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It’s greening time!
How CO_2 - based vehicle taxation can shift car registrations*

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Slovakia’s passenger-car taxation provides only a weak signal about the environmental impact of vehicle choice. New cars registered in Slovakia remain relatively emission-intensive, while vehicle-tax revenues are low in European comparison.

The reform examined in this brief would link registration and annual ownership taxes more directly to CO_2 emissions and extend annual taxation to household-owned cars. It aims to encourage cleaner choices, broaden the tax base and raise additional revenue.

The simulations suggest that the reform would accelerate the shift towards lower-emission vehicles, reducing average emissions from new registrations by around 5–6%. For vehicles registered in 2026–2028, the estimated lifetime reduction is about 451 thousand tonnes of CO_2. Annual revenue would reach approximately EUR 448–451 million.

Slovakia is one of the few EU countries without a direct CO_2 component in passenger-car taxation.

The reform would accelerate the existing shift towards cleaner vehicle choices.

Average emissions from new registrations are predicted to fall by around 5–6% relative to the baseline.

The scenario combines environmental incentives with a broader tax base and sizeable revenue potential.

The estimated lifetime CO_2 reduction for the 2026–2028 new-vehicle cohorts is around 451 thousand tonnes.

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Why vehicle taxation matters for Slovakia

Slovakia's passenger-car taxation sends only a weak signal about the environmental impact of vehicle choice. New cars registered in Slovakia remain relatively emission-intensive, while vehicle-tax revenues are low in European comparison. This combination makes passenger-car taxation relevant both for environmental policy and for the structure of public revenues. Cars are durable assets whose purchase and use generate external costs, including CO_2 emissions, local air pollution, noise and road wear.

In this policy brief, we present an illustrative reform of Slovakia's passenger-car taxation. The reform would extend annual vehicle taxation to household-owned passenger cars and link both the annual tax and the registration charge more directly to CO_2 emissions. We then simulate how such a reform could affect the composition of new registrations, lifetime CO_2 emissions and public revenues.

The point of the exercise is not to estimate the optimal level of vehicle taxation. It is to show what a broader and more CO_2-sensitive design could change. The environmental channel works through relative prices: higher-emission cars become more expensive compared with lower-emission alternatives. The fiscal channel works mainly through broader coverage of the annual tax and the overall level of rates.

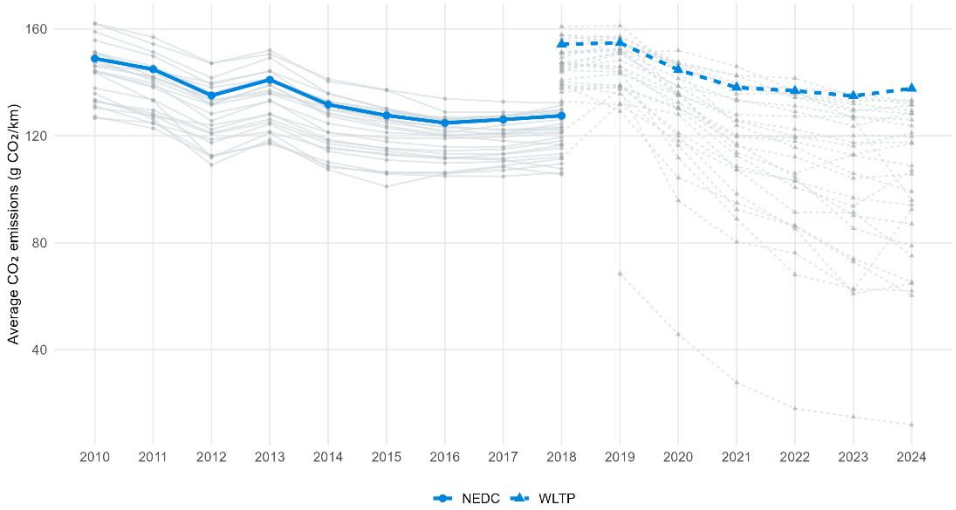
Slovakia's new-car market and vehicle-tax system

Average CO_2 emissions from newly registered passenger cars have generally declined over time, but Slovakia has remained close to the high-emission end of the European distribution under the WLTP[1]. Chart 1 shows this pattern and highlights Slovakia's position relative to other EEA countries. This suggests that the Slovak new-car market still has significant room to shift towards lower-emission choices.

The issue is not limited to a small number of luxury or performance vehicles. Slovak new registrations remain concentrated in medium and higher CO_2 bands, while zero- and very-low-emission vehicles still account for a limited share of the market. A reform that targets only the most emission-intensive tail would therefore miss a large part of new registrations. A gradual CO_2 schedule can create a signal across the distribution, not only at the top.

[1] *WLTP (Worldwide Harmonised Light Vehicles Test Procedure) is the current vehicle-testing standard used to measure CO_2 emissions and fuel consumption. It replaced the older NEDC (New European Driving Cycle); values under the two standards are not directly comparable.*

Chart 1
Average CO_2 emissions of newly registered passenger cars in EEA countries



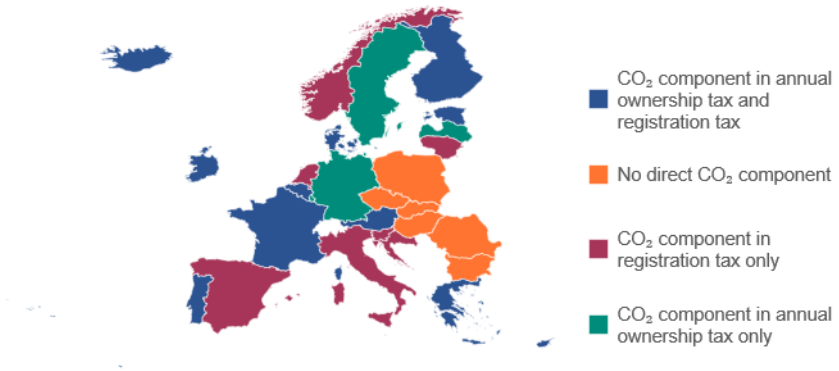
Source: European Environment Agency; authors' calculations. Note: Slovakia is highlighted. The chart distinguishes between NEDC-based CO_2 emissions for 2010–2018 and WLTP-based CO_2 emissions for 2018–2024.

Slovakia's current vehicle-tax system relies on two instruments, but neither is directly built around measured CO_2 emissions. The annual motor vehicle tax applies mainly to vehicles used for business or self-employed activity, while household-owned passenger cars are generally outside its scope. For passenger cars, the tax base is engine cylinder capacity, adjusted by vehicle age. The registration fee is based mainly on engine power and an ecological coefficient, rather than directly on measured CO_2 emissions.

Slovakia therefore combines relatively emission-intensive new registrations with a comparatively light transport-tax burden. Revenues from transport taxes as a share of GDP are close to the lower end of the European distribution. This does not by itself determine the right level of taxation, but it shows that a broader and better-targeted vehicle-tax base can be examined without making Slovakia an outlier in European comparison.

Most European countries already link passenger-car taxation to CO_2 emissions through either the registration tax, the annual ownership tax, or both. As Map 1 shows, Slovakia belongs to a smaller group of countries where passenger-car taxation is still not systematically based on CO_2. Introducing a CO_2-sensitive tax base would therefore not be an unusual European experiment, but a move towards a design principle already used across much of Europe.

Map 1
Use of a CO_2 component in passenger-vehicle taxation across Europe in 2025



Source: National legislation; authors' classification. Note: Countries are classified according to whether CO_2 emissions enter the registration tax, the annual ownership tax, both instruments, or neither. The map reflects legislation in force at the end of 2025.

Reform scenario and estimation approach

The illustrative scenario combines an annual ownership tax, a one-off charge at first registration in Slovakia and a small administrative fee for later ownership transfers. Unlike the current Slovak motor vehicle tax, the annual tax would cover passenger cars owned by households as well as firms. The annual tax includes a basic amount, a Euro-standard and fuel component and a progressive CO_2 component. The registration charge combines a progressive CO_2 component with an additional charge for heavier vehicles. The exact rates used in the simulation are shown in Box A.

The rates are illustrative rather than an estimate of the optimal tax level. They are selected to create a stronger and progressively increasing CO_2 signal, broaden the annual tax base and raise additional public revenue, without making Slovakia an outlier in European comparison. The structure is loosely inspired by Estonia's recent vehicle-tax reform, which combines an annual motor vehicle tax with a registration fee and links the burden to vehicle characteristics such as CO_2 emissions and mass. The Slovak calibration is adapted to the domestic vehicle fleet, institutional framework and objectives of this exercise.

We estimate the behavioural response in three steps:

- **We calculate the tax burden of representative vehicles in each CO_2 band under the current system and under the illustrative reform.** The tax burden combines the registration charge with the present value of annual ownership taxation and is expressed relative to wages, so that the model captures tax affordability rather than only the nominal tax amount.

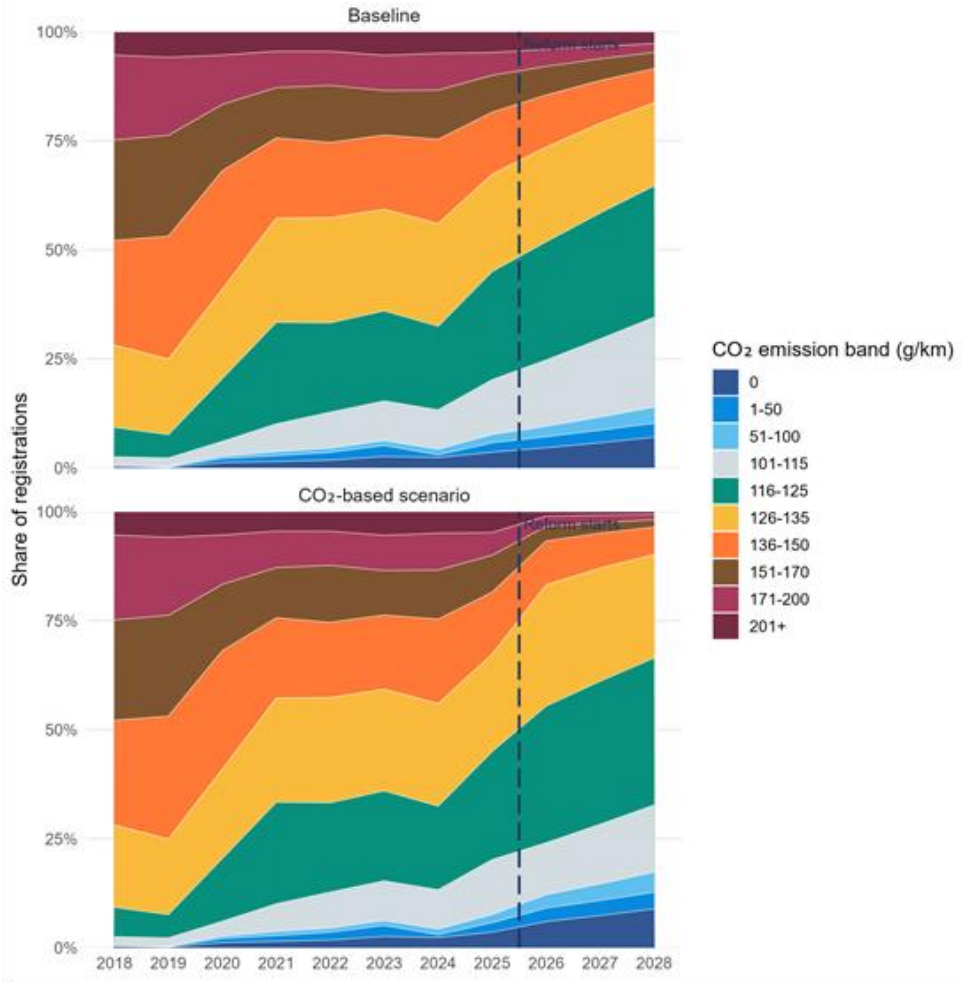
- **We use a panel Poisson model estimated on country-year-CO_2-band registration data to predict how registration shares respond to changes in tax affordability.** The model keeps the overall size of the new-car market fixed and reallocates registrations across CO_2 bands.

- **The predicted registration shares are fed into a fleet and revenue simulation that combines forecasts of new registrations, imports, scrappage and the age structure of the vehicle stock.** The estimates should therefore be interpreted as model-based simulation results that rely on conditional correlations, rather than as precise forecasts of market behaviour or fully identified causal effects.[2]

Results

The reform accelerates the existing shift towards cleaner vehicles. Average emissions from new registrations are expected to decline gradually even without policy change, reflecting technological progress and the wider availability of lower-emission models. The tax change strengthens this trend by making higher-emission cars more expensive relative to lower-emission alternatives.

Chart 2
Predicted structure of new registrations by CO_2 band under the baseline and illustrative reform scenario, 2018-2028



Source: European Environment Agency, national tax rules; authors' model-based simulation. Notes: The vertical line marks the introduction of the reform in 2026. The vertical axis represents the share of cars in each CO_2 emission band among all newly registered passenger cars in Slovakia.

As Chart 2 shows, the model predicts a reallocation of new registrations away from the highest CO_2 bands and towards lower- and medium-emission categories.

[2] For detailed methodology, see Péli (2026).

This is not a scenario in which consumers immediately switch only to zero-emission vehicles. Rather, the main predicted response is a broader movement along the emissions distribution, away from the most emission-intensive choices.

The predicted shift lowers the average type-approval emissions of new registrations by around 5-6% relative to the baseline. For vehicles registered between 2026 and 2028, the estimated lifetime use-phase reduction is about 451 thousand tonnes of CO_2.[3] Spread across the three new-vehicle cohorts, this is roughly 150 thousand tonnes of CO_2 per cohort. This corresponds to about 3.6% of annual emissions from passenger-car transport. The comparison is only a scale indicator: the 451 thousand tonnes are lifetime reductions associated with the affected cohorts, not annual economy-wide reductions achieved in a single year.

The same scenario also generates substantially more revenue than the current system. In the preferred specification, which incorporates the predicted behavioural response, total revenue is estimated at around EUR 448-451 million per year in 2026-2028, including the administrative re-registration fee. The annual ownership tax accounts for most of this amount, raising around EUR 392-395 million per year, while the one-off registration charge contributes around EUR 45 million and administrative fees roughly EUR 10 million. The corresponding benchmark under the current system is approximately EUR 130-134 million per year.

The increase in revenue comes from broader coverage and higher average tax rates. Extending annual taxation to household-owned passenger cars expands the tax base, while the stronger overall rate level further raises the amount collected. The CO_2-based structure primarily determines how this additional burden is distributed across vehicles and how strong the behavioural signal is.

Conclusion

Slovakia currently combines emission-intensive new registrations, a weak direct CO_2 signal in passenger-car taxation and relatively low vehicle-tax revenues in European comparison. This creates room to examine a broader and more CO_2-sensitive vehicle-tax design.

The illustrative reform examined in this brief shows that extending annual taxation to household-owned passenger cars and linking both annual and registration taxes more directly to CO_2 could change the composition of new registrations, reduce lifetime emissions and raise additional revenue. **The model predicts that average emissions from new registrations would be around 5-6% lower than under the baseline, with an estimated lifetime reduction of about 451 thousand tonnes of CO_2 for vehicles registered in 2026-2028. Annual revenue would reach roughly EUR 448-451 million.**

The main policy lesson is therefore not that every tax parameter in the scenario should be adopted exactly as presented. It is that a broad, gradual and transparent CO_2-based vehicle-tax design can create a clearer environmental signal while generating stable public revenue.

[3] Estimates assume annual mileage of 12,000 km and a vehicle lifetime of 20 years.

Box A: Illustrative CO_2-based scenario

The scenario combines an annual ownership tax, a one-off registration charge at first registration in Slovakia, and a small administrative fee for later ownership transfers. The registration charge applies to vehicles first registered in Slovakia from 2026 onwards, while the annual ownership tax applies to all passenger cars in use. Unlike the current Slovak motor vehicle tax, it covers passenger cars owned by households as well as firms. CO_2 is the main tax variable in both instruments; Euro-standard, fuel type, weight and age coefficients refine the signal. The design and rates are illustrative and loosely inspired by recent European reforms, especially Estonia's 2025 vehicle-tax reform combining an annual tax and a registration charge.

Table 1
CO_2 component of annual ownership tax

From (g CO_2/km)	To (g CO_2/km)	€ per g in band	Tax from preceding bands (€)	Formula within band
0	110	0	0	0
111	140	2	0	$(CO_2 - 110) \times 2$
141	160	4	60	$60 + (CO_2 - 140) \times 4$
161	180	6	140	$140 + (CO_2 - 160) \times 6$
181	200	8	260	$260 + (CO_2 - 180) \times 8$
201	and more	10	420	$420 + (CO_2 - 200) \times 10$

Table 2
CO_2 component of one-off registration tax

From (g CO_2/km)	To (g CO_2/km)	€ per g in band	Formula within band
1	80	1	$CO_2 \times 1$
81	100	2	$80 + (CO_2 - 80) \times 2$
101	120	5	$120 + (CO_2 - 100) \times 5$
121	140	10	$220 + (CO_2 - 120) \times 10$
141	160	25	$420 + (CO_2 - 140) \times 25$
161	180	50	$920 + (CO_2 - 160) \times 50$
181	200	100	$1920 + (CO_2 - 180) \times 100$
201	and more	150	$3920 + (CO_2 - 200) \times 150$

Source: Authors' illustrative scenario. Note: CO_2 component is adjusted according to the age of the vehicle.

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