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Global State of Play:

*Internal Combustion Engine Bans & Zero Emission Vehicle
Targets – 2023 Update*

Monthly Research Report: April 2023

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Key Points:

- More than 50 countries have announced an intention to set a ban ICEVs or a ZEV sales target, generally in the 2030-2040 timeframe.
- Countries have also committed to global movements to achieve 100% sales in the LDV and MDV fleet by 2035 and in the HDV fleet by 2040. Those commitments are largely not backed up by actual, implemented policy.
- ZEV targets versus ICEV bans matter. ZEV targets that do not specify the powertrain open up the possibility for zero GHG fuel combinations that are not necessarily electric vehicles such as e-fuels, hydrogen and even renewable fuels.
- However, there is ambiguity and a lack of clarity in some countries over how the term “ZEV” is defined.
- The U.S. government announced stringent tailpipe emission standards that are expected to lead to a massive growth in EV sales but does allow other fuel-powertrain combinations.
- The EU finalized its CO2 standards proposal with the European Commission committing to develop a proposal for e-fuels.

Introduction

Since the inception of this service, I have been following announcements and policies related to the ban of internal combustion engine vehicles (ICEVs) and completing an annual post or report for members (see [post Nov. 8, 2022](#); [report Jan. 27, 2021](#); [report Feb. 25, 2020](#)). In preparing this update, I again researched actual, verifiable announcements and policies from national governments. Accompanying this report is an [updated spreadsheet](#) with a summary of each of the countries that have announced bans with links to actual government documents where applicable. This time, the spreadsheet is broken out to distinguish zero emission vehicle (ZEV) targets versus actual bans, timelines and fleet application.

We have all seen the news stories about national ICEV bans, which continue to proliferate, but what is real? Are policymakers in countries around the world formulating policies and/or plans to implement bans beyond press

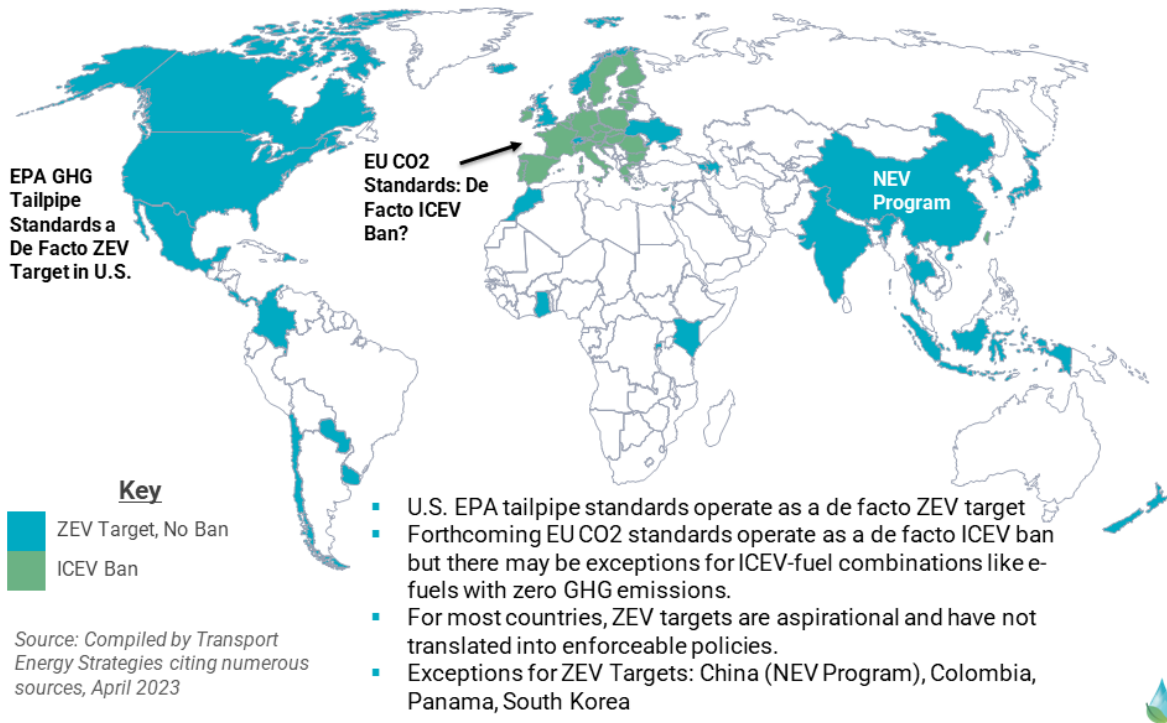
releases and media announcements? If so, what do those look like? Are they actual bans or are they targets? What kinds of powertrain and fuel combinations are permitted? Most policies have focused until recently on light-duty vehicles (LDVs), but what about medium- (MDVs) and heavy-duty vehicles (HDVs)? This report provides an answer to these questions.

In short, I still believe the issue of ICEV bans remains one of the most overhyped issues in the transport energy space. In the early years, ban announcements lacked substance and amounted to “virtue signaling.” Outside of the EU, California, and now, the U.S. federal government, that is still much the case. Targets remain aspirational. Not so in the EU and the U.S., which are now moving to set stringent standards that would effectively compel the scale up of EVs. Another observed trend is the setting of targets for the MDV and HDV fleets in several countries for the first time.

Global ICEV Bans and ZEV Targets

At the outset, more than 50 countries have announced an intention to ban ICEVs or set a ZEV sales target, generally in the 2030-2040 timeframe and across the LDV, MDV and HDV fleets. These countries are summarized in Figure 1.

Figure 1: Summary of National ICEV Ban Announcements and 100% EV Sale Targets



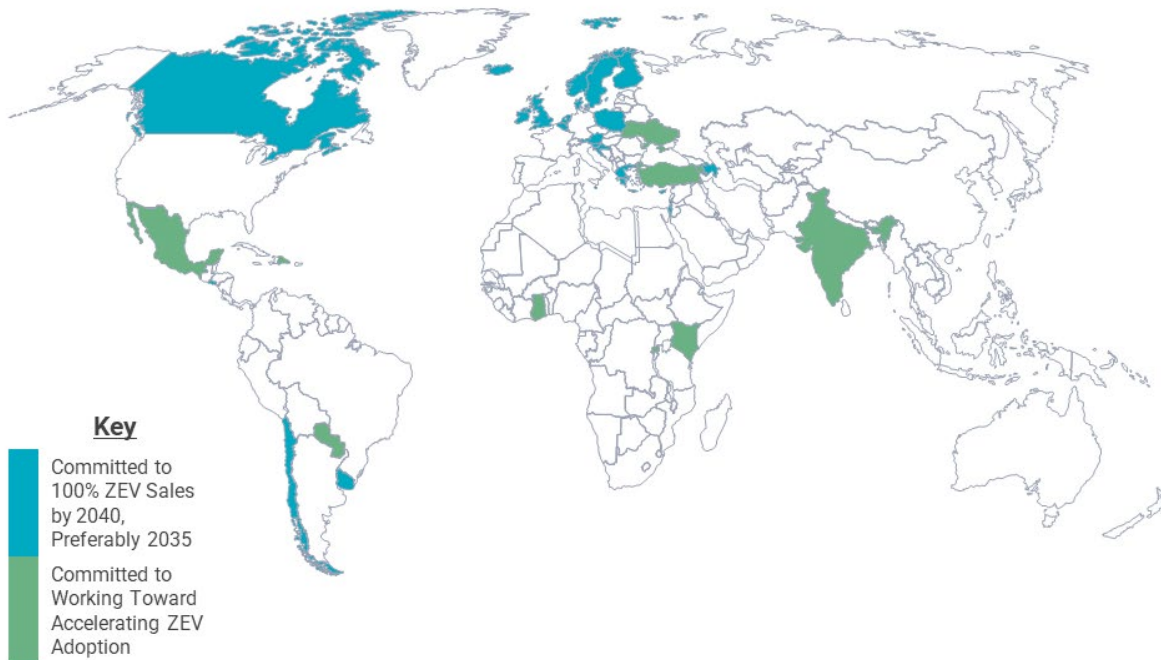
Most of the foregoing countries have committed in the last Conference of the Parties (COP) to work toward 100% ZEV sales, signing the COP26 Declaration on Accelerating the Transition to 100% Zero Emission Cars and Vans (Declaration). At last year’s COP26 meeting, government officials from national, state and local governments as well as automotive manufacturers, fleet owners, investors and others in the financial community “committed to working toward all sales of new cars and vans being zero emission globally by 2040, and by no later than 2035 in leading markets.”¹ Signatory governments included: Austria, Azerbaijan, Belgium, Canada, Cape Verde, Chile, Croatia, Cyprus, Denmark, El Salvador, Finland, Greece, Iceland, Ireland, Israel, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, New Zealand, Norway, Poland, Slovenia, Sweden, The Holy See, United Kingdom, Uruguay.

Additional emerging market signatory countries included: Armenia, Dominican Republic, Ghana, India (focus on two- and three-wheelers), Kenya, Mexico, Morocco, Paraguay, Rwanda, Turkey and Ukraine. These countries did not commit to a specific 100% ZEV mandate date but agreed to “work intensely towards accelerated proliferation and adoption of zero emission vehicles. We call on all developed countries to strengthen the

¹ Government of the United Kingdom, COP26 Declaration on Accelerating the Transition to 100% Zero Emission Cars And Vans, Nov. 17, 2022 at [COP26 declaration on accelerating the transition to 100% zero emission cars and vans - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/news/cop26-declaration-on-accelerating-the-transition-to-100-zero-emission-cars-and-vans).

collaboration and international support offer to facilitate a global, equitable and just transition.” These countries are summarized in Figure 2.

Figure 2: Signatory Countries on the COP26 100% ZEV Sales Declaration



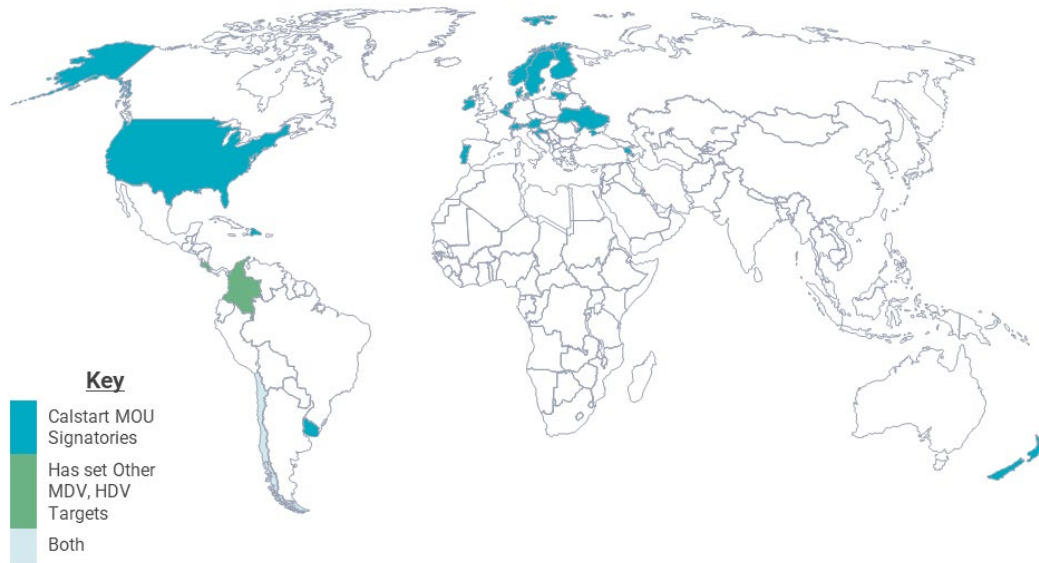
*Not pictured: Cape Verde and The Holy See. India is focused on two- and three-wheelers.
Source: Compiled by Transport Energy Strategies citing the declaration, October 2022*



Advocates are increasingly working with countries to scale up electrification in the MDV and HDV fleets as well. Calstart, the U.S. organization from California working on decarbonizing transport, facilitated the Global Memorandum of Understanding (MOU) on Zero-Emission Medium- and Heavy-Duty Vehicles under its Drive to Zero Program at COP 27 in December 2021 which was signed by 26 countries and summarized in Figure 3.² Among other things, the MOU commits countries to achieving 30% of ZEVs in new truck and bus sales by 2030 and 100% by 2040. The MOU defines ZEV as “vehicles with gross vehicle weight above 3,500 kilograms used for freight and passenger transport. ZE-MHDVs are MHDVs with zero tailpipe emissions,” which may open the door to the use of fuels such as hydrogen in ICEVs, e-fuels, and even renewable fuels that can conceivably achieve zero GHG tailpipe emissions.

² Calstart, Memorandum of Understanding on Zero-Emission Medium- and Heavy-Duty Vehicles, Dec. 20, 2021 at [Global-MOU-ZE-MHDVs-signed-20-Dec-21.pdf \(globaldrivetozero.org\)](https://www.globaldrivetozero.org/global-mou-ze-mhdvs-signed-20-dec-21.pdf).

Figure 3: Signatories to the Calstart MOU and Other Countries with ZEV Targets for MDVs and HDVs



Not pictured are additional signatories: Aruba, Curacao, Scotland, St. Maarten, Wales
 Source: Compiled by Transport Energy Strategies citing the declaration, April 2023

Outside of the MOU, three Latin American countries have announced intentions for increasing ZEVs in their MDV and HDV fleets:

- **Chile:** By 2035, 100% of public transport (buses, taxis and shared taxis) sold must be zero emissions and 100% of large mobile machinery sold must be zero emissions.
- **Colombia:** Achieve 10% share of ZEVs in urban bus sales by 2025 and 100% by 2035.
- **Costa Rica:** a target of 70% share of ZEVs in bus and taxi sales by 2035, and 100% by 2050.

ICEV Bans v. ZEV Targets: What’s the Difference?

Does it matter whether you call it a ban or a target? Is there a difference between the two? The media and analysts, even me, have tended to conflate the two. But there are some subtle differences that may matter down the line. First, most of the foregoing countries have announced 100% ZEV sale targets, but others have not. For example, China’s New Energy Vehicle (NEV) program requires 18% NEV sales for the year 2023 for plug-in hybrids (PHEVs), battery electric vehicles (BEVs) and fuel cell electric vehicles (FCEVs). Other examples are shown in Table 1.

Table 1: Country ZEV Targets

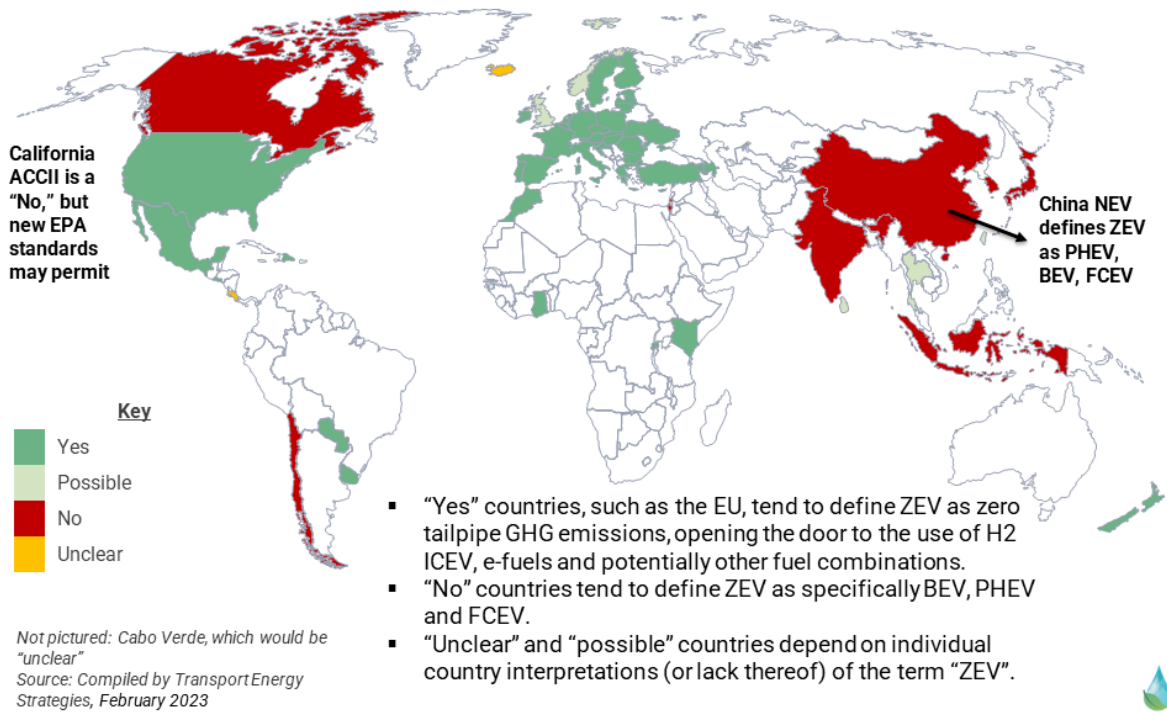
Country	ZEV Target	Year	Fleet
China (NEV Program)	18%	2023	LDV
Costa Rica	60%	2050	LDV
	70%		HDV

Country	ZEV Target	Year	Fleet
India	30%	2030	LDV
Kenya	5%	2025	LDV
Panama	40%	2030	LDV
South Korea	83%	2030	LDV
Thailand	50%	2035	LDV

Source: Transport Energy Strategies citing country plans and policies, April 2023

Second, a legislative or regulatory ICEV ban has implications for future fuels. An outright ban permits no possibility of fuel-powertrain combinations that may achieve zero (or even net negative) GHG emissions. ZEV targets that are predicated on zero GHG emissions leave open the possibility for future fuels such as hydrogen ICEVs, electrofuels, other advanced alternative fuels and even biofuels. If those fuels can achieve zero tailpipe GHG emissions, then conceivably they would comply with applicable country’s policy. It all comes down to how a country defines the term “ZEV.” Countries that have signed the Declaration and MOU, both referenced above, effectively define ZEV as achieving zero tailpipe GHG emissions. Other countries are more restrictive, limiting ZEVs to PHEVs, BEVs or FCEVs. Figure 4 summarizes country approaches and highlights the definitional ambiguities in some countries that have not defined ZEV at all (at least not yet).

Figure 4: Do ZEV Mandates/Targets Include Other Fuels?



Whether it’s a ban or a ZEV target, what are countries thinking in terms of timelines? These are summarized in Figure 5.

Figure 5: ZEV Target Timelines



Source: Compiled by TransportEnergy Strategies, April 2023
 *CO2 GHG standards

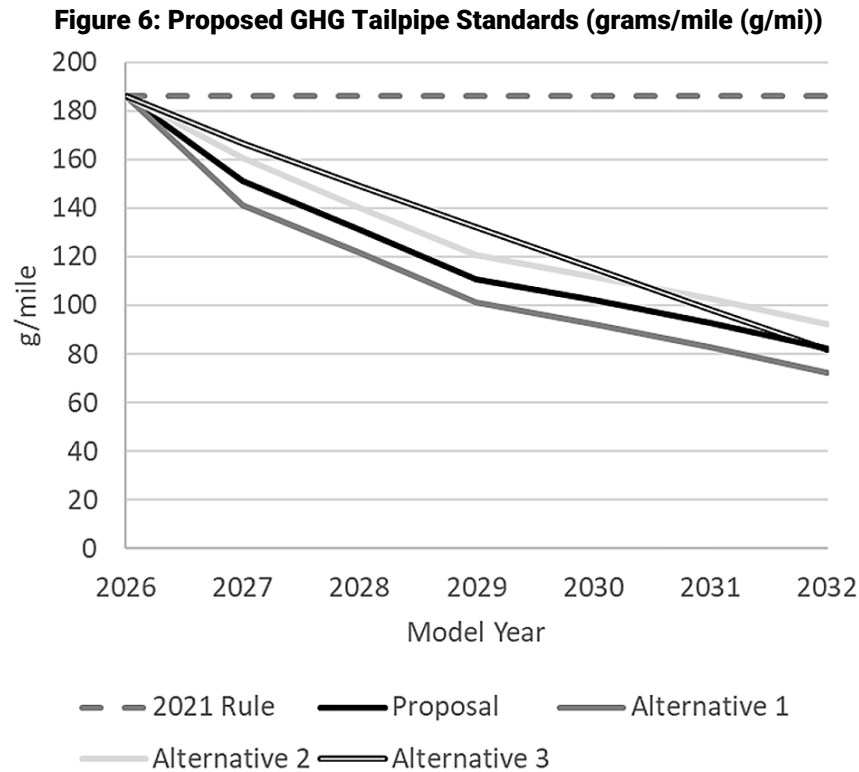


U.S. Government to Set Stringent Tailpipe Standards Propelling EV Sales

Earlier this month, the U.S. Environmental Protection Agency (U.S. EPA) announced new, more ambitious proposed standards to reduce tailpipe emissions from the LDV and MDV fleets beginning with model year 2027.³ The proposal builds upon EPA’s final standards for federal GHG emissions standards for passenger cars and light trucks for model years 2023 through 2026 (see [report Mar 22, 2021](#); [Sept. 18, 2018](#)). For LDVs, EPA is proposing standards that would increase in stringency each year over a six-year period, from MYs 2027-2032. Figure 6 summarizes the standards⁴ and also compares alternatives EPA considered, which are discussed in more depth in the proposal.

³ U.S. Environmental Protection Agency, Proposed Rule: Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, Apr. 12, 2023 at [Proposed Rule: Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles | US EPA](#).

⁴ These are expressed in grams/mile. In a future post, I will compare the U.S. v. EU approach, similar to work I have done in the past.



Source: U.S. EPA, April 2023

The proposed standards are projected to result in an industry-wide average target for the LDV fleet of 82 grams/mile (g/mile) (50 g/km) of CO₂ in MY 2032, representing a 56% reduction in projected fleet average GHG emissions target levels relative to the existing MY 2026 standards. U.S. EPA is careful to note that the proposed standards are performance-based, which means automakers can choose what emissions control technologies to meet the standards. However, and as you may have seen in the mainstream media, this is largely a smokescreen. The real goal behind the legislation is to massively boost electrification in the LDV and MDV fleets. EPA projects that EVs could account for 67% of new LDV sales and 46% of new MDV sales in MY 2032.

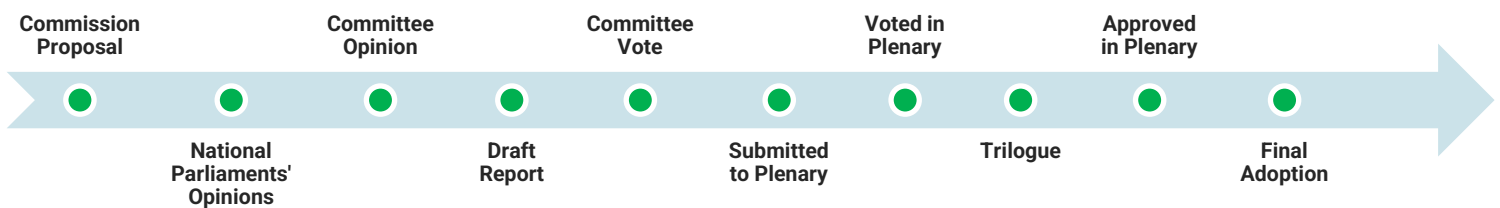
Setting a direct ZEV mandate is an absolute no-go in the U.S. First, U.S. EPA lacks the legal authority. Second, such a mandate would have to be enacted by legislation of the U.S. Congress, which would never happen because there would not be a majority in favor. Third, even if U.S. EPA and/or Congress set such a mandate, it would likely be struck down by a very conservative U.S. Supreme Court. That may happen anyway as the regulated community comes to grips with just what the 758-page rulemaking really means.

Nevertheless, EPA’s “performance-based” stance would mean, in its analysis, a wholesale scale up of electrification. For example, EPA projects that one potential pathway for the industry to meet the proposed standards would be through:

- Nearly 70% BEV penetration in MY 2032 across the combined light-duty passenger car, crossover/SUV, and pickup truck categories.
- About 40% BEV penetration by 2032 across the combined medium-duty van and pickup truck categories.
- Wide-spread use of gasoline particulate filters to reduce PM emissions.
- Improvements in technology to reduce CO2 from conventional gasoline vehicles.

Update on CO2 Standards in the EU

Figure 7: Snapshot of Policy Progress



Source: Compiled by Transport Energy Strategies, April 2023

Last month, the European Council finally adopted the CO2 standards proposed by the European Commission in 2021 under Fit for 55 (see [report Feb. 22, 2023](#); [report July 28, 2021](#)). “The new rules aim to reduce emissions from road transport that has the highest share of emissions from transport and provide the right push for the automotive industry to shift towards zero-emission mobility while ensuring continued innovation in the industry.”⁵ The new rules set the following targets:

- 55% CO2 emission reductions for new cars and 50% for new vans from 2030 to 2034 compared to 2021 levels.
- 100% CO2 emission reductions for both new cars and vans from 2035.

A regulatory incentive mechanism for zero- and low-emission vehicles (ZLEV) will be in place from 2025 until the end of 2029. As part of this mechanism, if a manufacturer meets certain benchmarks for the sales of zero- and low-emission vehicles it can be rewarded with less strict CO2 targets. The benchmark is set at 25% for cars and 17% for vans (MDVs).

⁵ European Council, ‘Fit for 55’: Council Adopts Regulation on CO2 Emissions for New Cars and Vans, Mar. 28, 2023 at <https://www.consilium.europa.eu/en/press/press-releases/2023/03/28/fit-for-55-council-adopts-regulation-on-co2-emissions-for-new-cars-and-vans/>.

The regulation also contains a reference to e-fuels. Members may recall that several countries led by Germany nearly derailed this proposal altogether, demanding the inclusion of e-fuels. The Commission acquiesced and will develop such a proposal following a consultation with stakeholders. This will be done after 2035 and outside the scope of the fleet standards.

The regulation includes a review clause that foresees that in 2026, the Commission will thoroughly assess the progress made towards achieving the 2035 100% emission reduction targets and the possible need to review them. The review will take into account technological developments, including with regard to plug-in hybrid technologies and the importance of a viable and socially equitable transition towards zero emissions. In addition, the regulation includes other provisions such as:

- Gradually reducing the cap of emission credits that manufacturers can receive for eco-innovations that verifiably reduce CO₂ emissions on the road, to maximum 4g/km per year from 2030 until the end of 2034 (currently set at 7g/km per year).
- A common EU methodology, to be developed by the Commission by 2025, for assessing the full life cycle of CO₂ emissions of cars and vans placed on the EU market, as well as for the fuels and energy consumed by these vehicles.