions has pushed standardisation into the market of especially public charging infrastructure. It has triggered for the Belgian market the emergence of the CO2 trading scheme between fuel suppliers, which does accelerate EV adoption in Germany (1komma5, Tronity,...) and the Netherlands. Currently the effect in Belgium seems moderate, as the register is only applicable to the CPO system for public charging, whereas in Germany and the Netherlands the applicability towards other technologies (like vehicle IoT) is included. Smart charging

Smart charging is still not widely adopted as a use case. Various technology solutions exist today:

1. Through the charge pole :

Charge poles, if smart, often allow a range of smart charging capabilities.

Ranging from simple load balancing over dynamic market price optimisation to ancillary service applications. Most charge poles nowadays deploy OCPP as a communication standard (version 1.6 often) which allows for smart charging control by one CPO only. Between CPO, the OCPI standard will allow smart charging control in the future, but the current implemented version often does not yet.

2. Through a smart charging cable

An early day solution when no charge pole could be installed, often in the case of hybrid vehicles. Smart charging cables do often lack interoperable standards to allow other operators to take control besides the original manufacturer. As they only allow for a reduced charging speed, and as electric vehicles are using bigger batteries, the solution is probably going to phase out.

3. Through vehicle IoT

A rather new approach to handle smart charging, to overcome the OCPP (1 sole operator) shortcomings and the need for a 'smart' charge pole is the application of vehicle IoT. Officially, only Tesla and Mercedes allow the control of the charging process through the API. Yet through reverse engineering of the mobile application, about 2/3rd of the EV models in the market can be controlled.

10. Conclusion

The electric mobility services sector is characterized by a range of business models that cater to different aspects of EV use and infrastructure. The maturity and growth potential of each model vary, with CPOs and MSPs already solidifying their presence, while services like SoH monitoring and BSPs are gaining momentum. The future of these models lies in their ability to



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adapt to new technologies, forge strategic partnerships, and meet the growing expectations of EV users. As the market evolves, innovation and integration will be key to capitalizing on the opportunities within this transformative sector.