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The Overlooked Bargains of EV Adoption Policy

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Transportation has become France's (and more generally Europe's) weak link in the race to decarbonize: this sector accounts for one-third of the country's greenhouse gas emissions, and unlike industry or energy, its emission levels have hardly decreased over the past thirty years. This makes reducing emissions from transportation a crucial policy challenge. While the electrification of the automotive fleet is rightfully a cornerstone of the national strategy, this Note argues that carefully taking into account usage, and especially the dynamics of the second-hand car market radically changes our understanding of policy effects, and suggests novel strategies to effectively reduce emissions at a lower cost to car users, carmakers, and public finances.

France is characterized by an aging vehicle fleet and a highly active used car market. Moreover, large corporate fleets, accounting for nearly half of new vehicle registrations, are slow to transition to electric vehicles despite supplying the second-hand market. The dynamism of this market raises questions about the effectiveness of public policies promoting the early replacement of internal combustion engine vehicles with electric ones. Drawing on existing data, original surveys, and simulation studies, our analysis shows that a internal combustion engine (ICE) vehicle sold on the used car market still emits around 60% of its lifetime emissions, even if equilibrium impacts of scrappage and new sales are taken into account. Thus, policy should influence vehicle choice at the time of purchase, rather than the timing of the purchase itself.

Beyond vehicle choice, usage plays a central role. Simulations conducted for this Note indicate that an immediate 10% reduction in usage, at the scale of the total car stock would have a climate impact comparable, in the short and medium term, to a rapid transition of new vehicle purchases to electric.

The match between vehicle type and usage intensity is another effective short-term policy lever. Households with low annual mileage are the ideal owner of high emission vehicles : they should be encouraged to keep them, rather than being guilted into change.

Building on those insights, this Note makes explicit recommendations to significantly reduce CO2 emissions by 2035 at a much lower cost to car users, carmakers, and governments. These include : providing three years of visibility on emission penalties to let manufacturers plan their lineup; spreading purchase incentives over a vehicle's lifetime to stabilize the electric second-hand market; establishing a green savings plan allowing households to start funding their future vehicle and charging infrastructure today, providing a strong signal of future demand; mandating dealerships to systematically evaluate EV suitability ; and promoting pay-per-mile car insurance as a means to reward moderation. Coordinated action influencing purchase decisions, usage, and consumer commitment to future change would reduce the budgetary cost of incentives, mobilize several billion euros of private savings, and rapidly lower cumulative emissions.

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The Global Context of Energy and Budgetary Sobriety: Act Fast, Spend Right

The transport sector plays a key role in the fight against climate change. In France, it is the only sector where greenhouse gas (GHG) emissions have stagnated since the 1990s, now accounting for 33% of total emissions compared to 23% in 1990.[1] The sector is also growing rapidly in non-OECD countries, where the vehicle fleet is expected to double by 2050.[2] Before turning to public policy considerations, it is useful to establish some facts about the global context of climate change mitigation.

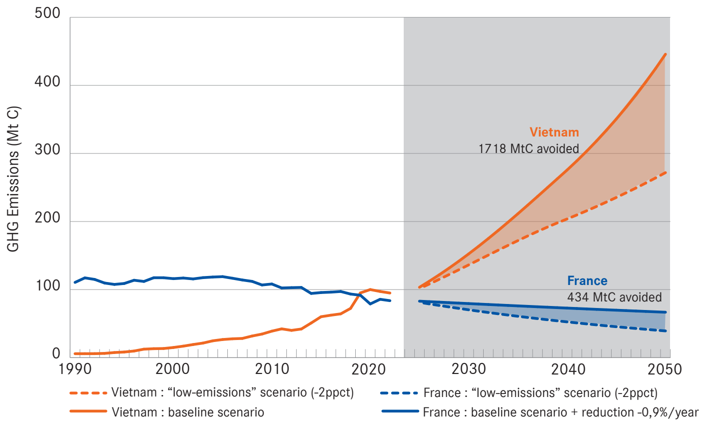
Greenhouse gas emissions represent a major negative externality that is difficult to address for four key reasons: their scale is global; abatement costs are high; impacts are unevenly distributed across space and time; and finally, enforcement and sanction mechanisms remain limited. The international community has managed to address other global externalities, such as acid rain or ozone layer depletion, but those involved much lower costs. The relative success of nuclear non-proliferation is a more relevant example, as it also involved existential risks and trust between states. However, it concerned only a small number of decision-makers and did not directly affect households' daily lives. In contrast, tackling climate change requires changing the lifestyles of billions of people.

Given these challenges, the complementarity between technological innovation and public policy is essential. The declining cost of renewable energy and electric vehicles (EVs) plays a key role in making the transition more acceptable to households. Regulations or taxes aimed at reducing emissions are less painful when affordable alternatives are available. However, innovation alone will not be enough. Past energy transitions (from wood, to coal, to oil and gas) did not lead to a decrease in the use of older energy sources, which were often required to establish the newer technologies.

The European Union (EU) has set a target to reduce GHG emissions by 55% compared to 1990 levels by 2030, and to achieve carbon neutrality by 2050. Encouragingly, current efforts are not in vain: EU emissions declined at an average annual rate of -1% between 1990 and 2022.[3] Thanks to investments in nuclear energy since the 1970s, France has one of the lowest per capita GHG emissions among developed countries.[4] However, this pace is insufficient to meet announced targets: at the current rate, EU emissions would only be halved by 2050.[5]

In this context, France is considering stepping up its efforts. However, the global nature of GHGs requires a global policy approach. In 2023, France and Vietnam had similar total emissions, but their trajectories are fundamentally different: in France, emissions are declining by 1% per year; in Vietnam, they are increasing by 9%.[6] This structural difference between developed and developing countries means that reducing emissions growth rates has a very asymmetric impact. In France, where emissions have already peaked, reducing the growth rate by 2 percentage points would cut cumulative emissions by 434 million metric tons of carbon (MtC) by 2050. In Vietnam, the same reduction would cut cumulative emissions by 1,718 MtC (see **Figure 1**).

Figure 1: Effect of a 2-Percentage-Point Reduction in Emissions Growth Rate



Note: The baseline scenario assumes two things: (1) France's emissions growth rate remains constant at the average observed from 1990 to 2022; and (2) Vietnam's growth rate declines linearly between 2025 and 2050 to converge with the current average Chinese rate by 2040. The "low-emissions" scenario assumes a 2-percentage-point reduction in growth rates starting in 2025.

How to read the figure: In 2040, Vietnam's yearly emissions would reach 276 MtC in the baseline scenario, compared to 204 MtC in the low-emissions scenario.

Sources: Global Carbon Budget and author's calculations.

These figures highlight the need to assess public policies within their international context: does one euro have more impact when granted as a subsidy for electric vehicle adoption

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[1] Crippa M. et al. (2022) : CO2 emissions of all world countries - 2022 Report, Publications Office of the European Union.

[2] U.S. Energy Information Administration (2024) : Annual Energy Outlook 2024.

[3] Friedlingstein P. et al. (2023) : « Global carbon budget 2023 », Earth System Science Data 15, n° 12.

[4] France generates 0.7% of global emissions and accounts for 0.8% of the world's population.

[5] This estimate is based on extrapolations from the Global carbon budget 2023 data.

[6] A similar comparison can be made between the European Union and India: in India, total emissions are increasing by 5% per year, while in the EU they are declining by 1% annually.

in France, or when invested as venture capital in a renewable electricity project in Vietnam? In this global context, the frugality of domestic public policies is not just a fiscal necessity—it is also a virtue. Reducing the cost of policy measures would: 1) yield more sustainable adoption policies, creating a more stable environment for consumers and businesses; 2) allow the redeployment of currently very limited public investment capacity; 3) foster greater diffusion of successful policies to other countries, especially developing ones.

It is essential to act quickly against climate change. Even in the simplest models, the effect of GHGs on the temperatures begins as soon as they are released into the atmosphere, but their full impact builds up with a delay—rising significantly over the 25 to 50 years following their emission, and remaining meaningful for over a century.[7] This means that the temperature increases currently observed correspond to emissions from the 1980s and 1990s. Today's emissions will affect future generations, making GHGs a global and intergenerational externality. This means that the timeline of emissions also matters: for the same cumulative quantity of CO_2 by 2050 or 2100, a scenario where emissions occur earlier will have a more severe climate impact than one in which they are delayed.[8] It is therefore essential to complement long-term measures with policies that reduce emissions in the very short term.

One final important observation is that the oligopolistic nature of the oil market represents an opportunity : it enhances the impact of demand-reduction policies. Suppose France and Europe reduce their demand for hydrocarbons. Will the oil that Europeans forgo remain in the ground? In a competitive market, a fall in European demand would lead to medium-term price reductions, which would, in turn, boost demand elsewhere in the world. This is the so-called rebound effect. In a simple model, a 50% reduction in European demand—equivalent to 5% of global demand—would see its impact on production halved (2.5%) due to this rebound effect. The oligopolistic structure of the oil market tends to dampen this rebound, thereby increasing the effectiveness of European efforts : price is set by competition with a fringe of competitive non-OPEC oil producers. Hence, even a major reduction in European demand is unlikely to have a significant long-term impact on oil prices.

The Importance of Used Car Markets and Driving Behavior

This Note focuses on public policies targeting automobile users in the context of the energy transition. Its scope deliberately excludes: local pollution, which provides the rationale for low-emission zones; and industrial policy objectives, i.e. the impact of public measures on the automotive industrial ecosystem in France.[9] Even within this restricted scope, an accounting decomposition of policy effects reveals the variety of channels through which policy affects emissions. The used car market and driving practices emerge as key determinants.

Impact Accounting

The effect of public policies on automotive emissions can be broken down into four channels:[10]

1. Impact on fleet size: Public policy can influence the total number of vehicles in circulation, both by encouraging the purchase of new vehicles, and by acting indirectly on the used car market.
2. Impact on average vehicle usage: Public policy can change the average yearly mileage per vehicle, for example by raising fuel prices, lowering the cost of public transit, or promoting soft mobility such as cycling.
3. Impact on average emissions per kilometer: Public policy can improve the environmental efficiency of the existing fleet, for instance by encouraging the replacement of internal combustion vehicles with hybrid or electric models, thereby reducing average emissions per kilometer (see **Box 1**).
4. Impact on the match between vehicles and usage: Public policy can also influence how vehicles are allocated to users—ensuring that the least polluting vehicles are used by those who drive the most, and vice versa.

It is important to take these different channels into account when evaluating policies. Interventions targeting a specific channel can be significantly undermined by poorly anticipated indirect effects on other channels. For example, a subsidy for electric vehicle purchases reduces emissions per kilometer (channel 3), but may increase the overall size of the vehicle fleet if the used car market is active (channel 1). Usage restrictions such as low-emission zones may reduce average vehicle use (channel 2), but can also worsen the match between vehicles and users if urban households (who generally drive less) sell their cars to higher-mileage drivers (channel 4).

[7] For instance : Nordhaus W.D. (1991) : « To slow or not to slow: the economics of the greenhouse effect », *The Economic Journal*, 1;101(407), p. 920-937, July.

[8] See Chassang S. and Lopes A. (2025): « Les externalités du marché automobile », *Les Focus du Conseil d'Analyse Économique* n° 115, July.

[9] These public policy challenges are significant, but they can be addressed at the local level (e.g., regulation of city-center traffic) through decentralized action and direct industrial policy instruments—such as R&D subsidies, technology standards, strategic public procurement, concessional loans, and public guarantees.

[10] See Chassang S. and Lopes A. (2025): "Externalities in the Automotive Market", *ibid*.

Box 1. Valuing the impact of vehicle emissions

It is helpful to keep a few orders of magnitude in mind to assess the impact of vehicle emissions. For reference, a modern hybrid subcompact car driven 12,000 kilometers per year for 14 years will emit about 25 tons of CO_2 (including manufacturing emissions). In comparison, an electric subcompact car will emits about 12 tons of CO_2[a]; a diesel subcompact car about 31 tons; and an electric midsize sedan between 13 and 16 tons.

Estimates of the global social cost of CO2 vary between €120 and €1,200 per ton.b For a cost of CO2 of €300 per ton, the emission reductions associated with choosing an electric subcompact car over a hybrid would be valued at roughly €3,600 in total, or about €250 per year over the 14-year lifespan of the vehicle.

[a] Based on the carbon intensity of French electricity. For average European carbon intensity, emissions from an electric subcompact car would be closer to 21 tons of CO_2.

b A 2023 report by the U.S. Environmental Protection Agency suggests a cost range of $140 to $420 per ton of CO_2. More recently, Bilal and Känzig (2024) propose a much higher figure of $1,400 per ton:Bilal A. & Känzig D.R. (2024): «The macroeconomic impact of climate change: Global vs. local temperature», *NBER Working Paper* No. w32450.In France, the «Quinet Report» adopts a value of €250 per ton:Quinet A., Bueb J., Le Hir B., Mesqui B., Pommeret A., & Combaud M. (2019): «La valeur de l'action pour le climat», France Stratégie.

Fleet demographics: the subtle but fundamental role of the used car market

Understanding the flows shaping the evolution of the active vehicle fleet is essential understanding levers available for public policy. According to the Data and Statistical Studies Department (SDES) of the Ministry for Territorial Planning and Ecological Transition, the French passenger car fleet grew at an average annual rate of 0.8% between 2011 and 2023, reaching 38.9 million vehicles. Roughly 2 million new vehicles are registered each year. Scrappage flows are 20–30% lower than inflows, meaning that from 2011 to 2023, the average vehicle age increased by 20%, reaching nearly 11 years. The used car market is highly active and capable of absorbing significant fluctuations in supply. Each year, between 5 and 6 million used vehicles are traded on the domestic market; 3 out of 4 buyers purchase a used vehicle. France also exports between 200,000 and 300,000 used vehicles annually, mainly to other European countries such as Poland.

Observation 1. The used car market is large and active ; vehicle lifespans are increasing. It is essential to take this into account when evaluating public policies.

The moderate growth of the overall fleet masks significant disparities across different powertrains, reflecting a profound shift in the demand for new vehicles. While gasoline vehicles have grown slightly (+1.2% per year), diesel powertrains—historically dominant—have declined (-0.2%). Starting from a very low base, hybrid and electric vehicles have shown high growth rates (40% and 62.8% per year, respectively). In 2023, electrified vehicles made up 5% of the fleet but accounted for 50% of new registrations (33% hybrid, 17% electric). Leasing has also grown as a vehicle financing method, with around 60% of new vehicles financed through leasing in 2024.[11]

Our surveys of households and small and medium enterprises (SMEs) reveal systematic differences in demand depending on the type of buyer.[12] Among households likely to purchase a new car in the next three years, around 30% say they intend to buy an electric vehicle. The proportion is similar among businesses with fleets of fewer than 10 vehicles (which account for 50% of corporate registrations in our SME sample). In contrast, companies with fleets of more than 10 passenger vehicles anticipate that only 10% of their purchases over the next three years will be electric. These differences in expectations are also reflected in the composition of existing fleets.

The under-adoption of electric vehicles by larger fleets deserves particular attention. Corporate fleets as a whole represent more than 50% of new vehicle registrations, and company cars are on average younger (4 to 5 years old) than household vehicles (10 to 12 years old). This means that company choices now are a key determinant of households' choices on the used car market in a few years. The gap between demand from fleets with fewer than 10 vehicles and those with more than 10 is particularly striking since the "Climate and Resilience" law requires large fleets to ensure that 20% of their new acquisitions are electric in 2024 (rising to 40% by 2027).[13] The fact that small fleets exhibit purchasing behaviors similar to households suggests that under-adoption by large fleets may stem from organizational or financial frictions rather than a mismatch between EVs and operational needs.

[11] Larivière L. et Antich A. O. (2024) : Le leasing automobile : faux ami de la transition automobile.

[12] The data presented here come from two original surveys: a business survey conducted with the Banque Publique d'Investissement (BPI France), and a household survey carried out with the help of UFC-Que Choisir and the Laboratoire d'Économie Expérimentale de Paris. See: Chassang, S. et al. (2025): "The Automotive Demand of Households and Businesses", *Les Focus du Conseil d'Analyse Économique*, No. 116, July.

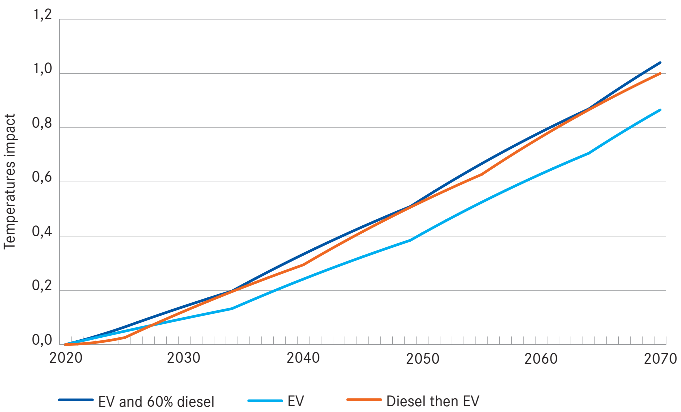
[13] The « loi d'orientation des mobilités » mandates the greening of vehiclepurchases by fleets with more than 100 vehicles: 10% of purchases from January 2022, 20% in 2024, 35% in 2027, and 50% in 2030. The « Loi Climat et Résilience » strengthened these targets by raising the minimum rates to 40% as of January 2027 and 70% as of January 2030.

Observation 2. Corporate fleets account for over 50% of new registrations and determine the supply of used vehicles available to households. Large fleets are more resistant to adopting electric vehicles than small fleets or households.

The scale and dynamism of the used car market directly raises questions about the effectiveness of policies that incentivize early replacement of internal combustion engine (ICE) vehicles with electric ones. Indeed, when a household gets rid of a combustion vehicle, in 80% of cases it is resold on the second-hand market and continues to emit greenhouse gases (GHGs). We estimate that such a vehicle would emit, on average, 60% of its remaining lifetime emissions.[14]

This is an important point. Imagine a household that is considering replacing its diesel car and can either: (i) use it for its remaining lifetime (5 years) and then buy an electric vehicle (dark blue curve), or (ii) buy an electric vehicle immediately (light blue curve). A quantification exercise shows that the second scenario leads to lower temperatures, even though the electric vehicle generates substantial emissions during its manufacturing phase.[15] However, this scenario does not account for the resale of the diesel vehicle on the second-hand market. If the diesel vehicle emits 60% of its potential lifetime emissions (orange curve), then **Figure 2** shows that early replacement has no positive impact on temperatures.

Figure 2: Early Fleet Renewal Is Not Desirable



Note : The temperature impact index is normalized to 0 in 2020 and to 1 in 2070 in the "Diesel then EV" scenario.

Observation 3. The early replacement of ICE cars to EVs has no positive impact on the climate. It is the choice of vehicle at the time of purchase—not the timing of the purchase—that should be influenced. The key performance indicator should be reductions in ICE car sales, rather than increases in EV sales.

The Importance of Vehicle Use

Given the low carbon intensity of electricity in France, EVs offer substantial reductions in greenhouse gas (GHG) emissions. It is therefore desirable for the majority of new vehicles to have very low emissions as early as possible. However, because ICE vehicles have long lifespans, greener new car sales will only have a gradual impact on fleet-wide emissions. Depending on the transition scenario, we estimate that 12 to 17 million ICE vehicles will still be on the road in 2050. It is therefore important to identify complementary strategies that reduce emissions in the short term without changing the overall vehicle stock. This justifies focusing on changes in vehicle usage, which can have short-term effects across the entire fleet.

Figure 3 quantifies these effects. It compares annual emissions and temperature impact under three scenarios: moderate growth in the EV share of new car sales (60% by 2035), rapid growth (98% by 2035), and moderate growth combined with an immediate 10% reduction in usage.[16] By 2050, a 10% immediate reduction in usage slows temperature rise at least as effectively as rapidly increasing the EV share in new sales. In the medium term, a prompt change in usage can have an impact comparable to accelerating EV adoption. In the longer term, however, a faster transition to EVs has a greater impact on temperatures.

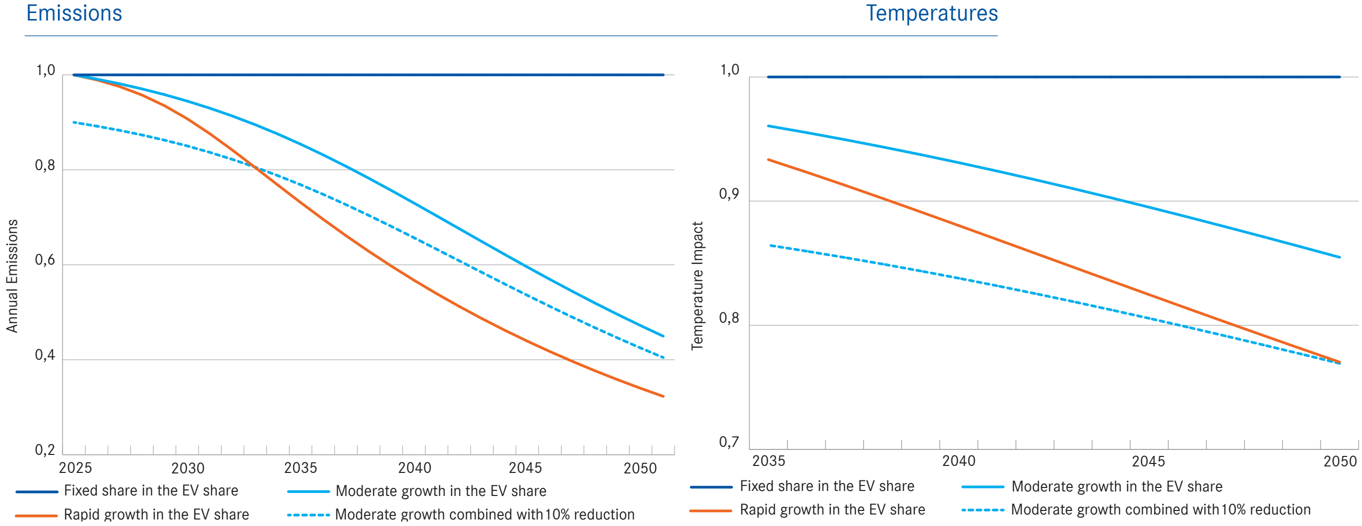
Observation 4. A modest reduction in current vehicles use would have an immediate impact on emissions and provide a meaningful complement to EV transition policies, whose effects will materialize over the medium and long term.

[14] This figure measures the net impact of one additional vehicle entering the used car market by considering two effects: it increases the scrapping of older vehicles and reduces demand for new vehicles. See: Chassang, S. and Lopes, A. (2025): "Externalities in the Automotive Market", op. cit.

[15] Geffray L.-P. (2023) : « Politiques de conversion anticipée du parc de véhicules thermiques en véhicules électriques : impacts climatiques », Institut Mobilités en transition.

[16] For clarity, emissions and temperature changes are reported relative to a baseline scenario in which the share of electric vehicles in new sales remains constant.

Figure 3. Comparative Effects of Different Transition Scenarios on Emissions and Temperatures



Notes: The three EV diffusion scenarios compared here are: moderate growth, rapid growth, and moderate growth combined with a 10% immediate reduction in car usage. For readability, emissions and temperature changes are expressed relative to a baseline scenario in which the EV share of new sales remains constant.

How to read the figure : In 2040, the rapid-growth scenario would reduce emissions by about 47% compared to the constant-share baseline and lower the temperature impact index by 12 points. The moderate-growth scenario combined with reduced usage would cut emissions by 37%, but lower the temperature index by 16 points.

Source : Author's calculations

Even if usage is difficult to change, it plays a key role in the evaluation of public policy. Matching high-mileage drivers with clean vehicles is a major determinant of national emissions. Moreover, the dynamism of the used car market—about 15% of the fleet changes ownership each year—means that vehicle-user reallocation can occur over relatively short timeframes.

INSEE data shows there is significant variation in the annual mileage of French motorists, even controlling for vehicle characteristics.[17] On average, cars are driven 11,000–12,000 kilometers per year. Controlling for vehicle age and size, cars used less than average are driven about 7,000 kilometers per year. This heterogeneity is partly explained by socio-demographic characteristics. A retired household aged 65 drives, on average, 3,000 kilometers less per year than a 35-year-old household. In contrast, a rural household drives on average 3,000 kilometers more than a similar urban household. An immediate implication is that it is not desirable to encourage low-mileage drivers to part with their combustion vehicles. Consider a household that drives 6,000 km/year—placing it in the bottom 25% in terms of usage. Suppose that, out of concern for the environment, it sells its ICE vehicle and switches to cycling. If the vehicle is resold through the used market to an average driver, it will statistically emit 60% of its lifetime potential emissions—equivalent to about 7,000 km per year—more than if the low-mileage household had kept the vehicle and its driving habits. The comparison is even worse if the household replaces its ICE car with an EV.

Observation 5. Carbon leakage through the second-hand market means that a low-mileage household is the best owner of a high-emissions vehicle. The significant heterogeneity in vehicle usage and the dynamism of the used car market makes rematching high-emission vehicles to low mileage users an effective short-term policy lever.

Policy Recommendations: Promoting Low-Carbon Mobility via Point-of-Sale, Usage, and Information Interventions

A broad range of public policies already supports the transition toward cleaner vehicles (see **Box 2**). We discuss adjustments to existing policies, as well as novel recommendations taking into account the impact of usage and the used car market.

[17] Insee (2019) : Enquête « Mobilité des personnes ».

[18] See: Chassang, S. et al. (2025): "The Automotive Demand of Households and Businesses", *op. cit.*, for an overview of the obstacles to electric vehicle adoption. From the perspective of both households and businesses, price and driving range are the main barriers.

Box 2. Overview of public policies encouraging the adoption of electric vehicles

French and European public policies on the transition to electric vehicles are varied and rely on various levers, both incentives and constraints.[a]

The ecological bonus, introduced in 2008, is one of the main incentives. It provides financial assistance for the purchase of new electric vehicles, up to a maximum of €4,000 per vehicle, equivalent to 27% of the purchase cost. In 2023, 357,000 bonuses were distributed, representing expenditure of €1.4 billion.

The ecological penalty, introduced in 2008, imposes a higher tax on the most polluting vehicles. This penalty has been progressively strengthened to align the economic incentives with the environmental objectives of reducing emissions. A 'mass' component has been added to the system from 2022. In 2021, the malus generated €537 million in tax revenue. However, it has certain limitations. For example, large passenger cars can be declared as light commercial vehicles in order to avoid the penalty. This circumvention weakens the effectiveness of the measure.

The conversion bonus, which replaced the scrappage bonus in 2015, provides aid for the purchase of an electric or plug-in hybrid vehicle, provided that the old vehicle is scrapped. It is means-tested. In 2023, 76,000 grants were awarded, representing expenditure of €229 million. This scheme was discontinued at the end of 2024, mainly for budgetary reasons.

Electric vehicle leasing, introduced in 2023, enables households on modest incomes to lease an electric vehicle for €100 a month. The cost to the state of leasing is approximately €6,000 per vehicle, which can be added to the ecological bonus. By 2024, 50,000 orders have been received, at a total cost of €275 million.

Low-emission zones (ZFE), which have been gradually developed since 2021, ban polluting vehicles from certain urban areas, depending on the Crit'Air standard of each vehicle. These zones are primarily intended to reduce air pollution. However, a vote could be taken to abolish them. It is currently being examined by Parliament.

The European Union requires car manufacturers to regulate the average emissions per kilometre of new vehicles sold. The current threshold is 95g CO2/km (falling to 49.5g CO2/km in 2034, then 0 after 2035). This regulation is accompanied by a penalty of €95 per excess gram per vehicle. An average excess of 10g of CO2/km would represent a penalty of around €2 billion on the scale of new vehicle sales in France.

Other measures include support for the installation of charging points, with the aim of increasing their number.

Finally, tax incentives for businesses, such as exemption from company vehicle tax (TVS) for electric vehicles, have been introduced to encourage companies to adopt fleets of clean vehicles. The French Mobility Orientation Act (2019, followed by the Climate and Resilience Act in 2021) sets green procurement targets for companies managing fleets of more than 100 vehicles. The annual incentive tax (2025) imposes greening targets for fleets as a whole, with tax penalties if they are not met.

[a] Sources: Durrmeyer I., Guillouzouic A., Malgouyres C., Mayer T., Tô M. (2024): «Évaluation des mesures de soutien aux véhicules propres», Institut des politiques publiques; Assemblée nationale (2024): Rapport d'information, n° 2630; France Stratégie (2024): «Le soutien au développement des véhicules électriques est-il adapté?», *Note d'analyse* n° 139.

Adjustments to Existing Measures

Maintain Targets for 2035

Uncertainty about the future of mobility is a concern for both manufacturers and drivers. Nearly 45% of households surveyed believe it is likely that both ICE vehicles and EVs will become obsolete and lose their value on the used market (**Table 1**). Additionally, 30% of surveyed businesses report slowing down the renewal of their fleets.[18]

These views are symptomatic of an uncertainty shock, and reflect a lack of clarity about the near future. In this context, it is important not to add political uncertainty to existing economic and technological uncertainty. As much as possible, regulatory evolution should not undermine the cost-benefit assessment of electrification investments already made.

Table 1. Perceptions of Obsolescence Scenarios

Scenario	Share of responses (%)
ICE vehicles will become obsolete and lose value	15,8
Current electric vehicles will become obsolete and lose value	12,8
Both scenarios are likely	44,7
Neither scenario is likely	26,8

Source : « Household » survey

Concretely, we recommend reaffirming commitment to the EU's emission reduction targets (93.6 g CO_2/km in 2025, 49.5 g CO_2/km in 2030, and 0 g CO_2/km in 2035), while revisiting the interpretation of the 2035 zero-emissions target. EVs do not produce zero GHG emissions. Depending on the energy mix, variable EV emissions range from 10 g CO_2/

[19] The adoption of heavy vehicles generates significant network effects: the more other users adopt heavy vehicles, the more advantageous it becomes to own one. See: Winston, C. and Yan, J. (2021): "Vehicle Size Choice and Automobile Externalities: A Dynamic Analysis", *Journal of Econometrics*, 222(1), pp. 196–218.

km (France) to more than 70 g CO_2/km for the average European mix. The correct interpretation of the 0 g CO_2/km target should therefore be: reducing the emissions gap to zero compared with the most efficient mainstream technology. Without changing the stated target, such a margin of interpretation seems reasonable.

Sale-taxes indexed on car emissions and weight, known as « malus eco » seem well designed. They act as an emissions tax at moderate excess levels and as a prohibitive penalty at high excess levels. Tax components penalizing vehicle weight are especially useful, given the large negative externalities associated with heavy vehicles.[19] A key feature of the malus—distinguishing it from a simple tax—is that penalties can be avoided by reducing emissions sufficiently. However, this requires that manufacturers have time to adjust their lineups. Clarifying the evolution of the malus over the next three years would help manufacturers plan better, and increase the social acceptability of the policy.

It seems reasonable to reassess exemption rules. Exemptions for utility vehicles, which include very large SUVs, can lead unacceptable abuses in the context of a national effort. Plug-in hybrid vehicles (PHEVs) can be problematic if they are not regularly charged. Monitoring actual usage is necessary, particularly for corporate fleets (see below).

> **Recommandation 1**. Ensure a stable regulatory framework—especially at the European level—that confirms the transition to EVs for both businesses and households. Provide manufacturers with greater visibility on future changes to emission-based sales tax.

More targeted subsidies could also be effective. According to recent estimates, around 75% of households purchasing an EV with a 15% subsidy would have done so even without it.[20] Results from our household survey indicate that some groups are much more responsive to incentives—especially relatively young households with children. This would suggest maintaining EV adoption subsidies through family allowances.

Smoothing Electric Vehicle Subsidies Over Their Lifespan

Current EV subsidies are heavily front-loaded during the first year of ownership. For example, France's bonus écologique only requires that the vehicle be kept for one year (and driven at least 6,000 km) to qualify. This subsidy structure distorts the used EV market, and mechanically contributes to the rapid depreciation of EVs.

For the used market to function properly, the cost of owning a new vehicle—calculated based on its lease or depreciation—must be higher than the cost of owning a used one. Given a historical used car depreciation structure—for instance, 20% in the first year, then 10% per year—an overly generous upfront subsidy can disrupt the market.[21] For example, with an initial subsidy of €4,000 on a vehicle with a list price of €30,000, the cost of owning the new vehicle amounts to €167 per month in the first year. However, despite a limited 10% depreciation, the monthly cost of owning a one-year-old vehicle is €200—higher than that of the new vehicle. In that case, why buy used?

In the medium term, this imbalance drives down the resale price of used EVs until depreciation becomes steep enough to make second-hand purchases attractive. In the example above, first-year depreciation increases by more than €3,300. This reduces the effective benefit of the subsidy for the initial buyer while accelerating the depreciation of EVs—damaging their image.

A more effective solution would be to distribute the subsidy annually, in proportion to the vehicle's depreciation. This mechanism would preserve the total value of the subsidy while avoiding distortions in the used car market. The depreciation profile of EVs would more closely resemble that of internal combustion vehicles. This would improve the image of EVs while creating a long-term selling point: the second-hand buyer would benefit from a share of the original subsidy's value. This would also address perceptions that EV subsidies only benefit wealthier households. In practice, the subsidy could be paid out during insurance renewals. Another option would be to subsidize used vehicle leases, a growing financing method, especially for EVs.

> **Recommandation 2**. Replace large one-time purchase subsidies with a stream of smaller subsidies proportional to annual ownership costs, in order to stabilize the used car market, improve the long-term perception of electric vehicles, increase the social acceptability of EV subsidies.

To support the second-hand electric vehicle market (and thereby reduce the effective cost of ownership for new vehicles), it would be useful to produce and disseminate objective data on EV lifespan. Telemetry data, along with responses from EV owners in our survey, indicate that battery range degradation

[20] Muehlegger and Rapson (2022: "Subsidizing Low- and Middle-Income Adoption of Electric Vehicles: Quasi-Experimental Evidence from California", Journal of Public Economics, 216, 104752) estimate the price elasticity of demand for electric vehicles to be –2.1. A 15% price subsidy therefore increases demand by 31.5%. Overall, 76% of electric vehicle buyers would have made the purchase even without the subsidy.

[21] See Chassang S. (2025) : « Incentives and the Demand for Automobiles », *Les Focus du Conseil d'analyse économique* n° 116, juillet.

[22] https://www.geotab.com/uk/press-release/2024-battery-degradation/.

is less than 2% per year, amounting to a total loss of about 25% over 15 years.[22] Yet 75% of households that do not own an EV believe that an electric vehicle will lose 30% or more of its range after 75,000 kilometers over 5 years.

Influence Choice at the Time of Replacement, Not the Timing of Replacement

Given the dynamism of the used car market, accelerating the replacement of ICE vehicles offers limited benefit (see above). It is more effective to influence the choice of vehicle once the decision to replace has already been made. Three measures can support this approach.

Encourage Deferred Commitment through a Green Savings Plan

Research in behavioral economics suggests that it is more effective to subsidize future behavior change than to try to change current behavior.[23] A "green savings plan" mechanism would allow households to commit in advance to buying an electric vehicle at the time of their next vehicle purchase.

Concretely, participants would open a dedicated, tax-exempt savings account, offering a subsidized interest rate, 2 to 3 percentage points above the market rate. In return, they would commit to using the funds to purchase an electric vehicle within a relatively short period (e.g., three years). If the funds are not used for that purpose within the timeframe, the tax benefits and subsidized component of returns would be forfeited.

Our household survey indicates that this approach is well received by both EV and ICE owners: 70% of respondents consider such a savings plan to be fair policy. The interest expressed suggests that the impact on EV adoption would be comparable in magnitude to that of a €5,000 purchase subsidy.

This green savings plan offers three key advantages. First, it can shift behavior at lower cost by encouraging households to commit now to a future decision, rather than attempting to induce vehicle replacement now. Second, the funds collected during the savings period could be reinvested—for example, into an electric infrastructure fund. Finally, the commitment expressed by participants would give car manufacturers and charging infrastructure operators better visibility on future demand, thus facilitating upstream investment.

The cost of this green savings plan would be significantly lower than that of current subsidies, making it a credible and sustainable policy at scale. If one million households participate, saving €6,000 each over three years (mobilizing €6 billion for infrastructure investment), and receive a 3 percentage point interest bonus, the cost to the state would be €400 million over three years. In comparison, a direct subsidy of €4,000 per vehicle would cost €4 billion for the same volume of sales. In other words, this approach could ten times less expensive than traditional subsidies, with comparable effectiveness.

Recommandation 3. Create a green savings plan that allows households committed to purchasing an electric vehicle to save at a subsidized interest rate. Invest the collected funds in an electric infrastructure fund.

Dealer Behavior

Half of the households responding to our survey have never driven an EV. Among those who have, the experience was overwhelmingly positive. However, among households that recently visited a dealership, 70% report that the salesperson did not assess whether their needs were compatible with an EV, and 77% did not receive any analysis of the potential savings EVs could offer. Strikingly, this lack of dealer engagement also affects households expressing strong interest in electric vehicles. In our survey, 27% of households whose needs were assessed by a dealer said their next vehicle would be electric, compared to 20% among those who received no such evaluation.

This suggests the exploring dealership-level interventions, such as: systematizing the evaluation of whether EVs are appropriate given the customer's needs; systematically offering EV test drives; and introducing financial incentives for sales staff.[24] Indeed, a €200 bonus per EV sale may seem negligible to a buyer, but it can be significant for the dealership : for a net margin of 3% on a €30,000 vehicle, the dealer margin is about €900.

Recommendation 4. Require dealerships to systematically assess customer needs (usage, budget, potential savings) and offer electric vehicle test drives. Financially incentivize dealers to sell electric vehicles.

Fleet Catalog Requirements

Our survey of SMEs shows that large fleet operators are resistant to adopting electric vehicles, while small fleet operators adopt them at rates similar to households. There are two possible explanations: EVs are poorly suited to the specific

[23] Thaler R.H. et Benartzi S. (2004) : « Save more tomorrowTM: Using behavioral economics to increase employee saving », *Journal of political Economy*, 112(S1), p. S164-S187.

[24] A field experiment would be necessary to assess the effectiveness of this type of incentive. It would likely be feasible for manufacturers to internalize such incentives—particularly within the framework of EU emissions regulations.

use cases of large fleets (e.g., very high daily mileage), organizational resistance to EV adoption is particularly strong in large firms.

Legislation introduced under the « Loi Climat et Résilience » mandates greener vehicle purchases for fleets of over 100 vehicles, but this requirement came without penalties—likely reflecting lawmakers' uncertainty about companies' capacity to adapt. It seems likely that the incentives introduced via the recent « Taxe Annuelle Incitative » (TAI) will pushing companies to change behavior. Our household survey reinforces the idea that companies can adapt their purchasing practices: among respondents using a company vehicle, about 50% said they would like their next vehicle to be electric, yet only 15% had the option to choose an EV when selecting their current vehicle.

Recommandation 5. Require large fleet operators to systematically include electric models in the corporate car choices offered to employees.

An alternative would be to restrict corporate leasing contracts with a maximum annual mileage below 25,000 kilometers per year (a high mileage still consistent with EV use) to offer only electric vehicles. This would tailor corporate constraints to actual driver needs.

Measuring and Rewarding Usage

Public policies targeting usage could help reduce fleet emissions quickly and at low cost. Influencing usage goes beyond reducing annual mileage—it also includes promoting more energy-efficient driving. Four recommendations are proposed in this area. These should not be seen as alternatives to measures promoting EV adoption, but as temporary measures to reduce emissions from the existing fleet while it is being renewed.

Promote Pay-as-You-Drive Insurance

Car insurance policies with unlimited mileage function as an implicit subsidy from low-mileage drivers to high-mileage ones, who tend to be relatively wealthier. This is unfair and encourages greater car use. Pay-as-you-drive insurance would allow usage to be measured and rewarded.

This type of insurance exists in France but its share remain small. We propose making genuine pay-as-you-drive insurance the default option for car insurance, while still allowing unlimited mileage as an alternative. The main advantage of this system is that it quantifies and rewards more frugal vehicle use.

For a cost of carbon of 300 €/tCO2 (see **Box 1**.), a driver who reduces their travel by 4,000 km per year, with a vehicle emitting 100 g CO_2/km, would achieve a CO_2 saving valued at €120. At an insurance price of around 3 euro cents per kilometer, this corresponds exactly to the reduction in insurance cost associated with the reduced distance. Moreover, such a measure can be effective not only through its financial impact but also through its psychological effect—especially if drivers set annual mileage targets.

Recommandation 6. Make pay-as-you-drive the default option for car insurance contracts.

Corporate Fleet Monitoring

Given the resistance of large fleets to electrification, more data is needed to determine how best to adapt corporate electrification requirements. This suggests using existing corporate fleet telematics to better understand actual usage and assess the match between usage and vehicle types. Indeed, corporate regulation would be greatly improved if it could be made contingent on usage. For instance the treatment of PHEVs as low emission vehicles should be made contingent on whether or not they are in fact charged regularly.

Recommandation 7. Mandate telematics reporting for corporate fleets, starting with mileage and fuel efficiency at the monthly level. Index regulation on actual use.

Following the example of the French postal service (La Poste) experiment on eco-driving, it may be fruitful to involve corporate drivers in an experimental effort testing measures to reduce or improve usage, whether by lowering mileage or improving driving style. This would allow company drivers to help emission reduction efforts, even when their professional needs are incompatible with EV adoption.

Take Into Account Low-Mileage Drivers in Public Policy

As discussed earlier, public policies that encourage vehicle replacement can be counterproductive if they affect low-mileage drivers. Due to carbon leakage through the used car market, a low-mileage household is the best possible owner of a high-emissions used vehicle. Encouraging such a household to replace its car would actually increase emissions. This calls for adapting public policies to avoid penalizing low-mileage drivers. The case for this adjustment is strengthened by the fact that low-mileage households tend to be older and have lower incomes.

This observation is relevant to Low Emission Zones (LEZs), introduced to reduce local pollution. The French National Assembly is currently considering repealing them, citing concerns that they penalize lower-income households and

[25] A U.S.-based nonprofit organization that designs and runs large-scale competitions open to technical and scientific teams, with the goal of fostering technological breakthroughs that benefit humanity. Prize amounts are typically in the millions of dollars.

exacerbate inequalities between city centers and peripheral areas. Our household survey shows that the presence of an LEZ leads about 7% of affected households to replace their vehicles. These vehicles are then resold on the used market to users not affected by LEZs, who often drive more. A possible improvement would be to allow limited access for older vehicles as long as they are used sparingly. This added flexibility would improve the social acceptability of LEZs by preserving occasional car use by lower-income suburban households traveling into the city.

It is also essential to improve public communication about the optimal use of aging ICE vehicles. The objective should not just be to replace them quickly, but rather, to assign them to households that will use them the least. For example, it is preferable for a household to keep its aging combustion vehicle for holiday use, and purchase a small electric vehicle for daily use, rather than buying a large mixed-use EV and reselling the combustion vehicle on the used car market. To support such arrangements, we should make it easier to insure multiple vehicles under a single policy.

Recommandation 8. Ensure that vehicle use regulations do not penalize low-mileage drivers. Improve public communication on the optimal end-of-life use of combustion vehicles.

Note that the impact of better matching vehicles to drivers is potentially significant. For drivers averaging 12,000 km per year in cars emitting on average 130 g CO_2/km, average emissions are 1.56 tCO_2 per user per year. Now consider a more efficient matching scenario: low-mileage drivers average 6,000 km per year in cars emitting 160 g CO_2/km, while high-mileage drivers average 18,000 km per year in cars emitting 100 g CO_2/km. In this scenario, average emissions fall to 1.38 tCO_2 per user per year—a reduction of 11.3%. Given the 15% annual turnover of the used car fleet, this reduction could be achieved in less than ten years.

Towards a Business Model for Usage Reduction

A majority of respondents to our household survey say they could reduce their driving by 10% or more at little welfare cost. A hypothetical "keep smart & cut back" program that rewards efforts to reduce usage among households choosing to retain their aging combustion vehicle—even with symbolic rewards (e.g., parking discounts, engagement badges)—would attract the interest of about 60% of households. In addition, fuel consumption from ICE vehicles can often be reduced by implementing fuel saving driving practices without changing routes.

To turn this potential into large-scale, lasting results, two complementary strategies can be pursued. The first is a decentralized, open experimentation process led by the public sector. This could involve setting up a technical and experimental framework (access to anonymized telemetry datasets at the monthly level, or to a pool of volunteer users), along with a simple application procedure for local governments, startups, or nonprofits seeking to test usage-reduction solutions quickly. These trials could be supported through competitions (in the style of the Xprize Foundation25) to identify the most effective, replicable, and affordable solutions under real-world conditions.

The second is to incentivize industry to tackle usage reduction. A first step would be to require manufacturers to share ownership of at least some telemetry data (say at the weekly or monthly level) with users, following the model of open banking.[26] In exchange, manufacturers would be allowed to offset part of their CO_2 penalties (under EU or national schemes) by earning credits for certified avoided kilometers across their vehicle fleet. Given their media reach and control over telemetry systems, manufacturers are particularly well positioned to build the necessary infrastructure for usage-reduction solutions.

Such mechanisms would create a business model encouraging both manufacturers and entrepreneurs to develop systems for reducing usage—either by directly lowering mileage or by promoting more efficient driving styles. This would align private initiative with a public goal: rethinking how cars are used, rather than simply greening new sales.

Recommandation 9. Transfer some ownership of vehicle telemetry data to users based on the open banking model. Allow automakers to offset part of their CO_2 penalties in proportion to certified avoided kilometers, making frugality a profitable goal for all actors.

A successful transition should not be measured solely by the number of electric vehicles sold, but also by how all vehicles are actually used day to day. By modernizing the fleet, rethinking usage, and matching each vehicle to drivers' real needs, France can achieve sustained reductions in greenhouse gas emissions. This requires public policies that simultaneously address purchase decisions, usage practices, and information access, making the transition both credible and economically sustainable.

it's time to take action: to take concrete action as an individual, visit **monplanauto.org** (mycarplan.org)**.** You'll find a citizen's action plan and updates on the practical implications of this note.

[26] A framework for opening access to user data for external providers to foster innovation and competition.

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