CHANGING TRANSPORT

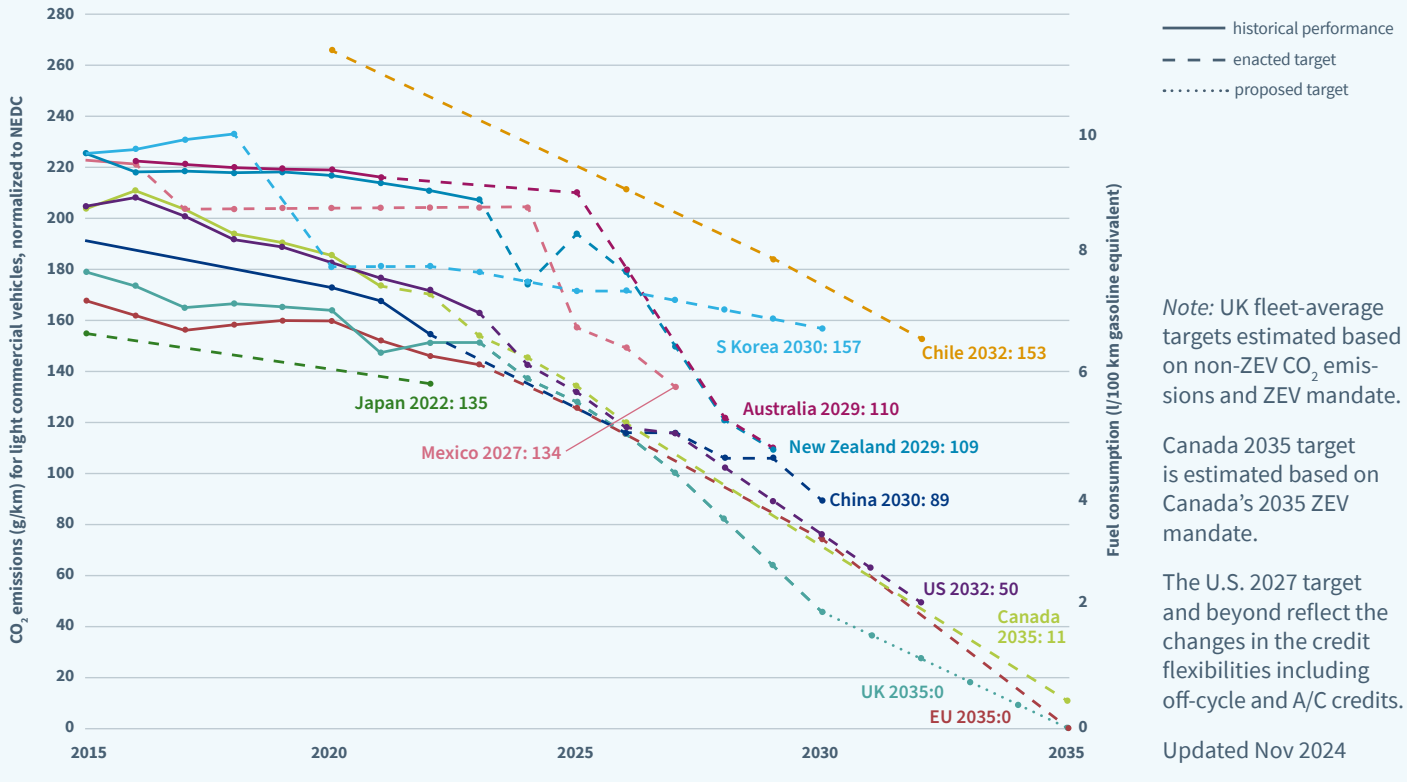
How to distinguish CO_2 and other emission standards

In the world of vehicle regulation, it's easy to assume that all "green" standards serve the same purpose: reducing environmental harm. But in reality, not all environmental regulations are created equal – and when it comes to tackling climate change, the distinction between CO_2 standards and other emission standards is crucial. Although both policies aim to make vehicles less harmful, they address very different problems. Understanding the difference is essential for designing effective transport policies that truly align with climate goals.

What are CO_2 standards?

CO_2 standards, sometimes called **vehicle efficiency standards** or **fuel economy standards**, directly address **climate change**. They set limits on the **amount of carbon dioxide (CO_2)** that a vehicle can emit per kilometre driven. Because CO_2 emissions are directly linked to **fuel consumption**, these standards push carmakers to develop vehicles that use **less fuel** – for example, through improved engines, lighter materials, or even electrification.

In other words: **CO_2 standards target the carbon footprint** of a vehicle. These policies are a cornerstone of transport decarbonisation strategies in many countries. For example, the European Union



Note: UK fleet-average targets estimated based on non-ZEV CO_2 emissions and ZEV mandate.

Canada 2035 target is estimated based on Canada's 2035 ZEV mandate.

The U.S. 2027 target and beyond reflect the changes in the credit flexibilities including off-cycle and A/C credits.

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The evolution of CO_2 standards in different countries (passenger cars normalised to WLPT)

has set fleet-wide average CO_2 targets for new cars and vans, with progressively stricter limits to incentivise the shift toward zero-emission vehicles.

What are pollutant standards?

By contrast, **pollutant (or emission) standards** (e.g. Euro Standard 6, Euro 7) are focused on **air quality**, not climate. They regulate **local air pollutants** such as:

- Nitrogen oxides (NO_x)
- Particulate matter (PM)
- Carbon monoxide (CO)
- Hydrocarbons (HC)

These pollutants are harmful to **human health** and contribute to problems like smog and respiratory diseases, especially in urban areas. Euro standards have been instrumental in reducing air pollution in Europe and other regions that have adopted similar regulations. But – and this is key – **Euro standards do not address CO_2 emissions**. A vehicle can fully comply with the latest Euro norm and still be highly fuel-inefficient and carbon-intensive.

How are emissions measured?

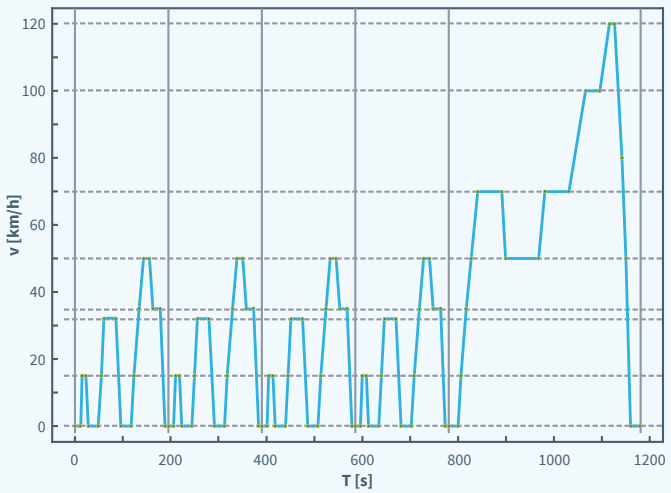
To enforce both CO_2 and pollutant standards, regulators need a way to measure what actually comes out of a car's tailpipe. That's where **driving cycles** come in. A **driving cycle** is a standardised simulation of typical on-road driving – with different speeds, stops, and accelerations – used in laboratory tests. The car is placed on a test bench (called a chassis dynamometer), and runs through the cycle while emissions and fuel consumption are measured.

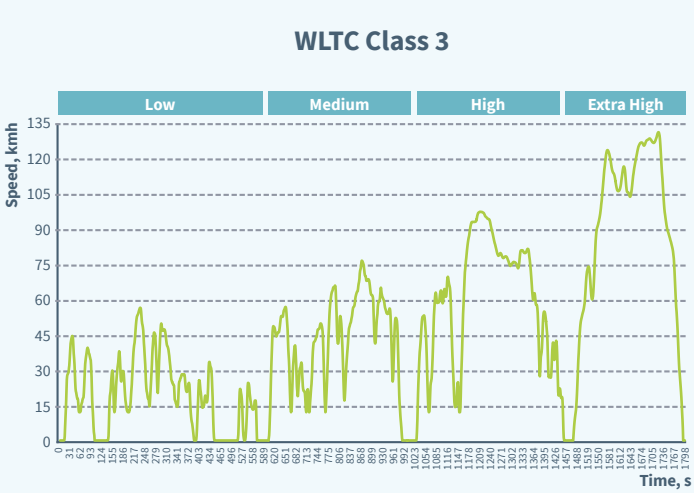
NEDC & WLTP–Driving cycles to measure pollutants & CO_2

For many years, Europe used the **New European Driving Cycle (NEDC)**. But this test was outdated and too gentle – it didn't reflect how people actually drive. As a result, it often *underestimated* both CO_2 emissions and air pollution.

That's why the EU replaced it with the **Worldwide Harmonized Light Vehicles Test Procedure (WLTP)**. WLTP includes more realistic speeds, gear shifts, and acceleration patterns, making it a better proxy for real-life driving. Both **CO_2 emissions** and **pollutants** like NO_x or particulate matter are measured under this lab-based procedure.

However, even WLTP still happens in controlled conditions – and in practice, it still **underestimates real-world fuel consumption** and **CO_2 emissions**. This is due to the controlled environment of the test, which cannot perfectly simulate real-world factors like driving habits, road conditions, or traffic. As a result, actual fuel use and CO_2 emissions are often higher than what WLTP tests suggest. When it comes to **local pollutants**, real-world behaviour can vary even more.





New European Driving Cycle (NEDC) and World Harmonised Light Vehicles Test Cycle (WLTC)

That's why newer **Euro standards now require an additional step: Real Driving Emissions (RDE) tests**. RDE tests are performed **on actual roads**, using portable sensors while the vehicle is driven in normal traffic. This helps ensure that vehicles stay clean not just in the lab, but also in real life. So, while both CO_2 and local pollutants are measured using standardised driving cycles like WLTP, **only local pollutants are subject to mandatory on-road testing** through RDE. This difference adds another layer of complexity – and it's part of why comparing standards can be confusing at first glance.

Why pollutant standards don't help the climate

The confusion often arises because both types of standards make vehicles "cleaner"– but in **very different ways**.

- A Euro 6 diesel SUV may emit relatively low levels of local pollutants thanks to exhaust treatment systems like diesel particulate filters and NO_x traps.
- However, if it burns **a lot of fuel**, it will still emit **large amounts of CO_2**, contributing to global warming.

This is why relying on Euro standards alone will **not decarbonise** the transport sector. While they improve public health by cleaning up the air we breathe, they **do not reduce fuel consumption** or encourage the transition to **low- or zero-emission vehicles**.

Put simply:

→ **Euro standards = clean air**

→ **CO_2 standards = climate protection**

Both are important, but they serve **different policy objectives**.

Real-world example: The Euro 6 SUV that's not climate-friendly

Let's take a common example: **a 2022 diesel SUV,** compliant with **Euro 6d-TEMP**, one of the most recent Euro emission standards.

✓ **Euro 6 compliant**: Thanks to advanced exhaust after-treatment systems (like selective catalytic reduction and diesel particulate filters), this SUV meets strict limits for **NO_x and PM** emissions.

✗ **High CO_2 emissions**: The same vehicle emits around **160 g CO_2/km**, well above the EU fleet target of **95 g CO_2/km** (pre-2021) and nowhere near climate-aligned pathways.

! **Fuel consumption**: About **6.0 – 7.0 litres per 100 km**, which means **burning fossil fuel** and emitting CO_2 every kilometre driven.

Bottom line: This SUV is "clean" for **urban air quality**, but **dirty** for the climate. It won't help reach net-zero targets – even if it passes every local pollution test.

The only way to achieve both: Electrify transport

To truly align the transport sector with both **health** and **climate** goals, there is one clear solution:

Electrification.

Only **zero-emission vehicles** – such as **battery-electric** or **hydrogen fuel cell** vehicles – can simultaneously deliver:

- **Zero tailpipe CO_2 emissions** (for climate protection), and
- **Zero local air pollutants** (for public health).

While CO_2 and Euro standards can work together to guide the market in the short term, **they still allow fossil-fuel vehicles** on the road. In contrast, electrification tackles **both problems at the root**: removing combustion from the equation altogether.

Final takeaway: Don't confuse clean air with climate action

Pollutant standards like Euro standards have been vital in cleaning up urban air and saving lives. But they are not climate policies. For real progress on climate, strong CO_2 standards are required – and ultimately, a complete shift away from combustion engines.

Sources of images:

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