MOVIN'ON
Sustainable mobility for societal good

TOWARDS A NEW CATEGORY OF LIGHTWEIGHT, AFFORDABLE AND SUSTAINABLE ELECTRIC VEHICLES

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Movin'On's public-interest initiative in favour of lightweight, affordable and sustainable electric vehicles — hereinafter referred to as "POP CAR" — aims to create the conditions for their emergence in Europe.

Having identified the creation of a new M0 category as a key milestone, this discussion paper provides concrete evidence in support of that objective. This document has been prepared by Movin'On to inform collective reflection. Its purpose is to contribute to public debate and to inspire stakeholders across the mobility ecosystem.

Introduction

The European Union has embarked on an unprecedented historic transformation: achieving carbon neutrality by 2050, in line with the objectives of the Green Deal. The transport sector plays a central —and demanding— role in this transition. It remains the main contributor to greenhouse gas emissions in Europe, accounting for 29% of total EU emissions in 2022, with more than 73% coming from road transport[1] .

In this challenging context, the European automotive market is under significant pressure. Despite a slight rebound, new vehicle registrations remain below pre-crisis levels[2] , and signs of slowing growth are visible, even in the most dynamic segments.

The small-vehicle segment — historically central to everyday urban, suburban and rural mobility — has contracted sharply: it represented 8% of the market in 2019, compared with 4–5% in 2024[3] .

However, private cars remain the backbone of European mobility, accounting for nearly 73% of all passenger-kilometres travelled across the continent.[4] In suburban and rural areas, where alternative transport options are either non-existent or structurally inadequate, they are often the only available solution. For millions of Europeans, it is not a matter of convenience, but a prerequisite for access to employment, healthcare, essential services, and social life.

In recent years, manufacturers have invested heavily to support the transition, achieving significant progress in electrification, performance, range, and energy efficiency. Yet this evolution has also followed a long-term trend toward greater complexity, mass, volume — and cost. In 2022, the average weight of a new vehicle in Europe exceeded 1,500 kg (all powertrains combined), continuing a steady increase over the past twenty years[5] .

This trend can be partly explained by the accumulation of technical and regulatory requirements, particularly concerning safety and connectivity. As Luca de Meo and John Elkann jointly noted in their call for a revival of the popular car in Europe, "*European regulations make our cars ever more complex, heavier, and more expensive — and most people simply can no longer afford them*[6] ."

While these requirements are legitimate in intent, they have produced unintended consequences: vehicles have become heavier, over-equipped, and increasingly unsuited to everyday use, particularly for short trips. In France, 62% of car journeys are under 10 kilometres[7] and 60% of commutes shorter than 5 km are made by car[8] . For these daily journeys, vehicles are oversized, cumbersome, energy-intensive, and costly — making them increasingly inaccessible.

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[1]: EEA, Greenhouse gas emissions from transport in Europe, 31 October 2024
[2] : ACEA: "*In 2024, new car registrations rose slightly, increasing by 0.8% to around 10.6 million units*."
[3] : The combined share of segments A and B fell from 33% in 2012 to less than 20% in 2024, according to ACEA. The share of so-called "mini city cars" (segment A) alone is now estimated at 4.2%, down 22% compared to 2023 (source: Jato)
[4]: EEA, Passenger Transport Activity, 10 October 2024
[5] : ICCT, European Vehicle Market Statistics, 2023
[6] : Interview with Le Figaro, 6 May 2025
[7] : Mobility of Persons Survey, 2019
[8] : INSEE, 2024

This trend directly affects the overall carbon footprint of vehicles — even electric ones — and now encounters physical and economic limits: growing congestion in urban areas, incompatibility with older parking infrastructures designed for lighter vehicles[9], and affordability challenges for many households.

At the opposite end of the spectrum, European regulations strictly govern light quadricycles (categories L6e and L7e), imposing limits on weight, power, and payload. While these vehicles are useful in certain contexts, their range and technical constraints limit their practicality. They cannot, on their own, replace private cars for most uses. Moreover, their lower safety standards, relative to conventional passenger cars, restrict their suitability for family or suburban travel.

Between these two extremes, an unstructured intermediate space is emerging — one for more compact, simpler vehicles better adapted to short daily trips. It is in this context that the POP CAR project was conceived within Movin'On, grounded in a shared conviction: there is a missing category of lightweight, affordable electric vehicles.

POP CAR aims to establish a new regulatory category — an M0 segment — between quadricycles and conventional cars[10]. This category would be defined by criteria adapted to this intermediate space and would have a carbon footprint of 6 tCO_2e by 2028, then 4.5 tCO_2e by 2033–2035[11] — two to three times lower than current standards. The objective is not to compete with existing segments but to complement them by providing the right vehicle for the right use. It represents the missing link in Europe's mobility architecture — one that could revitalize the European automotive industry while accelerating fleet decarbonisation, reducing costs and congestion, and meeting everyday mobility needs where alternatives are insufficient.

A study conducted by Kantar for Movin'On in October 2024 among 1,000 French respondents confirms this societal demand: a four-seat (or larger) electric vehicle that is accessible, lightweight, designed for daily use[12], and particularly suited to replacing the household's second car — often an older, highly polluting internal-combustion vehicle.

This document is addressed to European and national institutions. To enable the emergence of this category, a clear and appropriate regulatory framework is essential. Such a category would also represent a strategic opportunity for Europe in terms of reindustrialization. In a context of heightened global competition, structuring a new segment of lightweight vehicles would mobilize European value chains — from design to assembly, sales, and recycling — while promoting reshoring, repairability, refurbishment, and extended vehicle lifespans. Against the backdrop of climate, economic, and industrial pressures, the creation of the M0 segment would be a concrete and coherent step aligned with Europe's ambitions for ecological transition and social justice.

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1. A context marked by ecological urgency and accessibility for all

The mobility transition cannot succeed as long as the dominant model remains largely based on the idea of an ever more versatile and high-performance private car, designed to adapt to all uses, everywhere and for everyone. This model, which for decades met market expectations and accompanied technological progress, now shows its practical, economic, ecological and social limits. It places a heavy burden on infrastructure and resources, while excluding an ever-growing share of the population due to its cost, technical complexity and demanding conditions of use. It has become simultaneously indispensable for many and unsustainable for all.

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[9] : In France, the average load-bearing capacity of car park slabs is generally between 250 and 300 kg/m^2 under operating load, which becomes critical with SUVs or high-end electric vehicles, especially on older structures.

[10] : European regulatory categories govern the approval of vehicles according to their use: M for passenger transport (M1 = passenger cars, M2/M3 = minibuses and coaches), N for commercial vehicles (e.g. vans), L for two-wheelers and quadricycles (e.g. scooters, microcars). The proposed M0 segment would fill the gap between electric quadricycles (L6e/L7e) and passenger cars (M1).

[11] : ADEME methodology

[12] : According to the study, the POP CAR is relevant for "going to buy everyday consumer goods" (43%), "doing personal shopping" (42%), "going to work or school" (35%) and for leisure activities (32%).

This paradox stems from a self-reinforcing system: every technical or regulatory evolution tends to amplify the characteristics of the dominant vehicle — larger, more equipped, more connected — and therefore heavier, costlier and more resource-intensive. This dynamic creates a spiral of inefficiency and exclusion: as vehicles move upmarket, they become less affordable and less appropriate for most of everyday trips. This logic shapes a mobility landscape that is increasingly uniform, centred around a single standard — that of the heavy, powerful, over-equipped car — even though it no longer corresponds to real uses. Within this techno-regulatory lock-in, space for simple, lightweight and accessible solutions has disappeared, leaving the daily mobility needs of most people unaddressed[13].

Faced with this deadlock, available alternatives have failed to take over. Public transport networks are essential in large urban areas but struggle to meet the needs of sparsely populated territories, where demand is sparse and operating costs are high. Cycling, despite its growth, remains constrained by numerous factors: weather conditions, topography, distance, or the need to carry loads or passengers. Shared-mobility solutions — such as carpooling or car-sharing — also struggle to become part of everyday habits, particularly where travel patterns are rigid, individualized and often constrained.

It is the middle classes and low-density territories that are most acutely confronted with this impasse. These are also the groups that travel the longest distances, and therefore account for a significant share of CO_2 emissions[14] .

For these populations, the car is not an option — it is a necessity. Yet it is an increasingly difficult one to bear. The feeling of being left out of the transition — or worse, of suffering from it — fuels social mistrust that extends far beyond environmental concerns. This leads to a paradox: where simple, robust and affordable solutions are needed, the market continues to offer heavy, expensive and sophisticated vehicles. Where access to appropriate mobility should be facilitated, technical standards exclude. And where we should be doing better with less, we are in fact doing more for fewer people.

This situation calls for a profound realignment. What is needed is not another niche option, but a missing piece to rebuild the system: a solution designed for the silent majority of constrained, repetitive, short- and medium-distance trips that structure everyday life but are never taken into account in vehicle design. A solution that makes it possible to move beyond “all-car” dependency and to rethink mobility through the synergy of different modes.

Addressing this gap is not only about responding to the ecological emergency. It is about restoring a right to practical, accessible and manageable mobility — a condition for making the transition truly sustainable, not only in its objectives but also in its trajectory

2. The POP CAR: the missing link in mobility

2.1. Lightening the vehicle to break the deadlock

The current trajectory of electric transition reproduces many of the limitations of the combustion-engine model it seeks to replace. By focusing on increasingly heavy, powerful, and expensive vehicles, it perpetuates a logic of oversizing that undermines the entire value chain: energy consumption, carbon footprint, dependence on critical resources, pressure on infrastructure, and economic accessibility.

This dynamic is sustained by a cycle of technical amplification: the pursuit of extended range requires high-capacity batteries, whose weight demands reinforced structures. Added to this are an ever-growing number of safety, comfort, and driver-assistance systems, which in turn contribute to mass increase. This additional weight requires more powerful motors, an oversized powertrain and chassis (suspension, braking systems), and ultimately results in vehicles that are more complex, more expensive, and paradoxically less suited to real-world use.

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[13] : "*We are moving away from the SUV concept towards more modest dimensions that are closer to real needs*" (56-year-old woman reacting to the presentation of the POP CAR concept), Kantar study for Movin'On, 2024

[14] : In France, 51% of emissions originate in rural towns and scattered rural areas (source: The Shift Project analysis based on the Personal Mobility Survey - Publication forthcoming)

In response, the POP CAR project proposes a reversal of logic: rather than electrifying an oversized model, the goal is to design a vehicle tailored to the essential needs of daily mobility. The vast majority of commuting trips in Europe cover short distances. In mainland France, the median commuting distance is 7.8 km, rising to 12.5 km in rural areas[15]. Yet in these same territories, the private car remains — and will continue to be — the only viable solution: public transport is scarce, alternatives are often ill-suited, and schedules are imposed rather than chosen. This paradox leads to an increasingly untenable situation: using vehicles weighing more than 1.5 tonnes to travel only a few kilometres alone, under conditions where additional power nor extended range are required.

POP CAR is neither a lightweighted M1 vehicle nor an over-equipped quadricycle. It is an original design proposal, defined by its drastically reduced weight and carbon footprint — opening the way for the creation of a new, fully-fledged M0 category with its own regulatory framework.

2.2. Controlled weight for a carbon footprint halved, then reduced threefold

One of the main levers of the POP CAR's sustainability lies in its deliberately limited mass. By breaking away from the dominant logic of technical oversizing in automotive electrification, the project makes the strategic choice of lightness: to reduce material needs, limit battery size, optimise the drivetrain, and control the overall carbon footprint.

As described in the technical roadmap (see Annex 1), the POP CAR follows a progressive and realistic trajectory: by 2028, the first models will target a total mass below 850 kg, including the battery, while meeting M1 (GSR2) safety requirements, and achieving a carbon footprint of 6 tCO_2e — a reduction by half compared with current thermal M1 vehicles (12 to 14 tCO_2e according to ADEME[16]).

By 2035, expected progress in design, materials, and integration, as well as the adaptation of safety standards, should make it possible to drop below 750 kg including battery and reduce the carbon footprint to 4.5 tCO_2e — nearly three times lower than today's standards. This evolution would pave the way for the creation of a new M0 category, corresponding to vehicles designed according to the same principles as the POP CAR, but exempted from some of the equipment currently mandatory when their usefulness for low-speed or low-density driving conditions is limited. This step would mark the culmination of a coherent trajectory: doing better with less, by adjusting standards to real-world use and the goal of truly sustainable mobility

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[15] : INSEE, 2024

[16] : This range is in fact already well below reality. Based on data provided by the Ademe database, we observe that the carbon footprint of a 2018 petrol car used for short distances is 0.175 kg CO2e/passenger.km, which, when applied to a total mileage of 150,000 km and an average occupancy rate of 1.6 passengers, gives a result of 16.41 tonnes. For the same vehicle travelling 200,000 km with an average occupancy rate of 1.2 passengers (data closer to reality), the carbon footprint this time is 29.17 tonnes of CO2e.

These results are made possible by a combination of technical and industrial levers that can already be activated:

- Weight reduction / lightweighting: significant reduction in overall mass, limiting material use and decreasing energy demand in operation;
- Controlled battery capacity: realistic range (150 to 200 km);
- Local and relocated production: integration of European value chains for both assembly and critical components, reducing the logistical footprint;
- Longevity and repairability: targeted lifespan of 240,000 to 300,000 km, spreading the initial footprint over extended use;
- Use of recycled materials and components, and innovations in lightweighting and modular design.

This approach brings together technical and energy efficiency with material economy, in a logic of frugal design from the outset. Far from being a compromise, lightness becomes here an industrial, economic, and ecological advantage — serving a vehicle designed to last, to be used daily, and to respond to planetary limits.

By targeting short and repeated trips, the POP CAR not only limits the footprint of new vehicles but also replaces older combustion cars — often used as secondary vehicles — which are particularly polluting. It thus plays a concrete role in the real decarbonisation of the European vehicle fleet, consistent with the objectives of the Green Deal and evolving emission standards. It demonstrates that climate neutrality can be achieved through intelligent simplification in design, rather than through an endless race toward technological complexity.

These requirements of low weight and carbon footprint therefore form the minimum foundation of the POP CAR. They define a clear framework ensuring that these vehicles contribute effectively to the decarbonisation of mobility. However, this framework does not imply a single, uniform solution. The means to achieve these targets — battery choice, power level, materials, or architecture — will depend on each manufacturer's strategy. These margins of manoeuvre, left to industrial initiative, will make it possible to reconcile systemic efficiency with diversity of approaches.

2.3. Technical objectives consistent with actual uses and price targets

The POP CAR is not a single model, but an open proposal. It is intended to be adapted and developed by manufacturers who wish to do so, according to their priorities, brand identities, and the needs of their target users.

The definition of controlled weight and limited carbon footprint, as we have seen, deeply shapes the technical architecture of the POP CAR. All key characteristics — range, power, dimensions, and embedded energy — stem from this founding logic of suitability for use and systemic efficiency.

The following technical elements therefore do not constitute a set of specifications, but rather reference targets designed to ensure a high level of functional and environmental consistency.

These targets are based on the observation of real-world uses, where excessive power, top speed, or oversized energy capacity are not only unnecessary but counterproductive. On this basis, a typical vehicle complying with M0 regulations could have the following characteristics:

- Optimised dimensions: ideally less than 3.60 m in length and 1.50 m in width and height, allowing for smooth circulation in both urban and rural environments, and reducing the ground footprint by up to 40% compared with a traditional compact car.
- Range adjusted to real needs: 150 to 200 km, covering the full spectrum of daily journeys, including those in low-density areas.
- Reasoned power and speed: equipped with a powertrain delivering 25 kW to 40 kW peak power, this very lightweight vehicle offers performance comparable to, or even superior to, current M1 vehicles weighing more than one tonne. It is designed to provide smooth and safe driving in urban, peri-urban, and rural environments, following a logic of controlled safety and energy efficiency.

- Compatibility with existing infrastructure: the compactness and lightness of the POP CAR variants are designed for seamless integration into current road networks, older or residential parking facilities, and, more broadly, into constrained urban environments.

These characteristics make it possible to combine functional performance, economic accessibility, and environmental sustainability, while leaving manufacturers free to design distinct vehicles in terms of aesthetics, ergonomics, or technology — provided they adhere to the overall philosophy of lightness, simplicity, and purpose-driven design that defines the POP CAR.

These characteristics combine functional performance, economic accessibility and environmental sustainability, while giving manufacturers the freedom to design vehicles that are distinct in terms of aesthetics, ergonomics and technology — provided they fit in with the overall logic of lightness, simplicity and targeted use promoted by the POP CAR.

2.4. Reasoned on-board safety

Safety is a fundamental issue for the POP CAR, but it must be designed in line with real-life use, driving speeds and the nature of journeys. The goal is not to maximise technological complexity, but to guarantee a high level of protection within a constrained, everyday and controlled use framework.

From 2028 onwards, the first generation of vehicles, certified under the M1 category, will integrate all the systems required by EU GSR2 regulations (emergency braking, lane keeping, fatigue detection, reinforced passive safety, etc.) — rigorously but without excess — favouring robust, simple solutions adapted to the vehicle's compact size.

The POP CAR is designed for urban, peri-urban and rural driving environments, and for limited distances. These characteristics make possible a lighter structural design and effective passive safety without oversizing.

By 2035, under the future M0 category, the project anticipates a targeted evolution of GSR2 regulations, aiming to align safety requirements with the actual performance expected. The goal is not to lower the level of ambition, but to enable a form of safety that is more relevant to efficient, lightweight vehicles intended for specific uses. Some systems that are currently mandatory for all vehicles could thus become optional when their contribution to real-world safety is marginal.

Finally, this approach paves the way for greater electronic resilience. By limiting the number of onboard processors, standardising components and sensors, and avoiding excessive software layering, the POP CAR reduces the risk of failure, simplifies maintenance, facilitates repairability and extends the vehicle's lifespan. In this way, safety becomes both a lever for robustness and a source of user confidence.

2.5. An open and adaptable technical framework for manufacturers

The POP CAR is not a single, fixed or exclusive model: it is a design framework that defines a coherent technical balance aligned with real-world use, yet flexible enough to be interpreted by different manufacturers according to their priorities, expertise and brand identity.

The project aims to create a new vehicle category, not a single product. It seeks to establish an industrial and regulatory direction grounded in shared objectives: lightness, efficiency, safety and durability. From this common foundation, each manufacturer will be able to propose its own interpretation — in terms of design, services, digital integration or interior modularity. The POP CAR project does not impose a single size or aesthetic; rather, it establishes an overall coherence that addresses a structural gap in today's mobility offer.

This approach could, in time, lead to the gradual industrialisation of shared components: rolling platforms, mechanical systems, simplified electronic architectures, or interchangeable battery modules. This flexible technical standard enables economies of scale without imposing uniformity, while opening up opportunities for cooperation and resource-sharing among manufacturers. It provides a foundation from which innovation can flourish at a reasonable cost, while maintaining compatibility with regulatory requirements and real-world mobility needs.

The POP CAR framework is also designed to incorporate future developments in industrial value chains: improved recycling processes, integration of low-carbon materials, modular software architectures, and more. It is not fixed but evolutionary, conceived within a long-term perspective.

By defining clear targets consistent with the imperatives of use, safety and sustainability, the POP CAR offers manufacturers a pragmatic and accessible framework within which they can express their capacity for innovation, while responding to a major and still largely unmet need in European mobility systems.

2.6. A sustainable cost for a fair transition

The success of the transition depends on solutions that are economically viable for households. The POP CAR was designed from the outset with this requirement in mind. Its streamlined architecture, low mass and technical simplicity make it possible to target a purchase price starting at €10,000 (with incentives) — positioning it among the most affordable vehicles on the market, in a segment that has often been neglected.

By comparison, the average price of a used car in France today frequently exceeds €12,000, for models that are generally old, combustion-powered and with no guarantee of durability.

Beyond purchase price, it is the total cost of ownership that makes the real difference. Thanks to its limited battery capacity and modest energy consumption (5 to 7 kWh/100 km), the POP CAR can be easily recharged via a standard domestic outlet or a low-power charging point. This not only simplifies daily use, but also reduces pressure on existing charging infrastructure, which is often undersized. By doing so, it helps ease congestion at public charging points, avoids massive investment in heavy infrastructure, and supports the development of a more frugal and resilient form of electromobility.

Its simplified maintenance will also help ensure better control over day-to-day mobility expenses. With public incentives (such as the ecological bonus), a long-term lease could be offered for around €100 per month, insurance included — an unprecedented threshold for a vehicle with at least four seats and compliant with automotive safety standards. By comparison, a conventional combustion car costs on average €300 to €450 per month in full ownership (fuel, insurance, maintenance, depreciation), while a standard electric car ranges between €250 and €400. This structural difference gives back real flexibility to low- and middle-income households, young people and seniors, for whom mobility has become a constrained expense.

By offering a durable, low-cost, and accessible vehicle, the POP CAR enables everyone to engage in the transition without giving up their mobility. It thus contributes to making this transition concrete, desirable and compatible with everyday realities, particularly in territories where the car remains a daily necessity

3. Changing the narrative: towards desirable and responsible mobility

The success of the transition will not depend solely on technical or economic solutions; it also requires a profound cultural shift. For a century, the private car has been a symbol of freedom, success and power. This founding narrative continues to shape collective imagination — with the “real car” still perceived as large, powerful, fast and status-defining.

Today, this imaginary model is disconnected from real use, from climate imperatives, and from the aspirations of younger generations. It sustains a form of technical absurdity — that of using vehicles weighing more than two tonnes to carry 1.2 people — and deepens a social divide between those who can still afford it and those increasingly excluded.

In contrast, the POP CAR embodies a new narrative built around coherence, simplicity and responsibility: a car designed to do well, not to do more. It represents a form of mobility that is chosen, lightweight, and modern — embodying the freedom to access clean transport.

It draws inspiration from the cultural evolution of cycling, marked by a growing appreciation for functional elegance, repairability and appropriateness of use. It also resonates with the aspirations of younger generations: less focused on ownership, more conscious of the impact of their choices, and eager to adopt objects consistent with their values.

In the years to come, the POP CAR could become much more than an individual vehicle: it is meant to be integrated into local and territorial mobility systems. Thanks to its compactness, low carbon footprint and reduced operating costs, it is ideally suited for shared fleets, residential car sharing, short-term rental or local intermodality. It can thus be effectively incorporated into mobility-as-a-service ecosystems, complementing public transport and active modes, particularly in low-density or poorly served areas.

As a lightweight, modular and low-impact link, the POP CAR would make it possible to densify daily mobility offers without heavy infrastructure, while responding to the growing demand for accessible, local solutions. It opens the way to a new way of imagining mobility: not as a collection of disconnected objects, but as an ecosystem of services adjusted to needs.

By reconciling utility, accessibility and aesthetics, the POP CAR can become an object of pride — both personal and collective. It stands as a symbol of European reinvention, at the crossroads of industrial innovation, resource efficiency and climate commitment. The goal is not to renounce the car, but to reinvent its meaning. The POP CAR is not about having less of a car — it is about having a different kind of car.

4. Tangible benefits: environment, accessibility, sovereignty

The POP CAR is not a sectoral response to a technical problem; it is a coherent proposal whose benefits extend far beyond the field of mobility. By focusing on suitability of use and design efficiency, it delivers major gains across three structural dimensions: environmental, social, and economic.

4.1. Environment: Reducing impacts and promoting material efficiency

The POP CAR is not only more efficient in its design; it also significantly reduces environmental impacts throughout its entire life cycle, while limiting pressure on the urban and rural ecosystems in which it operates.

First and foremost, the significant reduction in weight and power helps limit energy consumption in use — but above all, it drastically reduces the demand for critical raw materials, whose extraction carries heavy ecological, social and geopolitical costs. Whereas a conventional electric vehicle requires dozens of kilograms of such materials, the POP CAR — thanks to its more compact battery — keeps this demand under control, thus alleviating pressure on scarce and strategic resources.

One of the most visible and immediate benefits, however, lies in the space that the POP CAR frees up. With its compact dimensions (less than 3.60 m in length and 1.50 m in width), it occupies up to 40% less ground area than a traditional compact car. This translates into:

- Reduced need for parking space (private or public);
- Easier circulation, particularly in historic districts or city centres with narrow streets;
- Lighter road infrastructure: smaller carriageways, reduced lane width, tighter turning radius;
- The possibility of reusing older parking boxes and spaces that have become too narrow for today's cars.

As Luca de Meo pointed out when advocating for the revival of small European popular cars, *"if all parking spaces in Paris were dimensioned for small city cars, the space saved would be equivalent to 55 football stadiums in the city*[17]*."* The POP CAR effectively helps decongest public space, reduce land artificialisation, and support European Zero Net Land Take (ZAN) policies. Less asphalt means less soil sealing, less urban heat, more vegetation — and more room for other uses: pedestrians, cyclists, green spaces and local commerce.

Finally, the lightweight, modular and durable nature of the POP CAR makes it a platform naturally compatible with a circular economy. Its simplified structure enables more localised production chains, limiting intercontinental transport of components. Its standardised parts facilitate maintenance, repair, reuse and refurbishment. At the end of its life, its lightweight and modular design supports recycling. In other words: less

[17] : Luca de Meo's Letter to Europe

material, fewer kilometres, longer lifespan — and thus genuine operational circularity within the automotive sector.

In short, the POP CAR is not merely a lighter vehicle: it is a lever for ecological transformation, at the crossroads of material efficiency, spatial liberation, and a form of mobility finally compatible with planetary limits.

4.2. Social: Making mobility accessible and manageable

In many low-density or peri-urban areas, the car is not an option but a daily necessity. For millions of residents living in territories where public transport services are limited, irregular, or non-existent, it often remains the only means of access to employment, healthcare, education, or essential services. Yet this indispensable car is also becoming increasingly inaccessible — both in terms of purchase price and operating costs. This paradox fuels a growing sense of injustice, particularly among middle-income households, young people, the elderly, and residents of rural or peripheral areas.

The POP CAR offers a concrete alternative to this dual social and territorial constraint. By reducing both purchase and running costs, it helps restore an effective right to mobility. With affordable entry prices and leasing options, it becomes a genuine tool of empowerment and autonomy, adapted to the economic realities of modest households.

It also addresses a need often overlooked in public transport policies: that of short, frequent, and constrained journeys. Daily commutes, errands, school runs, or medical trips do not require large, powerful vehicles but rather practical, compact, and manoeuvrable solutions — vehicles that are easy to park, whether in dense city centres or sparsely equipped rural areas. Thanks to its small size, technological simplicity, and low energy consumption, the POP CAR is a vehicle for everyday life[18], designed to be used effortlessly and maintained without technical expertise.

In many households, it can also replace the second car, which is often older, more expensive to operate, and more polluting. It thus provides an affordable, modern, and accessible mobility solution while significantly reducing associated emissions[19]. Moreover, the used car market, long perceived as a financial fallback, has now reached price levels that make it unaffordable for many households. Offering an accessible new vehicle has therefore become a strategic imperative to ensure an inclusive transition.

In practice, the POP CAR is aimed at a diverse range of users:

- Young people acquiring their first vehicle,
- Seniors seeking a light, reassuring, and easy-to-drive car,
- Families needing an economical second car for local trips,
- Workers facing short-distance, compulsory daily commutes[20].

By lowering financial and technical barriers, the POP CAR broadens the circle of those who can benefit from the transition — reaffirming everyone's right to mobility[21].

Finally, by reducing the mental and financial burden associated with vehicle ownership (maintenance, insurance, range management, repairability), the POP CAR gives its users back control over their daily lives. It brings the automobile back to the scale of real use — and brings the ecological transition back to the scale of human life.

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[18] : "*The everyday electric car, accessible to many more people*" (Male, 55) in Kantar study for Movin'On, 2024

[19] : In France, the price of a used car typically starts at around €12,000.

[20] : In fact, the Kantar study for Movin'On shows a wide variety of projected users, both in terms of their profiles (working people (18%), retirees (26%) and students (25%)) and their areas of residence: people living in city centres (42%), people living in suburban areas (18%), people living in rural areas (13%)

[21] : Price emerges as the primary driver of acceptance, allowing the POP CAR to be viewed as an electric car that is both affordable and perfectly suited to everyday use, particularly thanks to its practicality.

4.3. Economy and sovereignty: Relocalise, recondition, reconquer

The transition to lighter and more accessible vehicles represents a major industrial opportunity for Europe. By breaking with technological and material escalation, the POP CAR simplifies production lines, reduces dependence on critical materials and brings assembly closer to where the vehicles are used. This change of scale and logic paves the way for a more flexible, distributed and resilient industrial structure.

Designed from the outset to limit electronic complexity, facilitate maintenance and maximise repairability, the POP CAR encourages the development of a local industrial ecosystem, relying on regional sectors for reconditioning, modular assembly, production of standardised components and associated services. This model, which is compatible with a distributed production mode, generates skilled and sustainable jobs throughout the country, particularly in employment areas undergoing conversion or located far from the historic centres of automotive production.

The reduction in weight, battery size and on-board sophistication also makes it possible to refocus innovation on more strategic objectives: robustness and technological efficiency. By stepping out of the race for performance and complexity, the POP CAR is helping to restore meaning to European innovation by reconnecting it to essential needs and sustainable models.

In a context of increased global competition, where compact electric vehicles from Asia – particularly China – are flooding the European market at very aggressive prices, the POP CAR represents a strategic response. It offers a coherent, competitive alternative that is aligned with European values: safety, technical and environmental control. It is not just a question of defending a sector, but of reaffirming a collective capacity to produce affordable, suitable and durable vehicles in Europe.

The project's objective is clear: to unite the European industrial ecosystem around a target volume of one million vehicles per year, all brands combined. This critical mass guarantees both the economic interest of the M0 segment and the industrial viability of a modular platform, available to manufacturers for multiple variations.

Supporting a European industry for affordable small electric cars means choosing renewed industrial sovereignty based on criteria of technological and social relevance, rather than on the accumulation of power or sophistication. It also means better control of geopolitical dependencies, reducing pressure on critical supplies, relocating know-how and consolidating a long-term local industry. In this sense, the POP CAR not only meets a need for mobility: it is an industrial and strategic project serving a stronger, fairer and more independent Europe.

5. A clear political and industrial roadmap for Europe

In her policy guidelines for the current 2024–2029 term of the European Commission, presented on 18 July 2024, European Commission President Ursula von der Leyen clearly expressed the *"need for a new plan for Europe's prosperity: to facilitate business activity and deepen our single market, develop a pact for clean industry to decarbonise and lower energy prices, put research and innovation at the heart of our economy, boost productivity through the spread of digital technologies, and invest massively in our sustainable competitiveness."*[22]

The POP CAR is not just a technological innovation; it is a political opportunity. For it to exist, scale up and fulfil its environmental, social and industrial promises, Europe must take structural decisions. The regulatory, fiscal and industrial frameworks can either accelerate or hinder the emergence of this new generation of light vehicles.

That is why we call for the implementation of an ambitious roadmap built around six main levers. The project's objective is clear: to unite the European industrial ecosystem around a target volume of one million vehicles per year, across all brands. This critical mass would ensure both the economic relevance of the M0 segment and the industrial viability of a modular platform available to manufacturers for multiple versions.

[22] : Policy guidelines for the next European Commission, 2024-2029

5.1. Creating a new European regulatory category: M0

The creation of an M0 category is not merely a technical measure, but a strategic response to new mobility needs. It would provide legal recognition for a new generation of light, efficient and safe vehicles, specifically designed for short, everyday journeys. By offering an appropriate regulatory framework — positioned between electric quadricycles (L6e/L7e) and M1 vehicles — this category would encourage innovation in lightweight design, without imposing constraints originally conceived for vehicles twice as heavy.

The objective is not to compromise on safety, but to define a standard aligned with real-world uses, climatic conditions and economic expectations. The adaptation of European regulations, particularly GSR2, thus becomes a lever for industrial transformation, rather than a mere regulatory adjustment.

5.2. Integrating the POP CAR into the CAFE mechanism with a virtuous, weight-based incentive

The CAFE (Corporate Average Fuel Economy) regulation must evolve to promote vehicles that are genuinely efficient and low in carbon emissions. A specific inclusion of the M0 category, supported by a weighted bonus system, would encourage manufacturers to produce and market these vehicles as part of their overall fleet mix. This virtuous incentive mechanism would make lightweight vehicles a lever for both regulatory compliance and environmental performance, on par with today's zero-emission models — while limiting the negative side effects of vehicle oversizing.

5.3. Introducing a reinforced eco-bonus specific to the M0 category

Since 2024, eligibility for the ecological bonus for electric vehicles has no longer depended solely on their powertrain, but on an environmental score based on their manufacturing carbon footprint. This score, defined according to a method supervised by ADEME, takes into account emissions linked to materials, the battery, assembly, and delivery of the vehicle within Europe. It does not cover the use phase or end-of-life, and therefore constitutes a partial life-cycle analysis focused on the "upstream" phase.

The current eligibility threshold is set at 60 points, corresponding to a maximum carbon footprint of around 14.25 tonnes of CO_2e.

In this context, we propose the creation of a reinforced eco-bonus dedicated to the future M0 category, designed to encourage the emergence of particularly efficient vehicles. This bonus would apply only to models with a carbon footprint significantly below this threshold.

The POP CAR project, which embodies this ambition, targets 6 tonnes of CO_2e by 2028 and 4.5 tonnes by 2035 — a reduction of more than 50% compared with the current threshold. This positioning would make it possible to clearly identify the most virtuous vehicles and to support them through enhanced financial incentives, while building on the momentum created by the French reform.

This mechanism would have a dual effect: accelerating the uptake of vehicles suited to everyday use, and encouraging the relocation of low-carbon industrial sectors by making public support conditional on truly exemplary carbon performance.

5.4. Integrating a local content objective to build a resilient European industry

In a context of strong competitive pressure, particularly from Asia, and given the strategic challenge of industrial sovereignty, it is essential to accompany the emergence of the M0 segment with a policy that supports local production. This implies defining a minimum local content target covering the entire vehicle life cycle — design, assembly, strategic components, critical materials, and related services.

This criterion should not be viewed as an additional constraint, but rather as a lever for reshoring, the creation of skilled jobs, and the structuring of new European value chains. It would be consistent to link this objective to existing incentive schemes (ecological bonus, investment aid, access to public procurement, European

funding), following a principle of progressive advantage: the higher the local content, the stronger the public support incentive.

Such a mechanism would encourage:

- The development of local industrial platforms,
- European production of key components (notably batteries and recycled plastic parts),
- The growth of an ecosystem for repairability, reconditioning, and short-distance logistics.

This local content criterion — to be calibrated realistically and progressively — would align with the objectives of the Green Deal and the European Industrial Deal announced for the 2024–2029 term.

5.5. Removing VAT on second and third leasing contracts

To support the rapid uptake of these vehicles, particularly among low-income households, a simple and targeted fiscal measure would be to remove VAT on the second and third leasing contracts for the same vehicle, in line with the principles of the circular economy. This measure would encourage operators to design vehicles that are more durable, more robust, and easier to recondition — and to keep them in circulation for longer lifespans. It would also help reduce the cost of access for second and third users, while maximising the environmental and social impact of each vehicle produced. In addition, it would help stimulate the recycling and second-life parts industries.

5.6. Supporting European innovation through dedicated programmes

Finally, the POP CAR can become a driver of reindustrialisation if it is integrated into a coherent sectoral approach. This requires explicit support for related innovations: lightweight platforms, production of fit-for-purpose batteries, recycled materials, advanced repairability, flexible assembly lines, and local reconditioning. These projects must be eligible for European funding (Horizon Europe, Innovation Fund) and given priority status in the *Green Deal's* industrial roadmaps.

6. The opportunity to bring together innovation, growth and sovereignty

The ecological transition cannot be decreed; it must be built through concrete, coherent and desirable choices that resonate with citizens in their daily lives. Setting ambitious climate targets is not enough — the means to achieve them must also be accessible, acceptable, and capable of generating public support. A transition experienced as a constraint cannot succeed. It must rely on solutions that make life better, restore a sense of agency, and open up possibilities rather than closing them off.

This is what POP CAR is all about. In contrast to an increasingly complex, inaccessible and disconnected automotive model, it embodies a shift towards mobility that is chosen, lightweight, and inclusive. Designed for everyday journeys, tailored to local realities and driven by intelligent efficiency, POP CAR defines a new benchmark. Neither a technological step backwards nor a niche experiment, it meets one of the fundamental challenges of our time: doing better with less, without compromising freedom, safety or appeal.

With its compact size, robustness, controlled cost and low environmental impact, the POP CAR is no utopia: it is a tangible, industrially viable solution, aligned with European standards and citizens' expectations. By addressing climate, economic, social and industrial challenges together, it reconciles innovation with fairness, performance with efficiency, and industry with everyday reality.

If Europe seizes this opportunity, it can make the POP CAR much more than a vehicle. It can turn it into a powerful political symbol — that of a continent which takes its climate commitments seriously, invests in its technological independence, and gives its citizens the means to act. A Europe capable of setting its own standards rather than following those of others. A Europe that reconnects with the spirit of democratic innovation that has always been its strength.

Making the POP CAR the missing link in European mobility is not only about creating a new category of vehicles — it is about affirming a vision of an innovative, sovereign and deeply human Europe.

Appendix 1. Objections & Responses

Objection 1: "This type of vehicle is not versatile enough to meet all needs."

Response:
It is precisely because the POP CAR does not try to do everything that it is relevant. It targets a specific use: short (under 10 km) and medium (10 to 50 km) daily journeys — frequent, constrained trips that represent the vast majority of mobility needs. Complementing other modes of transport (public transit, cycling, carpooling, or long-distance vehicles), it efficiently covers most real mobility demands without being oversized. In this sense, it enriches the existing ecosystem rather than trying to replace it.

The POP CAR also fits into a complementary logic. It can advantageously replace the household's second car, usually used for short, frequent trips, often made with an older combustion vehicle. In this respect, it complements existing mobility solutions while reducing the carbon footprint of travel. This new category could also benefit from car-sharing options and flexible, on-demand subscriptions. Car-sharing is a particularly dynamic market in this regard, and the POP CAR, with its versatility, would naturally find its place in it. As a self-service vehicle, it could ideally fulfil the "last kilometre" function of modal shift, for example when leaving a station or airport.

Objection 2: "This type of vehicle already exists: light quadricycles."

Response:
L6e and L7e quadricycles meet specific mobility needs but remain limited by their weight, power, restricted range, and lower safety levels due to more flexible regulations. They are generally designed for two passengers, which limits their suitability for family or shared use.

By contrast, the POP CAR aims to offer a more versatile vehicle, capable of carrying at least four passengers while remaining compact, lightweight, efficient, and affordable. It belongs to a different technical and regulatory framework: initially within the M1 category, with a high level of safety (notably GSR2), and by 2035 within a new M0 category designed specifically for everyday use. It does not duplicate what already exists — it fills a regulatory and technical gap that is currently uncovered.

Objection 3: "Will these vehicles really be safe?"

Response:
The POP CAR meets the active and passive safety requirements of the M1 category, including key ADAS equipment, while adapting its architecture to realistic speeds and use cases. It is designed to maximise safety through a reasoned approach: moderate weight to limit kinetic energy, optimised protective structures, and targeted onboard technologies. In the long term, the creation of an M0 category will make it possible to align regulations with expected performance levels, maintaining a high standard of safety without imposing standards designed for 1.5-tonne vehicles.

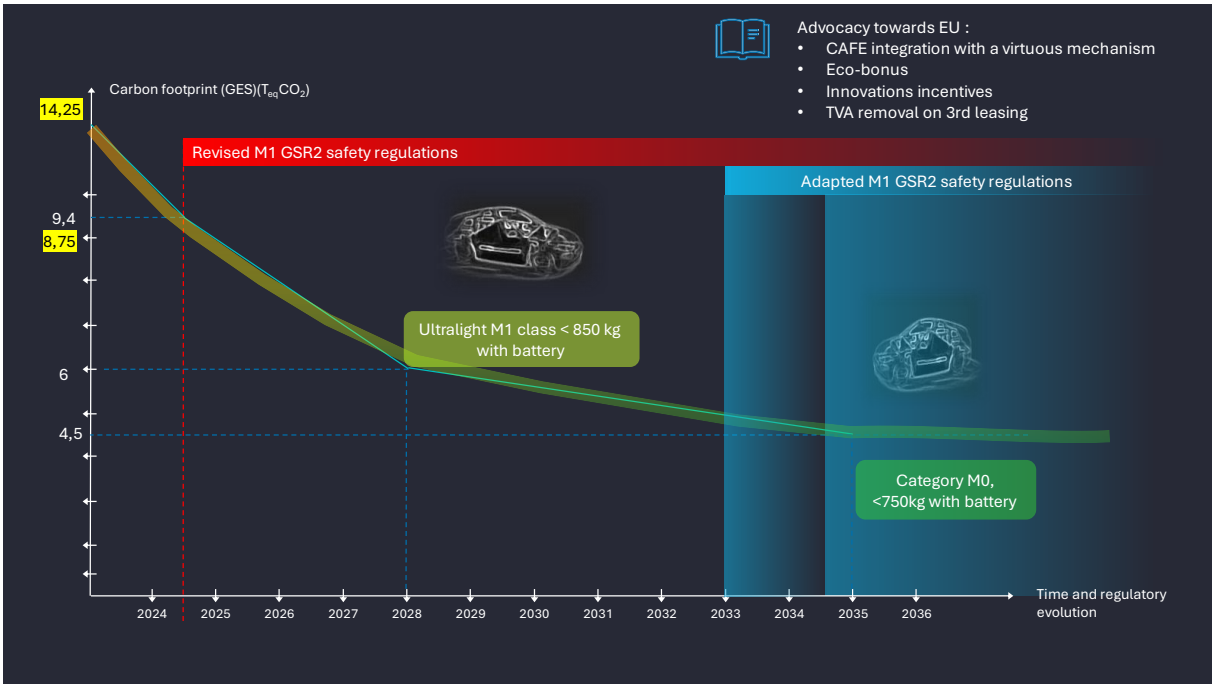
Objection 4: "The public will not want smaller, less powerful vehicles."

Response:
This perception does not reflect actual household behaviour. Today, nearly 65% of private buyers already choose new vehicles in segments A and B — compact, efficient cars suited to daily use. This demonstrates that a large share of the population already prioritises simplicity, affordability, manoeuvrability, and efficiency over power and size.

Expectations are evolving, especially among younger generations, toward greater consistency between use, budget, environmental impact, and real functionality. The POP CAR does not aim to impose a single model, but to offer a new form of automotive desirability based on intelligent use and freedom of choice. By promoting a more accessible and modern mobility, it aligns with an emerging cultural trend that questions past standards.

Finally, to stand out within the already well-established category of small electric vehicles, the POP CAR will also need to deliver an enhanced customer experience combined with a flexible ownership model: high-quality after-sales service, simplified maintenance, and concierge services tailored to real-world uses.

Appendix 2. POP CAR development roadmap



The trajectory presented illustrates the climate ambition of the POP CAR project: to halve, and then reduce by two-thirds, the carbon footprint of a lightweight electric vehicle compared to current M1 category standards. This reduction follows a progressive path, aligned with the expected evolution of available technologies, industrial practices, and automotive design models.

By 2028, a first milestone will be reached with a vehicle weighing 850 kg, achieving a carbon footprint limited to 6 tonnes of CO_2 equivalent (according to the ADEME methodology). This level is made possible by a compact battery (providing a real range of 150 to 200 km), simplified and relocalised manufacturing, an overall reduction in mass, and an extended vehicle lifespan.

By 2034, a second stage will be reached with a 750 kg model, developed within the framework of the future M0 category — the creation of which is the subject of a dedicated proposal. Through further optimisation of materials, greater use of low-carbon components, and a more structured circular ecosystem, the carbon footprint will then fall to 4.5 tonnes of CO_2e — less than one-third of that of an average current M1 vehicle.

This trajectory does not rely on uncertain technological bets but on levers that can be activated in the short and medium term. It aims to demonstrate that truly efficient, durable, and affordable electric vehicles are possible — provided that the regulatory and public support framework evolves accordingly.

That is why we propose the creation of a new M0 regulatory category, the recognition of these vehicles' specific characteristics within the eco-bonus system, and the adjustment of certain technical requirements (such as ADAS and GSR2) to better reflect real-world usage. The goal is not to bypass existing standards, but to open space for frugal innovation — to support a faster, fairer and better-targeted transition.

Appendix 3 - The new environmental score and eligibility for the eco-bonus

1. Regulatory context

Since 1 January 2024, eligibility for the French eco-bonus for electric vehicles has no longer depended solely on their "zero-emission in use" status, but also on their carbon footprint. This footprint is calculated based on emissions generated during the manufacturing phases (extraction and processing of materials, battery production and transport, vehicle assembly, etc.) and the vehicle's delivery to the European market.

The usage phase is taken into account through a standardised estimate based on the certified electricity consumption (according to the WLTP procedure) and an average emission factor assigned to the electricity used, depending on the energy mix of the country where the vehicle is first registered. It is therefore neither a dynamic life-cycle analysis (LCA) nor a calculation based on actual usage data.

This calculation is based on a method established by ADEME and defined by the decree of 7 October 2023[23]. The carbon footprint, expressed in tonnes of CO_2 equivalent (tCO_2e), determines a score out of 80 points: a vehicle with a footprint of 12 tCO_2e receives a score of 80, while a vehicle with a footprint of 21 tCO_2e receives a score of 0.

Based on this scale, a vehicle's score is calculated by linear interpolation between the two regulatory thresholds:

Carbon footprint	Score assigned
12 tCO2e	80 points
21 tCO2e	0 points

To qualify for the eco-bonus, a vehicle must achieve an environmental score equal to or above 60. In carbon footprint terms, this corresponds to a maximum of 14.25 tCO_2e.

Official interpolation formula:

Score = 80 × (21,000 – *E*) / 9,000 where *E* is the vehicle's carbon footprint in $kgCO_2e$.

Example: a vehicle with a manufacturing footprint of 14,250 $kgCO_2e$ will obtain:

80 × (21,000 – 14,250) / 9,000 = 60 points.

The threshold of 14.25 tCO_2e therefore represents the maximum footprint compatible with the eligibility score of 60[24].

2. Implications for the POP CAR project

The POP CAR project aims to promote a new category of lightweight vehicles (M0 segment) designed to maximise efficiency and minimise carbon footprint. The ambition is clear: to achieve a footprint well below the regulatory threshold of 60 points, corresponding to approximately 14.25 tCO_2e.

The project sets the following progressive targets:

- 6 tCO_2e by 2028
- 4.5 tCO_2e by 2035

This ensures:

- Systematic eligibility for the French eco-bonus,
- A demonstration of climate leadership at the European level,
- A tangible contribution to reducing the automotive sector's upstream (Scope 3) emissions.

[23] : Order of 7 October 2023 on the methodology for calculating the environmental score and the minimum score required for eligibility for the ecological bonus for new electric passenger cars

[24] : National Assembly Information Report No. 2630 (Nov. 2023)

3. Aligning public incentives with low-carbon innovation

The reform of the eco-bonus marks a turning point: an electric vehicle with an excessively high manufacturing footprint can no longer qualify for public support. By placing the production carbon footprint at the core of the incentive mechanism, the State acknowledges that climate neutrality is determined not only at the tailpipe but from the product's design stage onward.

In this new context, the POP CAR anticipates future requirements. It demonstrates that an approach based on lightness, efficiency, durability and localisation can not only ensure compliance but also pave the way for more ambitious standards. That is why a reinforced eco-bonus specific to the M0 category could be considered — reserved for vehicles whose carbon footprint is at least 30% lower than current thresholds.

Such a mechanism would reward environmental excellence, stimulate industrial investment in frugality, and make the most efficient vehicles immediately affordable for households, particularly in regions where car use remains indispensable.

Appendix 4. CAFE regulations (average emissions of new vehicles)

1. Ambitious targets for the decarbonisation of the car fleet

In Europe, passenger cars and light commercial vehicles account for around 15% of total CO_2 emissions, the main greenhouse gas[25]. To achieve its climate objectives (a 55% reduction in greenhouse gas emissions by 2030 compared with 1990, and carbon neutrality by 2050), the European Union has introduced strict average CO_2 standards for new vehicles. Regulation (EU) 2019/631 sets caps on average emissions (in grams of CO_2 per kilometre) for all new passenger cars sold by each manufacturer. These limits, which are regularly tightened, aim to steer the automotive industry towards low- and zero-emission vehicles, directly contributing to the decarbonisation of the vehicle fleet.

2. CAFE standards in force in 2025 (new vehicle fleets)

The term CAFE, short for "Corporate Average Fuel Economy", is borrowed from US regulations but is commonly used to refer to the European average fleet emissions standards.

Since 2020, a European target of 95 g CO_2/km on average has applied to new passenger cars (value under the former NEDC cycle, equivalent to around 118 g/km under the new WLTP cycle). From 2025 onwards, the regulation requires a 15% reduction in average emissions compared with the 2021 level. In practice, this corresponds to a target of around 81 g CO_2/km (NEDC) for the 2025–2029 period — approximately 93.6 g/km WLTP according to the updated conversion.

Each manufacturer is assigned a specific annual target, calculated from this European baseline and adjusted for the average mass of the vehicles it sells (manufacturers producing heavier vehicles have a slightly higher target, and vice versa[26]). This flexibility prevents disproportionate penalties for larger vehicle segments, while maintaining the overall environmental ambition.

In case of non-compliance, manufacturers must pay a significant penalty of €95 per gram of excess CO_2/km for each vehicle registered. This financial mechanism strongly incentivises manufacturers to electrify their ranges and improve the energy efficiency of their combustion models.

3. Tightening expected by 2030

The requirements will become significantly stricter by 2030, in line with the acceleration of the low-carbon transition. The updated regulation under the "Fit for 55" climate package raises previous ambitions and now sets the following targets for new passenger cars:

- 2021 (reference): 95 g CO_2/km on average (baseline limit, 100% reference level).
- 2025–2029: –15% (15% reduction from 2021, i.e. an average of around 81 g CO_2/km NEDC, or ~93.6 g/km WLTP).
- 2030: –55% (55% reduction from 2021, around 43 g CO_2/km on average).
- 2035: –100% (full reduction, equivalent to 0 g CO_2/km — only new zero-emission vehicles from that date onward).

These thresholds apply to the EU-wide average for all new passenger cars. Achieving around 43 g/km by 2030 will in practice require a large majority of electric or ultra-low-emission vehicles in new sales. Estimates suggest that roughly half (or more) of all new vehicles sold will need to be zero-emission by 2030. The European Union has also confirmed the end of sales of new internal combustion engine passenger cars by 2035 (100% new vehicles being electric or hydrogen-powered), thereby completing the quantitative CO_2/km objectives.

It is important to note that these regulations address tailpipe emissions (certification cycle) and not full life-cycle emissions. Nevertheless, they strongly encourage manufacturers to invest in electrification and clean technologies to avoid substantial fines while contributing to Europe's climate goals.

[25] : consilium.europa.eu
[26] : climate.ec.europa.eu

4. The leverage offered by a POP CAR-type vehicle

In this demanding regulatory context, an innovative vehicle such as the POP CAR — characterised by low weight and a battery capacity optimised for everyday use — can be a major asset for manufacturers seeking to comply with CAFE standards. Because the regulation is based on fleet averages, introducing an ultra-efficient, low-emission vehicle can significantly reduce the overall average. A 100% electric, ultra-light vehicle emitting 0 g CO_2/km (in use phase) offsets the emissions of more conventional models in the range, thereby improving the manufacturer's fleet performance. The very logic of the CAFE mechanism — an average across a fleet — favours this type of strategy: compensating higher-emitting vehicles with others that are exceptionally efficient. By its very design, the POP CAR checks all the boxes of a low-carbon vehicle and would have an immediate, positive impact on a manufacturer's fleet average once marketed.

Beyond regulatory compliance, the POP CAR offers a broader climate benefit. Thanks to its light structure and optimised battery, its overall carbon footprint is drastically reduced compared with a standard M1 passenger vehicle. By opting for a smaller, lighter car with just the necessary battery capacity for daily travel, both use-phase emissions (electricity consumption) and manufacturing emissions are minimised. A POP CAR, with its limited mass and smaller battery, halves — and ultimately reduces by up to two-thirds — the carbon footprint compared with a conventional car, while still meeting everyday mobility needs.

In summary, faced with increasingly stringent EU CO_2 standards, the POP CAR concept aligns perfectly with the dual challenge of the coming decade: decarbonising journeys (through drastically lower tailpipe emissions) and decarbonising production (through reduced material impact). By combining energy and material efficiency, such a vehicle provides a credible, complementary lever to help the automotive industry meet CAFE targets while accelerating the transition to a sustainable vehicle fleet. It offers a concrete means of greening the fleet average of new vehicles, contributing both to compliance with European regulations and to the broader goal of decarbonising road transport.

Appendix 5. What the example of K-Cars teaches us

1. Genesis and regulatory framework of "Kei cars" in Japan

K-Cars – officially known as keijidōsha (**軽自動車**, “light vehicles”) – are the smallest category of automobiles in Japan. Created as early as 1949 by the Japanese government to democratise access to cars and support a then-emerging domestic industry, this specific category is defined by a tailored and highly stringent regulatory framework. To be approved as a *keijidōsha*, a car must comply with precise maximum dimensions and engine capacity limits: length ≤ 3.40 m, width ≤ 1.48 m, height ≤ 2.00 m, and engine ≤ 660 cm^3 (compared with 360 cm^3 and 3 m in length in the 1960s, with thresholds gradually raised over time). In return for these restrictions, K-Cars benefit from major regulatory incentives that have supported their growth: reduced annual taxes, lower insurance premiums, and other advantages that make ownership significantly easier. These small cars also feature distinctive yellow and black number plates, making them instantly recognisable on the road[27].

2. A pillar of light, accessible and sustainable mobility

Born from this political ambition, K-Cars have, within a few decades, become a cornerstone of everyday mobility in Japan. They embody a restrained and efficient form of mobility: their small engine size results in low fuel consumption and limited pollutant emissions, and several recent models are now fully electric (e.g. the Nissan Sakura launched in 2022).

From a social perspective, Kei Cars provide an affordable and accessible mobility solution for low-income households and isolated rural populations. These mini-cars are cheaper to buy and operate than conventional vehicles, while still offering genuine independence in travel. They meet the needs of people who would otherwise be unable to own a car — for example, elderly residents in rural areas with limited public transport, who represent the majority of K-Car buyers. Younger drivers and urban dwellers also appreciate their practical and economical format. Despite their compact size, these vehicles do not compromise road safety: accident studies show that, under real-world conditions, K-Cars do not pose a higher risk of injury than standard cars in low-speed collisions.

3. An industrial success and massive market integration

Thanks to this favourable framework, K-Cars have established themselves as an essential component of Japan’s automotive industry. Their integration into the market is such that they consistently account for more than one-third of new car sales in Japan. This market share, oscillating between 35–40%, even peaked at 40% in 2013. As recently as 2020, *keijidōsha* still represented 37.4% of new registrations. Including mini utility vehicles (vans and small rural trucks), the segment exceeds half of the national market. Around 1.5 million of these ultra-compact vehicles are sold each year — a significant volume that helps sustain a strong domestic manufacturing base.

Industrially, the success of K-Cars benefits almost exclusively Japanese manufacturers, all of whom offer models in this category. Specialist brands such as Suzuki and Daihatsu (Toyota Group) have made them their flagship products, while major generalist manufacturers like Honda, Mitsubishi, and Subaru also produce their own kei cars. Nissan and Mazda market models designed by partner companies. This captive market has stimulated innovation and employment in Japan, while remaining largely protected from foreign competition, since these microcars are difficult to export outside Japan as they are.

4. An inspiration for Europe and the “M0” project

The Japanese K-Car model demonstrates that, with an appropriate regulatory framework, a new category of vehicles can emerge and thrive, eventually becoming a key driver of sustainable mobility. Of course, this concept cannot be replicated identically in Europe — regulatory frameworks, safety standards, and usage patterns differ significantly. However, it provides strong inspiration to guide a European approach.

[27] : Contrary to popular belief, they do not exempt drivers from proving they have a parking space in urban areas.

At a time when small cars are disappearing from the European market, there are increasing calls to create a modern equivalent of the kei car. For example, in 2023, the CEO of Renault suggested launching a category of small electric cars inspired by keijidōsha for the European market[28]. This is precisely the aim of the "POP CAR" light electric vehicle concept: to define a new "M0" category designed for Europe, with its own technical and safety criteria, in order to offer a lightweight electric vehicle accessible to all. The Japanese example of K-Cars perfectly illustrates how a dedicated framework can foster the emergence of a local, affordable and environmentally friendly mobility offer — a path that Europe could follow, adapted to its own needs.

[28] : Japanese "kei cars", the potential future of small cars in Europe; Le Monde, 2023

Appendix 6. Mass and speed: key determinants of carbon footprint

The weight of a vehicle is one of the main determinants of its carbon footprint, both during manufacture and use. A vehicle that is two to three times heavier than another can generate up to three times more greenhouse gas emissions, even if it is electric. A higher weight means more materials are used, a reinforced structure, larger batteries, higher energy consumption in use, and greater wear on tyres and infrastructure.

Speed is a second, indirect but essential parameter. Aerodynamic drag increases with the square of the speed: doubling the speed results in four times greater drag. Thus, designing vehicles capable of travelling at 130 km/h or more requires much more powerful engines, larger batteries, stronger braking systems and reinforced structures. Conversely, use focused on short journeys and moderate speeds makes it possible to lighten the entire vehicle, control weight, contain costs and limit the carbon footprint, while maintaining a high level of safety.

It is from the convergence of these two parameters — mass and reasonable speed — that a truly optimised approach to light vehicles can emerge: vehicles that are more efficient to produce, more economical to use, and easier to maintain, recycle, relocalise and share. This approach is not only technical, but also industrial, economic and social.

However, it requires a profound change in the current framework. European regulations remain largely focused on emissions in use (g CO_2/km), without taking into account grey emissions, weight, or the real use of vehicles. In doing so, they create a systemic bias in favour of heavy, powerful and highly motorised vehicles, which can more easily accommodate large batteries and therefore benefit from environmental bonuses, even though their total carbon footprint remains high.

This framework prevents the emergence of low-impact solutions, blocks innovation towards lighter vehicles, and limits model diversification. It also deprives many regions of more affordable, local and accessible mobility options. A break with the status quo is therefore both necessary and urgent.

The POP CAR approach is precisely in line with this logic of change. By combining strict weight control (below 850 kg in the short term, 750 kg in the medium term) with performance adapted to real-world use (without unnecessarily oversizing range or power), it enables the design of a simpler, lighter, more robust and more sustainable vehicle. This orientation paves the way for new value chains — shorter, more circular and more European. It is based on a deliberate choice of sobriety, serving energy efficiency and access to mobility for the greatest number.

From this perspective, integrating the dimensions of mass and real-world use into European decarbonisation policies is a strategic lever for action. This means adapting bonus eligibility thresholds, safety requirements, type-approval standards and industrial support criteria to make fuel-efficient vehicles the norm — not the exception.

Appendix 7. Total cost of ownership, insurance and commercialisation of the POP CAR

The POP CAR has been designed to offer an exceptionally low cost of use. Its total cost of use (TCU) covers a broader scope than the traditional total cost of ownership (TCO). It includes not only the direct costs of acquisition, maintenance, insurance and energy, but also the practical costs associated with everyday use — such as parking accessibility, ease of maintenance, and compatibility with shared mobility services.

1. A controlled Total Cost of Ownership (TCO)

The POP CAR stands out with a TCO significantly lower than that of conventional electric or combustion M1-category passenger cars. Several structural factors contribute to this:

- *A lighter vehicle*: with a target weight below 850 kg, the POP CAR requires fewer materials in production, reducing both manufacturing costs and its initial carbon footprint.
- *A moderate-capacity battery*: designed for a real-world range of 150–200 km, it avoids the extra costs and emissions of oversized modules while remaining perfectly suited to daily travel.
- *Reduced maintenance*: the vehicle's technical simplicity (fewer complex components, easy access, and enhanced repairability) helps limit maintenance expenses throughout its lifetime.
- *Long service life*: with a target lifespan of 240,000–300,000 km, the POP CAR spreads its initial cost and environmental impact over a higher mileage.

2. An even more advantageous Total Cost of Use (TCU)

Beyond ownership, the POP CAR is designed to minimise day-to-day running costs through several additional advantages:

- *Very low energy cost*: thanks to its light weight and optimised aerodynamics, the POP CAR consumes little electricity and can travel for less than €3 per 100 km — three to four times cheaper than an equivalent combustion vehicle.
- *Potentially lower insurance costs*: as a lightweight vehicle designed for moderate speeds, the POP CAR represents a lower risk profile for insurers. This opens the way for specific products with significantly lower monthly premiums than traditional vehicles. Expected accident rates, particularly for bodily injury, are structurally lower.
- *Easier parking*: due to its compact size, the POP CAR can park more easily — even in constrained spaces — and could benefit from local incentive-based parking policies.
- *Compatibility with new services*: its compactness and simplicity make the POP CAR well suited for shared use, car-sharing, and both short- and long-term rental schemes. It can be easily integrated into urban or peri-urban fleets, reducing costs for occasional users.

3. A distribution model designed for large-scale adoption

The POP CAR has been conceived as an open platform that multiple manufacturers can adopt and adapt. This industrial positioning enables diversified distribution models and makes the vehicle accessible from the very first euro:

- *Low-cost leasing or long-term rental* (LLD): the controlled production cost makes it possible to offer very low monthly lease payments, potentially without down payment, and possibly including insurance and maintenance.
- *Direct sales or short supply chains*: alongside traditional channels, the POP CAR can be distributed through non-automotive retailers, online platforms or even local authorities, broadening its reach.
- *Shared and service-based models*: it can be deployed in car-sharing schemes, short-term rentals, or integrated into public mobility services. This diversity of access options strengthens the economic appeal of the POP CAR, particularly in areas with limited transport provision.

Designed from the outset for efficiency, tailored to daily use, and offered at a highly competitive cost of ownership and use, the POP CAR provides a structural response to the need for affordable and sustainable mobility across European territories.

Appendix 8. Automotive glazing: circularity and lightweighting for low-impact mobility

Automotive glazing – windscreens, side windows and panoramic roofs – represents a significant share of a vehicle's total weight and can play an important role in its environmental performance. Through two key levers — glass circularity and the optimisation of glazing thickness — it is possible to reduce a vehicle's carbon footprint while maintaining the highest standards of quality and safety. These principles are fully integrated into the POP CAR approach, which promotes lightweight, sustainable design adapted to real-world uses.

1. The circularity potential of automotive glass

Glass is a material that can theoretically be recycled indefinitely without any loss of quality. However, automotive glazing requires extremely high standards of mechanical strength, optical transparency and visual integrity. Today, most vehicle glazing already contains 40 to 50% recycled glass, mainly in the form of pre-consumer cullet — waste generated during the float glass manufacturing and processing stages. This type of cullet offers a quality perfectly compatible with the production of new glazing.

By contrast, the share of post-consumer glass (from end-of-life vehicle glazing) remains very low — less than 1% — due to the lack of industrial ecosystems capable of ensuring viable large-scale collection and treatment. Yet the potential benefits are considerable: a recycling rate above 60% would cut CO_2 emissions from glass production by 15 to 20%. Developing a closed-loop recycling system for automotive glass is therefore a credible pathway for environmental improvement.

By aiming to design vehicles that are easier to dismantle and recycle at the end of their life, the POP CAR can serve as a lever for testing and structuring such value chains, in line with the principle of operational circularity.

2. Lightweight glazing: a direct lever for decarbonisation

Every millimetre saved in glazing thickness translates into a weight reduction, and therefore lower energy consumption during use. Manufacturers' choices regarding glass thickness are often driven by acoustic insulation requirements, particularly for aerodynamic noise perceptible above 100 km/h. But for lightweight vehicles designed for moderate speeds and short urban or suburban trips — such as the POP CAR — these constraints are less critical, opening the way to a structural reduction in glazing thickness.

For example, a standard 5 mm windscreen can be reduced to 4 mm or even 3 mm, as shown by Renault's 2014 Eolab concept, equipped with a 3 mm lightweight windscreen. Over a surface area of 1.5 m^2, reducing the thickness from 5 mm to 3 mm saves more than 7 kg. At vehicle scale, lightweight glazing could reduce total weight by several kilograms, contributing directly to the overall objective of keeping the POP CAR below the 850 kg threshold.

3. A lever to activate for the M0 category

Within a platform such as the POP CAR, designed for the future M0 category — light, efficient vehicles adapted to daily travel — lightweight glazing represents a relevant area for optimisation, without compromising safety or comfort. It forms part of a broader eco-design strategy: reducing weight, facilitating recycling, simplifying maintenance, and contributing to a truly circular automotive economy.

By combining recycled materials, optimised thickness and end-of-life recovery channels, glazing becomes an exemplary component of a reimagined mobility — accessible, sustainable, and aligned with Europe's ecological transition objectives.

Movin'On - Who are we?

Movin'On is the world's first co-innovation ecosystem dedicated to sustainable mobility. It delivers concrete solutions and innovations to meet everyone's mobility needs, with the aim of contributing to societal progress while acting for the planet. Convinced that no single player can address today's challenges alone, Movin'On brings together agents of change — organisations and individuals alike — and gives them the means to innovate collectively for more mobility with less impact.

Movin'On provides expertise to promising initiatives and offers its ecosystem access to resources, processes, technological intelligence, operational support and the sharing of best practices worldwide.

Movin'On works on tangible solutions and innovations to promote mobility, guided by two main objectives. The first is to improve society by deploying a wide range of complementary mobility solutions that meet three key criteria: efficiency, ethics and inclusion. The second is to act for the planet by combating climate change and air pollution, while preserving scarce natural resources.

In practical terms, Movin'On is committed to five major challenges:

- Fighting climate change and air pollution
- Preserving natural resources
- Ensuring safe and accessible mobility
- Enhancing multimodal mobility
- Designing a new model of overall transport efficiency

This discussion paper was carried out with the participation of The Shift Project.

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