BRIEFING

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The end of the road? An overview of combustion-engine car phase-out announcements across Europe

Sandra Wappelhorst, May 2020

INTRODUCTION

Passenger cars and vans are responsible for about 15% of European Union (EU) carbon dioxide (CO_2) emissions and contribute to high concentrations of air pollutants in many European cities.[1] The COVID-19 pandemic is likely to cause a temporary dip of emissions from passenger cars and vans reflecting a decrease in passenger transport volumes and less traffic.[2] On a local scale, data for March 2020 show that specifically nitrogen dioxide (NO_2) emissions dropped significantly in selected European cities affected by strict measures—from social constraints to the lockdown of an entire country—to curb the spread of COVID-19.[3] Yet these restrictive measures are limited to the duration of the coronavirus outbreak, and without more longer-term instruments, emissions from transport are likely to bounce back quickly to previous levels. Early research points to air pollution possibly assisting the spread of COVID-19 and thereby increases the pressure to reduce pollutant emissions from road vehicles and improve people's health.[4] In addition, mitigating climate change remains a top priority to avoid

1 European Commission, CO_2 emission performance standards for cars and vans (2020 onwards), (n.d.), https://ec.europa.eu/clima/policies/transport/vehicles/regulation_en
European Environment Agency, Annual mean NO_2 concentrations observed at traffic stations, 2017, (17 December, 2019), https://www.eea.europa.eu/data-and-maps/figures/annual-mean-no2-concentration-observed-12

2 Agora Energiewende, *Auswirkungen der Corona-Krise auf die Klimabilanz Deutschlands. Eine Abschätzung der Emissionen 2020* [Effects of the corona crisis on Germany's carbon footprint. An estimate of 2020 emissions], (2020), https://www.agora-energiewende.de/fileadmin2/Projekte/2020/_ohne_Projekt/2020-03_Corona_Krise/178_A-EW_Corona-Drop_WEB.pdf

3 European Space Agency, "Coronavirus lockdown leading to drop in pollution across Europe'" (27 March, 2020), https://www.esa.int/Applications/Observing_the_Earth/Copernicus/Sentinel-5P/Coronavirus_lockdown_leading_to_drop_in_pollution_across_Europe

4 "The pandemic. Airborne particles may be assisting the spread of SARS-CoV-2," *The Economist*, (26 March, 2020), https://www.economist.com/science-and-technology/2020/03/26/airborne-particles-may-be-assisting-the-spread-of-sars-cov-2

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severe negative effects on humanity in future years. In this respect, the COVID-19 crisis demonstrates the importance of early action and how governments should and can take huge steps to protect their populations.

An increasing number of local and national governments are signaling their intention to phase out combustion engine-powered vehicles altogether.[5] In response, car manufacturers are increasingly adapting product strategies away from combustion engines and toward electric power. This comes at a time when combustion-engine vehicles still dominate new car registrations in the European Union. In 2019, gasoline cars accounted for 59% of new passenger car registrations, diesel cars for 31%, conventional hybrid electric vehicles (HEVs) for 5.9%, and cars running on ethanol, liquefied petroleum gas (LPG), and compressed natural gas (CNG) for 1.7%. The share of electric vehicles, including battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs), was 3%.[6] This briefing outlines announcements by select European local and national governments as well as global car manufacturers to phase out passenger cars running on fossil fuels—gasoline, diesel, LPG, and CNG—to increase the share of zero- and low-emission vehicles, including BEVs and PHEVs.

PHASE-OUT TARGETS BY NATIONAL GOVERNMENTS

To mitigate climate change and improve local air quality, a growing number of national governments in Europe have announced plans to phase out combustion-engine vehicles. The following list shows countries that have proposed phase-out targets within the next two decades and have set timetables for phase-outs in official national policy documents.

2025

» Norway's 2025 target is the most ambitious for phasing out combustion-engine vehicles. The government's 2017 Transport Plan states that sales of passenger cars and light vans shall be zero-emissions from 2025 onward. Under the plan, preconditions are "improvements in technological maturity in a way that zero-emission vehicles will be competitive in relation to conventional vehicles."[7]

2030

» Denmark set a 2030 target to stop sales of new gasoline and diesel cars and a 2035 goal to bar new PHEVs under its October 2018 Climate and Air Plan. To reach this goal, the plan lists specific measures, including incentives for purchasers and owners of electric vehicles such as waiving registration taxes on car purchases, lower periodical ownership taxes, lower taxes for company cars powered by electricity, discounts on parking, and the use of bus lanes. The plan also proposes increasing consumer convenience through the extension of the fast-charging network and securing space for private actors to set up sufficient charging stations in cities.[8]

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5 Peter Slowik, Dales Hall, Nic Lutsey, Michael Nicholas, and Sandra Wappelhorst, *Funding the transition to all zero-emission vehicles*, (ICCT: Washington, DC, 2019), https://theicct.org/sites/default/files/publications/Funding_transition_ZEV_20191014.pdf

6 ACEA, "Fuel types of new cars: petrol +11.9%, diesel -3.7%, electric +80.5% in fourth quarter of 2019," (8 February, 2020) https://www.acea.be/press-releases/article/fuel-types-of-new-cars-petrol-11.9-diesel-3.7-electric-81.3-in-fourth-quart

7 Norwegian Ministry of Transport and Communications, National Transport Plan 2018–2029, (2017), https://www.regjeringen.no/contentassets/7c52fd2938ca42209e4286fe86bb28bd/en-gb/pdfs/stm201620170033000engpdfs.pdf

8 Regeringen, "Sammen om en grønnere fremtid. Klima- og lufudspil [*Together about one greener future. Climate and Air Plan*], (2018), https://efkm.dk/media/12350/klimaministeriet_klimaogluftudspil_digital.pdf

- Iceland after 2030 will outlaw registration of new gasoline and diesel cars under its Climate Action Plan of September 2018, with consideration of exemptions for people living in remote areas.[9]
- Ireland proposed that legislation effective in 2030 ban the sale of new fossil-fuel cars, according to its August 2019 Climate Action Plan.[10]
- The Netherlands set 2030 as the latest point for requiring 100% emission-free new passenger cars in its June 2019 Climate Agreement. Measures to implement the target include the accelerated roll-out of charging infrastructure and tax incentives.[11]
- Slovenia intends to follow a phased-in approach over 2025–2030. Based on the government's Market Development Strategy from May 2017, initial registration would be prohibited after 2025 for new passenger cars and light commercial vehicles with emissions of more than 100 grams of carbon dioxide per kilometer (g CO_2/km). After 2030, the limit would fall to 50 g CO_2/km. The government proposes various measures to reach this goal, including the deployment of charging infrastructure and the promotion of alternative-fuel vehicles.[12]
- Sweden will study the feasibility of banning new gasoline and diesel car sales starting in 2030 under the December 2019 Climate Policy Action Plan. The document lists 131 other measures to reach national climate targets.[13] A study was commissioned in December 2019 to analyze conditions for a national phase-out, how to exempt vehicles that run on renewable fuels and electric hybrid vehicles, and how to bring about an EU-wide ban.[14]

2032

- Scotland will "phase out the need" to buy gasoline and diesel cars or vans by 2032, based on the government's May 2018 Climate Change Plan. The document includes a number of policies and proposals to contribute to that goal. They include the government's aim to push for more stringent future EU emission standards, negotiate with the government of the United Kingdom to continue an exemption on registration tax for new zero-emission vehicle purchases, extend the public charging infrastructure, and make available interest-free loans for consumers, businesses, and taxi and private-hire vehicle operators purchasing electric vehicles.[15]

9 Ministry for the Environment and Natural Resources, Iceland's Climate Action Plan for 2018–2030, (2018), https://www.government.is/library/Files/Icelands%20new%20Climate%20Action%20Plan%20for%202018%202030.pdf

10 Government of Ireland, "Climate Action Plan 2019. To Tackle Climate Breakdown. Annex of Actions," (2018), https://www.dccae.gov.ie/en-ie/climate-action/publications/Documents/16/Climate_%20Action_Plan_2019_Annex_of_Actions.pdf

11 Klimaatakkoord, *Climate Agreement*, (2018) https://www.klimaatakkoord.nl/documenten/publicaties/2019/06/28/klimaatakkoord

12 Republika Slovenija, *Strategija na področju razvoja trga za vzpostavitev ustrezne infrastrukture v zvezi z alternativnimi gorivi v prometnem sektorju v Republiki Sloveniji* [*Market Development Strategy for the Establishment of Adequate Alternative Fuel Infrastructure in the Transport Sector in the Republic of Slovenia*], (2017), https://e-uprava.gov.si/.download/edemokracija/datotekaVsebina/298735?disposition=inline

13 Regeringskansliet, Klimatpolitiska handlingsplanen – Fakta-PM (*Climate Policy Action Plan - Facts PM*), (17 December, 2019) https://www.regeringen.se/4af76e/contentassets/fe520eab3a954eb39084aced9490b14c/klimatpolitiska-handlingsplanen-fakta-pm.pdf

14 Government Offices of Sweden, Inquiry appointed on phasing out fossil fuels and banning sales of new petrol and diesel cars, (20 December, 2019), https://www.government.se/press-releases/2019/12/inquiry-appointed-on-phasing-out-fossil-fuels-and-banning-sales-of-new-petrol-and-diesel-cars/

15 Scottish Government, "Climate Change Plan: third report on proposals and policies 2018-2032 (RPP3)," (28 February, 2018), https://www.gov.scot/publications/scottish-governments-climate-change-plan-third-report-proposals-policies-2018/pages/12/

2035

» The United Kingdom accelerated its proposed phase-out to 2035 from 2040. The government announced the new goal in February 2020, revising policies to end the sale of new conventional gasoline and diesel cars set forth in 2017 and 2018.[16] The new plan would also ban new PHEVs and hybrid electric vehicles (HEVs).[17] In late February 2020, the proposals were put out to open consultation with the public's views to be submitted by the end of May 2020.[18] There were also discussions to further move the target forward to 2032.[19]

2040

» France set a 2040 goal for ending the sale of new passenger cars and light commercial vehicles using fossil fuels, according to the Mobility Guidance Law. The target is to be evaluated every five years.[20]

» Spain by 2040 aims to reach 100% sales of electric passenger cars in accordance with the national Draft Law on Climate Change and Energy Transition. Policies stated in the draft law include reducing rates for charging electric vehicles, programs aiming at the deployment and promotion of charging points, and providing financial aid for the purchase of electric vehicles.[21]

Table 1 lists the official policy documents—plans, strategies, and agreements—and drafted and adopted laws that specify phase-out targets. The table also highlights selected implementation measures according to the relevant policy document. Figure 1 maps selected national government combustion-engine car phase-out targets.

16 Department for Environment, Food and Rural Affairs; Department for Transport, UK plan for tackling roadside nitrogen dioxide concentrations, (2017), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/633270/air-quality-plan-detail.pdf
Department for Transport, "The Road to Zero. Next steps towards cleaner road transport and delivering our Industrial Strategy," (2018), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/739460/road-to-zero.pdf

17 "Electric dream: Britain to ban new petrol and hybrid cars from 2035," *Reuters*, (3 February, 2020), https://www.reuters.com/article/us-climate-change-accord/electric-future-britain-to-ban-new-petrol-and-hybrid-cars-from-2035-idUSKBN1ZX2RY

18 Department for Transport, Office for Low Emission Vehicles, Open consultation: Consulting on ending the sale of new petrol, diesel and hybrid cars and vans, (20 February, 2020), https://www.gov.uk/government/consultations/consulting-on-ending-the-sale-of-new-petrol-diesel-and-hybrid-cars-and-vans/consulting-on-ending-the-sale-of-new-petrol-diesel-and-hybrid-cars-and-vans

19 "Petrol and diesel car sales ban could start in 12 years, says Shapps," *BBC News*, (12 February, 2020), https://www.bbc.com/news/business-51474769

20 République Française, Law Number 2019-1428 of 24 December 2019 on Mobility Orientation, https://www.legifrance.gouv.fr/affichTexte.do?categorieLien=id&cidTexte=JORFTEXT000039666574&dateTexte=

21 Congreso de los Disputados Proposición de Ley sobre Cambio Climático y Transición Energética [*Proposed Law on Climate Change and Energy Transition]*, boletín official De las cortes generals, (16 July, 2019), http://www.congreso.es/public_oficiales/L13/CONG/BOCG/B/BOCG-13-B-48-1.PDF

Table 1. Select national government targets for phasing out combustion engine cars up to 2040 and selected implementation policies as of April 2020.

Country	Phase-out year	Policy document and publication date	Target and select implementation policies according to policy document
Norway	2025	National Transport Plan 2018-2029 (2017)	**Target:** All new passenger cars and light vans sold in 2025 shall be zero-emission vehicles. **Implementation:** Not specified.
Denmark	2030/2035	Together for a greener future - Climate and Air Plan (October 2018)	**Target:** After 2030, new gasoline and diesel cars will no longer be sold in Denmark, and new PHEVs after 2035. **Implementation:** Through electric vehicle support actions such as no registration tax on car purchase, lower ownership tax, lower tax for electric company cars, extension of the fast-charging network, securing space for private actors to set up charging stations, discounts on parking, or use of bus lanes.
Iceland	2030	Iceland's Climate Action Plan for 2018–2030 (September 2018)	**Target:** New registration of diesel and gasoline cars will be unlawful after 2030. Exceptions, such as for remote areas, will be considered. **Implementation:** Not specified.
Ireland	2030	Climate Action Plan 2019 (August 2019)	**Target:** Ban of the sale of new fossil fuel cars from 2030 onward. **Implementation:** Through regulation, i.e. introduction of legislation.
Netherlands	2030	Climate Agreement (June 2019)	**Target:** New passenger cars will be emissions-free by 2030 at the latest. **Implementation:** Through electric vehicle support actions including accelerated roll-out of charging infrastructure and tax incentives.
Slovenia	2025/2030	Market Development Strategy for the Establishment of Adequate Alternative Fuel Infrastructure in the Transport Sector in the Republic of Slovenia (May 2017)	**Target:** New passenger cars will be emissions-free by 2030 at the latest. **Implementation:** Through electric vehicle support actions including accelerated roll-out of charging infrastructure and tax incentives.
Sweden	2030	Climate Policy Action Plan - Facts (December 2019)	**Target:** Starting in 2030 it will no longer be permitted to sell new gasoline and diesel cars. Sweden is pushing for a similar ban within the EU. **Implementation:** Through regulation. A feasibility study will be conducted on how this could be implemented in practice.
Scotland	2032	Climate Change Plan (May 2018)	**Target:** Scotland will phase out the need to buy gasoline and diesel cars and vans by 2032. **Implementation:** Through electric vehicle support actions such as registration tax exemptions, funding for the extension of the public charging network, funding for interest-free loans on vehicle purchase, information and awareness-raising campaigns, or support of the public sector when procuring electric vehicles. In addition, through regulation, i.e. pushing for strong future emission standards for passenger cars and light commercial vehicles at the European level beyond current target levels.
United Kingdom	2035	Announcement by Prime Minister Boris Johnson (February 2020)	**Target:** To end the sale of new conventional gasoline and diesel cars and vans including PHEVs and HEVs by 2035. **Implementation:** Based on previous Road to Zero Strategy, mainly through electric vehicle support actions, e.g. financial aid for the purchase of an electric vehicle, procurement of electric vehicles by the government, information and awareness-raising campaigns, exchange groups involving government, industry, and consumer groups. In addition, through regulation, i.e. keeping the ambition level of EU vehicle emission standards.
France	2040	Mobility Guidance Law (December 2019)	**Target:** To end of the sale of new passenger cars and light commercial vehicles using fossil fuels by 2040. **Implementation:** Not specified.
Spain	2040	Draft Law on Climate Change and Energy Transition (July 2019)	**Target:** Goals are set for minimum shares of electric vehicles of total passenger cars sold, to reach 100% by 2040. **Implementation:** Mainly through electric-vehicle support actions such as reduction of rates for recharging an electric vehicle, programs for the deployment and promotion of charging points, and financial aid for the purchase of electric vehicles.

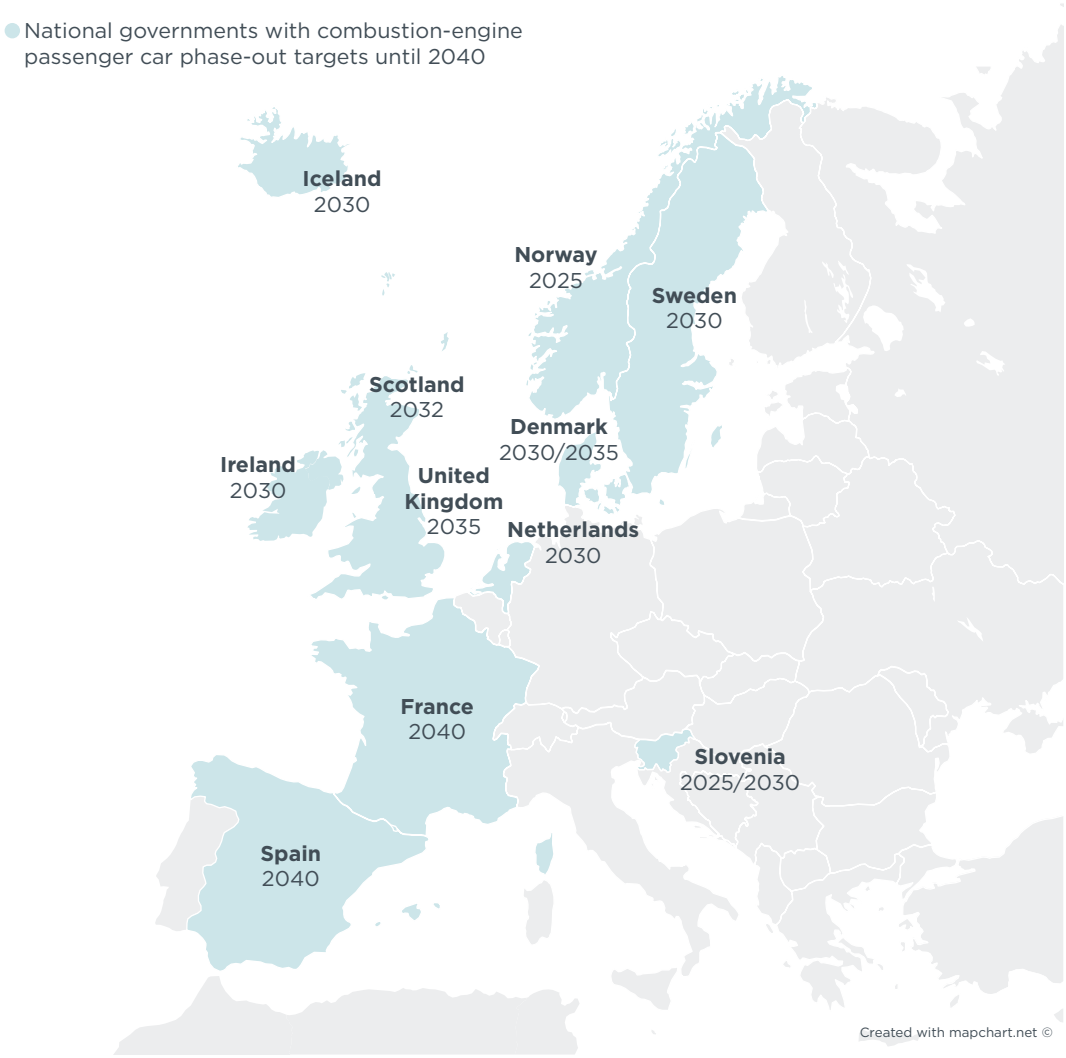

Figure 1. Select national government targets for phasing out combustion-engine cars up to 2040 as of April 2020.

In addition to national goals to decarbonize vehicle fleets, EU member states are also required to report climate and energy objectives, targets, policies, and measures to the European Commission in the form of a 10-year integrated National Energy and Climate Plan (NECP) for 2021–2030. The final versions were to be submitted by December 2019. Out of 27 EU Member States, 23 provided final NECPs by the end of April 2020, of which only Denmark, France, and Spain mention the end of the sale of all new combustion engine cars by 2030 and 2040, respectively. However, Ireland and the United Kingdom also planned to bar sales of non-zero-emission cars in their draft NECPs submitted in early 2019.[22] Romania proposed in its final plan dated January 2020 to prohibit the registration of vehicles with Euro 3 and Euro 4 emission standards without mentioning a date.[23]

There are also collaborations among countries to decarbonize transport. In the International Zero-Emission Vehicle Alliance, 18 governments are exchanging best

22 European Commission, (National energy and climate plans (NECPs), (20 April, 2020), https://ec.europa.eu/energy/en/topics/energy-strategy/national-energy-climate-plans

23 Romanian Government, Planul Național Integrat în domeniul Energiei și Schimbărilor Climatice 2021-2030. Ianuarie 2020 [*Integrated National Plan in the field of Energy and Climate Change 2021-2030. January 2020*], http://www.economie.gov.ro/images/transparenta-decizionala/ANUNT%20PNIESC%202020/PNIESC%20revizuit_31%2001%202020.pdf

practices on how to overcome barriers and accelerate the shift to 100% zero-emission vehicle sales by 2050. European countries and states involved include Germany, the German state of Baden-Wuerttemberg, Norway, the Netherlands, and the United Kingdom, of which the last three have set out earlier combustion-engine vehicle phase-out targets within 15 years as shown above.[24]

The activities exemplify the commitment of some European governments to phasing out combustion engines in new passenger cars and vans to reduce emissions from transport. These goals are mostly set out in official national policy documents, which describe transport—such as France and Norway—or climate goals and strategies—such as Denmark, Iceland, Ireland, the Netherlands, Scotland, Spain, and Sweden. But most have not yet elaborated on underlying implementation plans or measures.

France is the only European country so far to write its phase-out target for fossil fuel cars into law, the Mobility Guidance Law adopted in December 2019.[25] In January 2020, Ireland published the Draft General Scheme of the Climate Action (Amendment) Bill 2019, aiming to put the sales ban of fossil fuel cars by 2030 into law.[26] In December 2019, the Swedish government began an inquiry into how to implement its 2030 phase-out goal, as well as a possible European Union ban on gasoline- and diesel-powered vehicles, with the aim of publishing a final report in early 2021.[27] In Spain, the Draft Law on Climate Change and Energy Transition, with a mandate for all passenger cars sold in 2040 be electric, was approved in February 2019. It was in final administrative processing as of April 2020.[28]

Measures set out by national governments in official documents focus on consumer-led policies that address the price gap between conventional and electric vehicles, increase consumer convenience by extending the charging infrastructure network, or increase awareness. Even though some governments do not specifically state similar implementation measures, they are already using strong measures to accelerate combustion-engine vehicle phase-outs through exemption on value-added tax on car purchases in the case of Norway and Iceland, or are using their bonus-malus vehicle taxation system to incentivize purchases of zero-emission vehicles while imposing heavier taxes on vehicles with high CO_2 emissions in the case of France.

Yet it remains unclear whether individual member states' phase-outs of combustion-engine vehicles after a certain date are compatible with EU rules. Denmark and 10 other EU countries in October 2019 asked for a joint EU strategy to phase out diesel and gasoline cars by 2040 and to allow bans on the sale of combustion-engine vehicles at the member-state level.[29] The European Commission has signaled its openness for discussions, notably as part of a coming review of the car CO_2 standards, as an

24 ZEV Alliance, Accelerating the adoption of zero-emission vehicles, (2018), http://www.zevalliance.org/

25 République Française, Last modification: December 26, 2019 at 5:00 p.m. Law of 24 December 2019 on mobility orientation, https://www.vie-publique.fr/loi/20809-loi-du-24-decembre-2019-dorientation-des-mobilites-lom

26 Department of Communications, Climate Action and Environment, "Minister Bruton Publishes Draft Scheme of New Climate Law," (7 January, 2020), https://www.dccae.gov.ie/en-ie/news-and-media/press-releases/Pages/Minister-Bruton-Publishes-Draft-Scheme-of-New-Climate-Law.aspx

27 Government Offices of Sweden, (2019). "Inquiry appointed on phasing out fossil fuels and banning sales of new petrol and diesel cars," (20 December, 2019), https://www.government.se/press-releases/2019/12/inquiry-appointed-on-phasing-out-fossil-fuels-and-banning-sales-of-new-petrol-and-diesel-cars/

28 Gobierno de España, "The Law of Climate Change and Energy Transition enters the final stretch of its administrative processing," (10 February, 2020), https://www.miteco.gob.es/es/prensa/ultimas-noticias/la-ley-de-cambio-clim%C3%A1tico-y-transici%C3%B3n-energ%C3%A9tica-entra-en-la-recta-final-de-su-tramitaci%C3%B3n-administrativa/tcm:30-506983

29 Jonas Ekblom, "Denmark calls for EU strategy to phase out diesel and petrol cars from 2030," *Reuters*, (4 October, 2019) https://www.reuters.com/article/us-eu-autos-denmark/denmark-calls-for-eu-strategy-to-phase-out-diesel-and-petrol-cars-from-2030-idUSKBN1WJ1YW

increasing number of European countries are announcing combustion-engine vehicle phase-outs.[30]

An open question is how the phase-out goals will be enforced beyond measures stated in the official documents. Although some governments say their phase-out targets are an important signal pushing automakers toward cleaner vehicles, none has yet implemented enforceable legislation making the targets binding, such as fines or withholding certifications for new combustion-engine vehicles. Only two jurisdictions outside Europe stand out in this respect:

- Hainan, southern China's island province, set official targets in its Clean Energy Vehicle Development Plan for the sale of electric vehicles—BEVs, FCEVs, PHEVs—and clean alternative-fuel vehicles, primarily CNGs and LNGs. The plan includes phased-in sales targets for new vehicles by sector, specifically government fleets, buses, taxis, urban freight, sanitation, rental services, tour coaches, intercity coaches, and private cars. For private passenger cars, the sales targets are 40% electric vehicles by 2020, 80% by 2025, and 100% by 2030. For passenger cars purchased by governments and car-sharing companies, Hainan targets to achieve a 100% electric vehicle share in new sales by 2019. For new sales of cars used in taxi, ride-hailing, and rental fleets, Hainan's target is to achieve a 100% clean energy vehicle share by 2019, 2020, and 2025, respectively.[31] Hainan was the first province in China to announce official targets for a transition to clean-energy vehicles however, without specifing a targeted allocation between electric vehicles and alternative-fuel vehicles. The next step is to implement the targets and to turn them into policies and actions.
- British Columbia was the first jurisdiction worldwide to legislate a 100% zero-emission vehicle sales target, specifically regulating vehicle manufacturers and suppliers. The Canadian province's Zero-Emission Vehicles Act of May 2019 sets phased-in targets for new light-duty zero-emission vehicle sales and leases of 10% by 2025, 30% by 2030, and 100% by 2040.[32] As of April 2020, the province is going through the process of adopting enforcement provisions that could include fines in cases of noncompliance.[33]

PHASE-OUT TARGETS BY LOCAL GOVERNMENTS

A number of European cities have also made phase-out announcements, setting targets and measures to prohibit combustion-engine vehicles from driving in cities. In contrast to national governments, local targets usually include all vehicle types and both new and second-hand vehicles on the road. In general, many European cities have implemented measures to prohibit combustion-engine vehicles from entering or driving in certain city areas, partly in response to European Union air quality standards, with the objective of improving local air quality and protecting human health. Typical regulatory measures include urban vehicle access regulations such as car-free city centers, congestion charging, or low emission zones (LEZs).

30 European Parliament, Parliamentary questions, (10 October, 2019), http://www.europarl.europa.eu/doceo/document/E-9-2019-002469-ASW_EN.html

31 Hongyang Cui and Hui He, *Hainan's Clean Energy Vehicle Development Plan (2019-2030)*. (ICCT: Washington, DC, 2019), https://theicct.org/sites/default/files/publications/Hainan_Clean_Energy_Vehicle_Dev_20190426.pdf

32 British Columbia, Zero-Emission Vehicles Act, https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/electricity-alternative-energy/transportation/zev_act_regulations_intentions_paper-1-final_-_updated_29oct2019.pdf

33 British Columbia, "B.C. Zero-Emission Vehicles Act: Regulations Intention Paper," (29 October, 2019), https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/electricity-alternative-energy/transportation/zev_act_regulations_intentions_paper-1-final_-_updated_29oct2019.pdf

Yet these kinds of policies can vary widely among cities in terms of geographic boundaries, from parking spaces to individual roads to entire cities/regions. There is also variation in vehicle types affected, such as passenger cars, vans, trucks, buses, and motorcycles, as well as affected engine types, whether gasoline, diesel, HEV, PHEV, BEV, FCEV, or LPG and CNG. In addition, cities take different approaches to exempted vehicle categories such as emergency vehicles; terms of access, such as usage charges for noncompliant vehicles or bans with penalties; operating times, such as limited hours or days; and implementation schedule, such as phased-in restrictions for combustion-engine vehicles.[34]

Here is a selection of cities that have adopted timetables to gradually prohibit gasoline or diesel cars or combustion-engine cars altogether and have published plans and targets in official policy documents.

2024

- Oslo outlined a plan to make the city center fossil-free by 2024 and to be the first transport emissions-free city by 2030 under its Climate Budget 2018. The capital of Norway intends to achieve this by implementing low-emission zones (LEZs).[35] In a recent document published by the city council, the three leading political parties declared that by 2030 all cars in Oslo will be emissions-free. The city aims to stop the sale of new fossil-fuel cars in Oslo by implementing, among others, higher road tolls and parking fees on new vehicle purchases starting in 2020.[36]
- Paris plans to prohibit diesel vehicles starting in 2024 followed by gasoline vehicles in 2030, based on the city's Climate Plan. The French capital seeks to reach these goals through gradually limiting access to the existing LEZ including the entire area of Paris within the ring road.[37]
- Rome outlined phased-in bans for diesel vehicles for certain areas of the city by 2024 and for gasoline vehicles to limit access to zero-emission vehicles only by 2030 in its Sustainable Urban Mobility Plan. This will be implemented through gradually restricting access, starting with the historic city center.[38]

2025

- Bergen in Norway wants all passenger car, light goods transport, heavy vehicles, and construction operations to be fossil-free starting in 2025, as indicated in its Action and Finance Plan 2019–2022. In accordance with the plan, detailed actions will be defined in 2020.[39]

34 Yoann Bernard, Joshua Miller, Sandra Wappelhorst, and Caleb Braun, *Impacts of the Paris low-emission zone and implications for other European cities*, (ICCT: Washington, DC, 2020), https://theicct.org/publications/true-paris-low-emission-zone

35 City of Oslo, "Climate budget 2018," (17 December, 2017), https://www.klimaoslo.no/wp-content/uploads/sites/88/2018/02/Climate-Budget-English.pdf

36 Oslo Labor Party, Oslo Green Party, and Oslo Socialist Left Party, "Plattform for byrådssamarbeid mellom Arbeiderpartiet, Miljøpartiet De Grønne og Sosialistisk Venstreparti i Oslo 2019-2023 *[Platform for city council cooperation between the Labor Party, the Green Party and the Socialist Left Party in Oslo 2019-2023]*," (2018), https://www.oslo.kommune.no/getfile.php/13346154-1573659611/Tjenester%20og%20tilbud/Politikk%20og%20administrasjon/Politikk/Byr%C3%A5det/Oslos%20byra%CC%8Adserkl%C3%A6ring%202019-2023.pdf

37 Mairie de Paris, Plan Climat de Paris *[Climate Plan of Paris]*, (2018), https://www.apc-paris.com/system/files/file_fields/2018/04/20/nouveauplanclimat.pdf

38 City of Rome, "Roma – Piano Urbano della Mobilità Sostenibile *[Rome - Urban Plan for Sustainable Mobility]*, (2019), https://www.pumsroma.it/download/RC.2019.19773.A3.pdf

39 Bergen Kommune, „Handlings- og økonomiplan 2019-2022. Budsjett 2019 *[Action and financial plan 2019-2022. Budget 2019]*," (https://www.bergen.kommune.no/bk/multimedia/archive/00338/H_P_2019-2022_og_Bu_338069a.pdf

» Amsterdam intends that road traffic within the city center be emissions-free by 2025 with the exception of passenger cars and motorbikes. By 2030, all traffic throughout Amsterdam is to be emissions-free, including passenger cars and motorbikes, as stated in the city's Clean Air Action Plan. To achieve these goals, the city lists a package of measures to spur electric vehicle adoption, including information campaigns targeting various consumer groups, purchase subsidies, and privileges for parking permits. The plan also facilitates electric mobility through the further roll-out of the charging infrastructure network and the extension of current LEZs.[40]

» London plans to move toward zero-emissions transport under to the Mayor's Transport Strategy. Creating zero-emission zones (ZEZs) is considered to be an essential policy. Specifically, the strategy seeks to introduce ZEZs in town centers starting in 2020 and in central London starting in 2025.[41]

» Strasbourg in France aims to bar diesel vehicles starting in 2025 without a final date set for gasoline vehicles. The city proposes the introduction of a city-wide LEZ applying to all motorized vehicles and progressively prohibiting access to the zone for diesel and gasoline vehicles starting in 2021.[42]

2027

» Milan plans to prohibit combustion engine vehicles, including passenger cars. All diesel passenger cars will be prohibited in the historic city center starting in October 2027 and from most other parts of the city starting in October 2030. This will be implemented through existing LEZs covering the central area and most of the rest of the city during daytime and weekdays. LEZs will progressively restrict access for diesel and gasoline cars, although there is no final date set for gasoline cars.[43]

2030

» The Brussels Capital Region plans to ban all diesel vehicles starting in 2030 at the latest and gasoline and LPG vehicles by 2035, according to its Climate Energy Plan 2030. This will be implemented through progressively stricter access restrictions to the existing LEZ—covering the Brussels Capital Region and in operation seven days a week, 24 hours a day—and by introducing ZEZs in certain areas of Brussels with reinforced access criteria compared with the LEZ.[44]

Table 2 summarizes the selected cities and metropolitan areas that have announced plans to prohibit combustion-engine passenger cars in certain city areas, including dates and selected implementation policies.

40 Municipality of Amsterdam, Follow the policy: clean air, https://www.amsterdam.nl/bestuur-organisatie/volg-beleid/duurzaamheid-energie/schone-lucht/

41 Mayor of London, Mayor's Transport Strategy, (2018), https://www.london.gov.uk/sites/default/files/mayors-transport-strategy-2018.pdf

42 Conseil Municipal de la Ville de Strasbourg, Délibération au Conseil Municipal du lundi 23 septembre 2019 *[Deliberation at the Municipal Council from Monday 23 September 2019]*, https://storage.creacast.com/strasbourg-vod/documents/20190923_CM_delib.pdf;
City and Eurometropolis of Strasbourg, Low Emission Zone. https://www.strasbourg.eu/zone-faibles-emissions

43 Comune di Milano, Area C: calendario dei prossimi divieti *[Area C: calendar of upcoming bans]*, https://www.comune.milano.it/aree-tematiche/mobilita/area-c/area-c-calendario-prossimi-divieti;
Comuni di Milano, Area B: Area B: veicoli che non possono entrare *[Area B: vehicles that cannot enter]*, https://www.comune.milano.it/aree-tematiche/mobilita/area-b/area-b-veicoli-che-non-possono-entrare;
Comune di Milano, "2019 – 2030: Aria più pulita, spostamenti più facili e veloci per tutti *[2019–2030: Cleaner air, easier and faster transfers for everyone]*," (accessed 29 April, 2019), https://www.comune.milano.it/documents/20126/696294/Area_B+%281535359330748%29.pdf/eda52f27-24ba-23a9-59cc-dadafb19993d?t=1551459125554

44 Région de Bruxelles-Capitale, Plan énergie climat 2030 *[Climate Energy Plan 2030]*, (2019), https://environnement.brussels/sites/default/files/user_files/pnec_rbc_fr.pdf

Table 2. Select local and regional government plans to prohibit combustion-engine vehicles in certain city areas and selected implementation policies as of April 2020.

City/Region	Phase-out year	Policy document and publication date	Target and select implementation policies according to policy document
City of Oslo (Norway)	2024	Climate Budget 2018 (December 2017)	**Target:** The City Government set a goal to achieve a fossil-free city center within Ring 3 by 2024. **Implementation:** Through regulation, i.e. the Introduction of a LEZ.
	2030	Platform for city council cooperation between the Labor Party, the Green Party and the Socialist Left Party in Oslo 2019-2023 (October 2019)	**Target:** By 2030, all cars in Oslo will be emissions-free. The city wants a quick stop to the sale of new fossil-fuel cars in Oslo. **Implementation:** Through disincentives for combustion-engine cars, e.g., higher road tolls and parking fees for new fossil-fuel cars sold starting in 2020.
City of Paris (France)	2024/2030	Climate Plan Paris (March 2018)	**Target:** Getting out of diesel mobility by 2024 and gasoline by 2030. **Implementation:** Through regulation, i.e. gradual access restrictions for gasoline- and diesel-powered vehicles entering the existing metropolitan-wide LEZ.
City of Rome (Italy)	2024/2030	Sustainable Urban Mobility Plan (2019)	**Target:** Emissions-free transport in central city area by 2030, starting from the LEZ Trident area – the historic center: no access for diesel Euro 6 vehicles and prior starting in November 2024 and gasoline Euro 6 vehicles and prior starting in November 2030. **Implementation:** Through regulation, i.e. gradual access restrictions for gasoline- and diesel-powered vehicles entering the existing LEZ covering the city center.
City of Bergen (Norway)	2025	Action and Finance Plan 2019–2022, Budget 2019 (2018)	**Target:** All new passenger cars will be fossil-free starting in 2025. All light goods transport in Bergen to be done with fossil-free vehicles starting in 2025. Bergen Municipality will facilitate fossil-free heavy traffic and construction operations in 2025. **Implementation:** Detailed plans to be defined until 2020.
City of London (United Kingdom)	2025	Mayor's Transport Strategy (March 2018)	**Target:** Phase out fossil-fuel vehicles altogether. The mayor through Transport for London (TfL) and the boroughs and working with the government will seek to implement ZEZs in town centers starting in 2020 and aim to deliver a ZEZ in central London starting in 2025. **Implementation:** Through regulation, i.e. introduction of ZEZs in London's town centers and a central London ZEZ.
City of Strasbourg (France)	2025	Deliberation at the Municipal Council on Monday 23 September 2019 (September 2019)	**Target:** Proposed restriction schedule to prohibit vehicles with Crit'Air 2 sticker (*note: diesel vehicles of all Euro standards*) as of 1 January 2025. **Implementation:** Through regulation, i.e. introduction of an LEZ applying phased-in access restriction to all vehicle types.
City of Milan (Italy)	2027/2030	2019–2030: Cleaner air, easier and faster travel for all (February 2019)	**Target:** Ban combustion engine vehicles including passenger cars: diesel cars Euro 6 D-TEMP and earlier from the historic city center starting in October 2027 and most of the city area starting in 2030. **Implementation:** Through regulation, i.e. the existing LEZs covering the historic city center (Area C) and most of the city of Milan (Area B).
Brussels Capital Region (Belgium)	2030/2035	Climate Energy Plan 2030 (October 2019)	**Target:** Ban diesel vehicles by 2030 at the latest and gasoline and LPG-powered vehicles by 2035. **Implementation:** Through regulation, i.e. stricter, phased-in access restrictions to existing LEZ and introduction of ZEZs in certain areas.

Additional cities have set detailed timelines for restricting combustion-engine vehicles. Through October 2019, 35 cities of the global C40[45] network pledged to ensure that "a major area of our city is zero emissions by 2030" as formulated in the C40 Fossil-Fuel-Free Streets Declaration. Among the 35 cities are 17 in Europe—Amsterdam, Barcelona, Berlin, Birmingham, Copenhagen, Greater Manchester, Heidelberg, Liverpool, London, Madrid, Milan, Oslo, Oxford, Paris, Rome, Rotterdam, and Warsaw. Measures to meet

45 The C40 Cities Climate Leadership Group is a network of 94 cities around the world aiming at cleaning the air and protecting the health of their local citizens.

the 2030 goal include a reduction in the number of polluting vehicles on streets and a transition away from vehicles powered by fossil fuels.[46]

Figure 2 maps the cities listed in Table 2 as well as the C40 cities, all of which are planning to prohibit combustion-engine passenger cars in coming years.

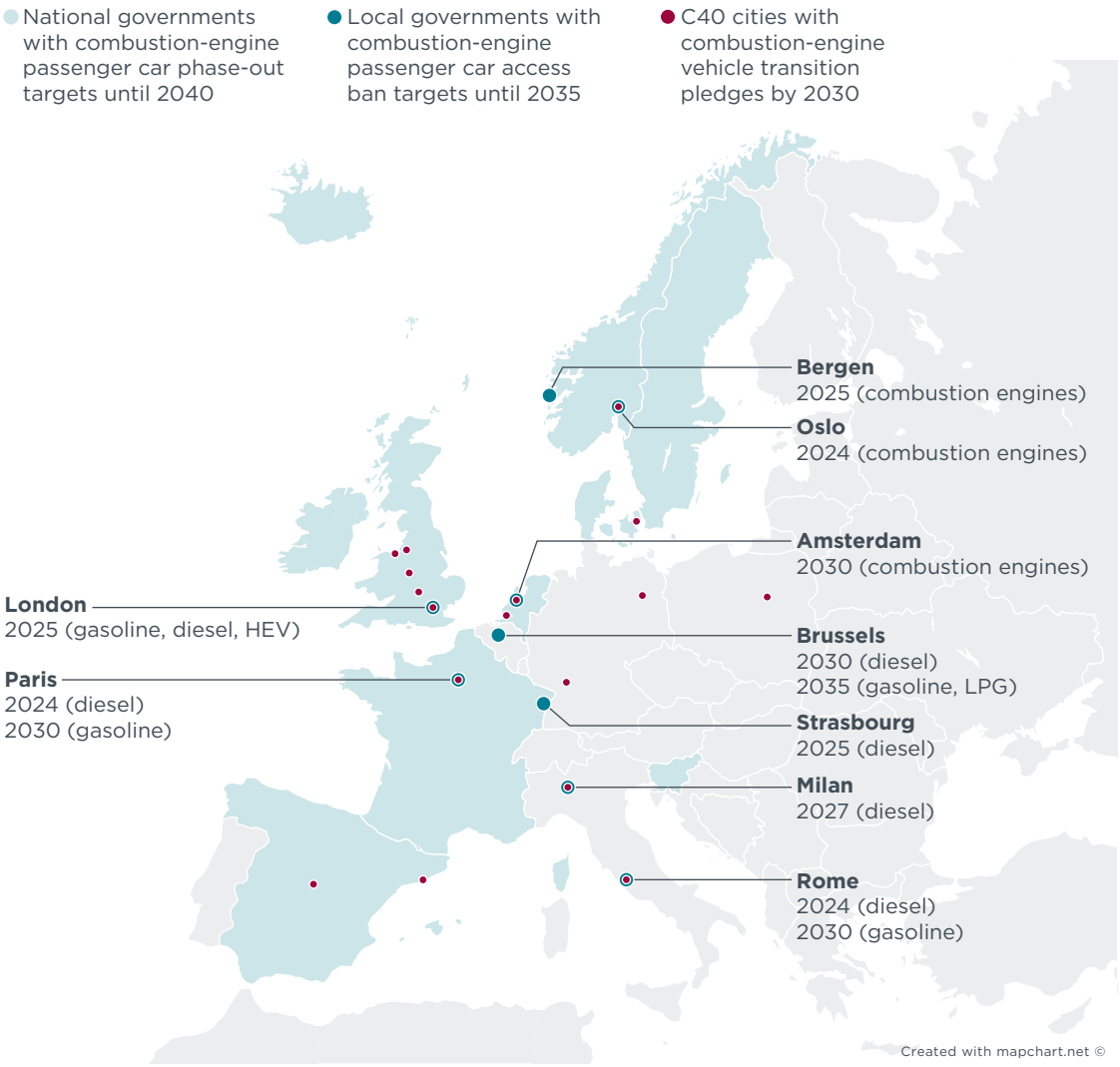

Figure 2. Select local government targets for combustion-engine car bans as of April 2020.

A number of cities have already implemented partial driving bans for combustion-engine vehicles including passenger cars. However, these restrictions are limited, for example applying only to certain fuel types or vehicles of certain Euro emission standards. Some of these cities have not set a final date for full bans of combustion-engine vehicles. In addition, some cities still allow combustion-engine vehicles to enter or be operated in regulated city areas if they pay a fee. For example:

46 C40 Cities Climate Leadership Group, Our Commitment to Grean and Healthy Streets. Fossil Fuel Free Streets Declaration, (accessed 29 April, 2020), https://www.c40.org/other/green-and-healthy-streets

- Madrid introduced a city-center LEZ in November 2018 called Madrid Central. Only BEVs, FCEVs, PHEVs with a minimum electric range of 40 km, and range-extended electric vehicles (REEVs) are allowed to circulate and park without restrictions in the LEZ. All other vehicles face limits on access duration and parking. Gasoline cars up to Euro 2 and diesel cars up to Euro 3 are prohibited.[47]
- Krakow was Poland's first city to introduce a Clean Transport Zone. Starting in January 2019, only electric, hydrogen, LPG, and CNG vehicles were to be allowed in the center. However, entrepreneurs living within the zone appealed, forcing the city council to modify the regulations. Despite formally still existing, the adaptions basically eliminated almost all constraints for combustion-engine vehicles in the zone.[48]
- Stuttgart banned all diesel vehicles up to Euro 4 from driving in the LEZ covering the entire city area starting in January 2019. Beginning in January 2020, diesel cars up to Euro 5 were banned on individual roads.[49]
- London introduced an ultra-low emission zone (ULEZ) in the inner city in April 2019. Drivers of gasoline cars up to Euro 3 and diesel cars up to Euro 5 have to pay a daily charge of £12.50 (about €14) to enter the ULEZ.[50] In addition, a daily congestion charge of £11.50 (about €13) is due for entering the congestion charge zone (CCZ) covering the same area as the ULEZ. Vehicles that meet Euro 6 standards (gasoline and diesel), that emit no more than 75 g CO_2/km and have a minimum 20 mile zero emission capable range are exempt from the charge. Starting in December 2025, all passenger cars independent of engine type will need to pay to enter the CCZ. Most recently, in March 2020, the first 24/7 zero-emissions street was introduced in London. Allowed are only zero-emission vehicles and PHEVs, defined as emitting a maximum of 75 g CO_2/km, having a minimum 20 mile zero-emission range, and meeting a Euro 6 equivalent NO_x emission standard. The pilot program may be made permanent.[51]
- Berlin imposed driving restrictions on selected road sections within the center in November 2019, affecting diesel cars up to Euro 5.[52]
- Stockholm introduced a LEZ in January 2020. The LEZ prohibits gasoline- and diesel-powered passenger cars up to Euro 4. The requirement also applies to vehicles that run on ethanol, biogas, and natural gas. The restrictions will be tightened in mid-2022 to ban diesel-powered passenger cars up to Euro 5.[53]

47 Madrid City Council, Air Quality Plan of the city of Madrid and Climate Change (PLAN A), (2018) https://www.madrid.es/portales/munimadrid/es/Inicio/Medio-ambiente/Publicaciones/Plan-de-Calidad-de-aire-de-la-ciudad-de-Madrid-y-Cambio-Climatico-PLAN-A-/?vgnextfmt=default&vgnextoid=2b809df12834b510VgnVCM1000001d4a900aRCRD&vgnextchannel=f6ff79ed268fe410VgnVCM1000000b205a0aRCRD

48 Municipal Krakow, ABC of clean transport zone in Kazimierz, (19 February, 2019), https://www.krakow.pl/aktualnosci/226585,29,komunikat,abc_strefy_czystego_transportu_na_kazimierzu.html; Municipal Krakow, "What is left of the Clean Transport Zone in Kazimierz," (6 March 2019), https://www.krakow.pl/aktualnosci/227935,26,komunikat,co_zostalo_ze_strefy_czystego_transportu_na_kazimierzu.html

49 Stuttgart, Diesel traffic ban, (accessed 29 April, 2020), https://www.stuttgart.de/diesel-verkehrsverbot; Regierungspräsidium Stuttgart, "Luftreinhalteplan für den Regierungsbezirk Stuttgart, Teilplan Landeshauptstadt Stuttgart *[Clean air plan for the Stuttgart region. Subplan of the state capital Stuttgart]*," (December 2019), https://rp.baden-wuerttemberg.de/rps/Abt5/Ref541/Luftreinhalteplan/541_s_stutt_LRP_5_FS_2019.pdf

50 Transport for London, Cars, (accessed 29 April, 2020) https://tfl.gov.uk/modes/driving/ultra-low-emission-zone/cars?intcmp=52215

51 City of London, "Beech Street – zero emission scheme," (2020) https://www.cityoflondon.gov.uk/services/transport-and-streets/traffic-management/Pages/beech-street-transformation.aspx

52 Berlin, Driving bans: What diesel drivers need to know, (accessed 29 April, 2020), https://www.berlin.de/special/auto-und-motor/nachrichten/4947848-2301467-drohende-fahrverbote-was-dieselfahrer-wi.html

53 Stockholms stad, Environmental zone on Hornsgatan, (accessed April 29, 2020), https://trafik.stockholm/trafiksakerhet-trafikregler/miljozoner/miljozon-hornsgatan/

» Bucharest, the Romanian capital, implemented restrictions for combustion-engine cars entering the city and adopted a timetable for coming years. Since January 2020, cars up to Euro 2 are banned from entering a so-called action zone for air quality (ZACA) covering the city center. Euro 3 and Euro 4 cars are allowed to enter but have to pay a daily charge of RON 5 (about €1)—for drivers of Euro 3 cars starting in January 2020 and for Euro 4 cars starting January 2021. The measures are applied Monday through Friday between 7 a.m. and 10 p.m. There are also plans for restricting cars in the rest of Bucharest: Starting in January 2020, drivers of cars up to Euro 2 have to pay a daily fee of RON 15 (about €3). Starting in 2022, the plan is to ban cars up to Euro 2 across the whole city and up to Euro 3 cars starting in 2024.[54]

Additional European cities have articulated plans to restrict combustion-engine vehicles from certain city areas. Examples include:

» Lisbon announced plans in early 2020 to introduce a new reduced emission zone (ZER) in the historic city center. The aim is to prohibit vehicles up to Euro 2. The zone is intended to come into force in summer 2020, operating between 6.30 a.m. and midnight. The plans were out for public consultation as of April 2020.[55]

» Oxford in the United Kingdom intended to launch an inner-city ZEZ in December 2020, waiving road charges for drivers of zero-emission vehicles while charging £10 (about €11) a day for other vehicles. The launch was postponed amid the coronavirus pandemic.[56]

» Bristol in the United Kingdom said in late 2019 it planned to restrict all privately owned diesel vehicles from the city center. The current plan envisions an inner-city clean air zone (CAZ), most likely applying during daytime seven days a week, starting in March 2021.[57] As in Oxford and other cities in the United Kingdom obliged to introduce a CAZ, the launch has been postponed due to the COVID-19 outbreak.[58]

Meanwhile, past announcements of other cities have not been substantiated or have been hindered by national laws.

» Athens announced its intention in December 2016 to ban diesel vehicles from the city center, but it was determined that the city lacks the power to do so. The national government, which does have that ability, has been reluctant to take action.[59]

» The Balearic Islands of Spain adopted a law in February 2019 that diesel-powered cars and motorcycles would not be allowed starting in 2025 and that only zero-emission vehicles would be permitted starting in 2035.[60] In November 2019, the Balearic Islands regional administration agreed with the Spanish government to put the plans on hold until the National Climate Law of the Spanish government is approved.[61]

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54 Citadina, The Oxygen Vignette Map of Bucharest, (14 January, 2020), http://www.citadina.ro/the-oxygen-vignette-map-of-bucharest/

55 Lisboa, ZER Avenida Baixa Chiado, https://zer.lisboa.pt/

56 Oxford City Council, Oxford's Zero Emission Zone, (20 March, 2020), https://www.oxford.gov.uk/info/20299/air_quality_projects/1305/oxford_zero_emission_zone_zez

57 Bristol City Council, Clean Air for Bristol, (accessed 29 April, 2020) https://www.cleanairforbristol.org/; Thomas Barrett, "Bristol council misses Clean Air Zone deadline for fourth time," *Air Quality News*, (3 March, 2020), https://airqualitynews.com/2020/03/03/bristol-council-misses-clean-air-zone-deadline-for-fourth-time/

58 ClientEarth, "Air pollution and Covid-19: clean air zones postponed across the UK," (24 April, 2020), https://www.clientearth.org/air-pollution-and-covid-19-clean-air-zones-postponed-across-the-uk/

59 RIS, Green Ring, (2019), http://www.ypeka.gr/Default.aspx?tabid=822&locale=el-GR&language=en-US

60 Govern Illes Balears, Law 10/2019, of February 22, on climate change and energy transition, http://www.caib.es/sites/canviclimatic2/es/la_ley_de_ccyte/

61 Govern Illes Balears, "Agreement between the central and regional government in relation to the Law on Climate Change and Energy Transition," (2019), http://www.caib.es/govern/sac/fitxa.do?codi=3996611&coduo=6&lang=es

» Warsaw announced restrictions on older diesel cars to enter the center. As a first step to improve air quality, the city aims to expand the paid parking zone and to make parking more expensive.[62]

Prohibitions on combustion-engine vehicles at local levels also illustrate the commitment of some European cities to zero-emissions transportation, mainly driven by improving local air quality. The goals shown in Table 2 and Figure 2 are partly stated in official local policy documents such as budgets, climate plans, clean air plans, transport strategies or mobility plans, or official deliberations. Measures to facilitate 100% zero-emission transport goals include disincentives for combustion-engine cars, such as higher road tolls and parking fees, as well as electric-vehicle support actions, such as information campaigns, subsidies, privileges for parking permits, and the extension of the charging infrastructure network. The most-often applied measures are some form of urban vehicle access regulations including restrictions or bans on combustion-engine vehicles in general, usually also including passenger cars.

EU legislation allows national and local authorities to restrict access by certain vehicle types to urban areas to comply with EU air quality standards.[63] Some countries have also adopted national legal frameworks to specifically regulate vehicle access. In France, the national Law on Energy Transition for Green Growth[64] allows municipalities to restrict access to certain vehicle types. In addition, a national Decree relating to Restricted Traffic Zones[65] leaves LEZ regulations to local authorities based on the national regulatory framework. In the Netherlands, local LEZs are also based on national frameworks as new, nationwide harmonized LEZ regulations came into force in January 2020.[66] There are also cases of formal judgments that allow cities to restrict certain vehicle types. In Germany, the Federal Administrative Court ruled in February 2018 that German cities can impose driving bans on older diesel vehicles to improve local air quality.[67]

PHASE-OUT TARGETS OF CAR MANUFACTURERS

Combustion-engine vehicle phase-out targets set by national and local governments add more pressure on car manufacturers to adapt their product portfolios. National phase-out goals going into effect 10 to 20 years in the future, local access restrictions possibly starting as soon as one year out, and stricter EU emission standards for cars and vans in place since 2020 are eliciting responses from the auto industry. Volkswagen Group, PSA Group, Renault Group, Hyundai Motor Group, BMW Group, Daimler, Ford, Fiat Chrysler Automobiles Group, Toyota Group, and Volvo Car Group have announced plans to increase the sales share or the number of electric-vehicle models or to steer their strategy away from combustion-engine vehicles over the next 10 years. Table 3 lists selected announcements by car manufacturers in descending order based on 2019 new passenger car registrations in Europe:

62 Marcin Klimkowski, "Old smoky diesels will not enter Warsaw?" *Wprost* (3 March, 2020), https://auto.wprost.pl/aktualnosci/10303528/do-warszawy-nie-wjada-stare-kopcace-diesle.html?utm_source=Wprost.pl&utm_medium=button&utm_campaign=Auto

63 Official Journal of the European Union, Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe, Official Journal of the European Union, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008L0050&from=en

64 République Française, Law Number 2015-992 of August 17, 2015 relating to the energy transition for green growth. https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000031044385

65 République Française, Decree Number 2016-847 dated 28 June 2016 relating to restricted traffic areas. https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000032790919&categorieLien=id

66 Rijksoverheid, Decree on harmonization of environmental zones, (2019), https://www.rijksoverheid.nl/documenten/besluiten/2019/11/11/definitief-besluit-stb-2019-398

67 Bundesverwaltungsgericht, Judgment of 27.02.2018 - BVerwG 7C 26.16. https://www.bverwg.de/270218U7C26.16.0

- Volkswagen said in 2018 that the last launch based on a combustion-engine vehicle platform would begin in 2026.[68] According to announcements from late 2019, the company is planning to focus on electric cars, investing about €33 billion in electric mobility from 2020 to 2024 to produce 1 million electric cars by the end of 2023 and 3 million in 2025,[69] and to launch as many as 75 BEV and 60 PHEV models by 2029. Volkswagen also said 25% of its global sales will be fully electric by 2025 and 50% by 2030.[70]
- Ford expects by the end of 2022 for more than 50% of its passenger vehicle sales in Europe to be electrified including BEVs, PHEVs, mild-hybrid vehicles (MHEVs), and HEVs. By 2024, the company intends to launch 17 electrified vehicle models in Europe.[71]
- PSA Group intends to introduce 14 new electric vehicle models by 2021, including seven fully electric and seven PHEV models. In 2025, PSA projects that PHEVs will represent more than 50% of its sales in the European market. In the same year, the company intends to offer electric versions of all of its models worldwide.[72]
- Renault Group plans to offer eight BEV models and 12 PHEVs and HEVs by 2022. By the same year, the company plans for 20% of its models to be BEVs and 50% electrified and to reduce diesel offerings by 50%.[73]
- BMW Group in December 2019 said it is aiming for a quarter of all vehicles sold in Europe to be electrified by 2021. The company expects sales of electrified vehicles on the European market to account for a third of deliveries in 2025 and 50% in 2030.[74]
- Daimler in its "Ambition 2039" plan of May 2019 projected that more than 40% of its vehicles in the European market could be electric by 2025. In the same year, the company said it expects BEV models to account for 15%–25% of total unit sales. By 2030, the company aims to have BEVs and PHEVs make up more than 50% of global car sales.[75]

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68 Stefan Menzel and Franz Hubik, "Volkswagen announces the end of the combustion engine," *Handelsblatt*, (4 December, 2018), https://www.handelsblatt.com/unternehmen/industrie/auto-von-morgen/handelsblatt-autogipfel-volkswagen-kuendigt-das-ende-des-verbrennungsmotors-an/23715746.html?ticket=ST-4804849-3Lwtuq0JamllCedPzYE5-ap6

69 Volkswagen, "The future lies in e-mobility," (9 September, 2019), https://www.volkswagenag.com/de/news/stories/2019/09/the-future-lies-in-e-mobility.html

70 Volkswagen, "Volkswagen significantly raises electric car production forecast for 2025," (27 December, 2019), https://www.volkswagen-newsroom.com/en/press-releases/volkswagen-significantly-raises-electric-car-production-forecast-for-2025-5696

71 Ford (10 September, 2019). Ford reveals electrified vehicle line-up that will surpass conventional petrol and diesel by 2022. https://media.ford.com/content/fordmedia/feu/en/news/2019/09/10/Frankfurt-2019.html

72 PSA Groupe Electrification in motion (accessed 29 April, 2020), https://www.groupe-psa.com/en/automotive-group/innovation/groupe-psa-lelectrification-en-marche/
Olivia Konotey-Ahulu, "Car industry's future under threat from electric vehicles, says PSA," *Bloomberg*, (29 October, 2019), https://www.bloomberg.com/news/articles/2019-10-29/car-industry-s-future-under-threat-from-electric-vehicles-psa

73 Renault Nissan Mitsubishi, Mobility of the Future, (Accessed 29 April, 2020), https://www.alliance-2022.com/electrification/;
Groupe Renault, "Mid-term plan 2017-2022," (6 October, 2017), https://group.renault.com/wp-content/uploads/2017/10/renault_mtp_2017_vdef_partie_2-1.pdf

74 BMW Group, "Delivered as promised: Already half a million BMW Group electrified vehicles on the road," (19 December, 2019), https://www.press.bmwgroup.com/deutschland/article/detail/T0303942DE/_geliefert-wie-versprochen_-bereits-eine-halbe-million-elektrifizierte-fahrzeuge-der-bmw-group-auf-der-strasse

75 Daimler, "Capital Market Day," (14 November, 2019), https://www.daimler.com/dokumente/investoren/kapitalmarkttage/daimler-ir-cmddkaelleniusdaumwilhelm-20191114.pdf
Daimler, "Mercedes-Benz achieves increased unit sales for ninth consecutive year and remains number one among luxury car brands," (9 January, 2020), https://media.daimler.com/marsMediaSite/en/instance/ko.xhtml?oid=45351625

- Fiat Chrysler Automobiles Group announced plans in 2018 to spend €9 billion on the electrification of its vehicle portfolio. The group intends to launch new PHEV and HEV models across all its brands and new BEVs by 2022. However, they are mostly destined for the Chinese market.[76] In late 2019, Fiat said it plans to introduce a BEV version of its Fiat 500 in mid-2020, investing around €700 million.[77]
- Toyota Group announced plans by 2025 to have 10% of its new vehicles sold in Europe as BEVs/FCEVs, 10% PHEVs, and 70% HEVs. Until then, the group intends to launch 40 new or updated electrified models, including at least one PHEV a year.[78]
- Hyundai Motor Group announced late in 2019 in its "Strategy 2025" setting a goal of selling 670,000 electric vehicles annually by 2025, including 560,000 BEVs and 110,000 FCEVs. The group said it intends to increase the number of BEV models from nine in 2019 to 23 by 2025. Hyundai also aims to electrify most models in key markets, including Europe, by 2030, including BEVs, FCEVs, PHEVs, and HEVs.[79]
- Volvo in October 2019 said it plans to release one new BEV every year through 2025.[80] By the same year, the company intends to generate 50% of global sales from fully electric cars.[81]

Table 3 gives an overview of selected car manufacturers and their announced phased-in dates to electrify model portfolios in the 2020–2030 timeframe.

76 Fred Lambert, "FCA announces a bunch of new all-electric vehicles: 4 Jeep SUVs, 4 Maserati models, and 2 Fiat cars," *Electrek*, (1 June, 2018), https://electrek.co/2018/06/01/fca-new-all-electric-vehicles-jeep-maserati-models/

77 Peter Maahn, "With this car Fiat starts its electric chase," *Handelsblatt*, (21 October, 2019), https://www.handelsblatt.com/auto/nachrichten/jeep-renegade-mit-diesem-auto-startet-fiat-seine-elektro-aufholjagd/25131106.html?ticket=ST-5512662-XmgKmZyjo55YmkO3i1M9-ap6
Sebastian Schaal, "Fiat invests in production of new electric 500," *Electrive.net*, (7 November, 2019), https://www.electrive.net/2019/07/11/fiat-chrysler-investiert-700-millionen-euro-in-produktion-des-neuen-elektro-500/

78 Mark Kane," Electrified Cars To Account For 90% Of Toyota Sales In Europe In 2025," *Insideevs*, (25 January, 2020), https://insideevs.com/news/394909/electrified-toyota-sales-europe-2025/

79 Mark Kane, "Hyundai Strategy 2025: 670,000 BEVs/FCEVs Annually By 2025," *Insideevs*, (5 December, 2019), https://insideevs.com/news/386308/hyundai-strategy-2025/
Mark Kane, "Hyundai Motor Group To Launch 23 Pure Electric Cars By 2025," *Insideevs*, (2 January, 2020), https://insideevs.com/news/390713/hyundai-electrification-plan-2025/

80 Steven Ewing, "Volvo will launch a new electric vehicle every year through 2025," *CNET*, (16 October, 2019), https://www.cnet.com/roadshow/news/new-volvo-electric-vehicles-2025/

81 Jack R. Nerad, "Volvo set to challenge Tesla for electric car supremacy," *Forbes*, (22 January, 2020), https://www.forbes.com/sites/jacknerad2/2020/01/22/volvo-set-to-challenge-tesla-for-electric-car-supremacy/#6908a6694011

Table 3. Announcements by leading European car manufacturers to electrify model portfolios.

Car manufacturer	Year	Announcement
Volkswagen Group (Volkswagen, Skoda, Audi, Seat, Porsche, others)	2020-2024	• €33 billion investment in electric mobility from 2020 to 2024
	2023	• 1 million electric cars to be produced by the end of 2023
	2025	• 3 million electric cars to be produced in 2025
	2026	• Last launch based on a combustion-engine vehicle platform
	2029	• Up to 75 BEV and 60 PHEV models to be launched
Ford	2022	• More than 50% of passenger vehicle sales in Europe to be electrified (BEVs, PHEVs, MHEVs, HEVs)
	2024	• 17 electrified vehicles to be launched in Europe including BEVs, PHEVs, MHEVs, HEVs
PSA Group (Peugeot, Opel/ Vauxhall, Citroën, DS Automobiles)	2021	• 14 new electric vehicle models by 2021 (7 fully electric models, 7 PHEVs)
	2025	• More than 50% of group sales in the European market to be electric vehicles
	2025	• 100% of models marketed by the group worldwide in an electric version
Renault Group (Renault, Dacia, Lada, Alpine)	2022	• Range of 8 BEVs and 12 electrified models (PHEVs, HEVs)
	2022	• 20% of group sales to be fully electric and 50% electrified
BMW Group (BMW, Mini)	2021	• 25% of all vehicles sold in Europe to be electrified
	2025	• One-third of sales in the European market to be electrified
	2030	• 50% of sales in the European market to be electrified
Daimler **(Mercedes,** Smart)	2025	• More than 40% of Mercedes-Benz vehicles delivered to customers in an electric version in the European market
	2025	• 15% to 25% of total unit sales to be fully electric
	2030	• More than 50% of Mercedes-Benz global car sales to be electric (BEVs, PHEVs)
Fiat Chrysler Automobile (FCA) Group (Fiat, Jeep, Lancia/ Chrysler, Alfa Romeo, others)	2022	• €700 million for construction of production line for Fiat 500 BEV
	2022	• €9 billion group investment in electrification of vehicle portfolio until 2022
	2022	• Launch of new BEVs, PHEVs, and HEVs across all group brands
Toyota Group (Toyota, Lexus)	2025	• 10% of new vehicles sold in Europe to be BEVs/FCEVs, 10% PHEVs, 70% HEVs)
	2025	• 40 new or updated electrified models, including at least one PHEV a year
Hyundai Motor Group (Hyundai, Kia, Genesis)	2025	• Sale of 670,000 electric vehicles annually by 2025 (560,000 BEVs and 110,000 FCEVs)
	2025	• 23 BEV models
	2030	• Most models in key markets including Europe to be electrified (BEVs, FCEVs, PHEVs, HEVs)
Volvo	2020	• 1 BEV model to be launched every year through 2025
	2025	• 50% of global sales to be fully electric cars

Note: Highlights in bold indicate that announcements refer to either the entire brand or to specific brands only. Despite the PSA and FCA groups announcing at the end of 2019 plans to merge, they are listed separately as a joint strategy has not yet been announced.

A growing number of car manufactures have made announcements to electrify their vehicle product portfolio until the end of 2030. This includes the launch of new models, an increase in electric sales shares, or large investments in the respective electrification strategies. Yet, it should be noted that these strategies mostly also include MEV and HEV models which combine a conventional internal combustion engine with an electric propulsion, rather than focusing on BEVs/FCEVs and PHEVs only.

CONCLUDING THOUGHTS

Almost half a dozen countries in Europe have set combustion-engine passenger car phase-out targets and dates in national strategies, plans, and programs, or have drafted or adopted such laws to mitigate climate change. In addition to national commitments, almost 30 cities have made plans or have pledged to prohibit combustion-engine cars altogether in urban centers or entire metropolises with the main aim of improving local air quality, partly focusing on full bans for diesel vehicles at an earlier stage than gasoline-powered cars.

The growing number of announcements by local and national governments to phase out combustion-engine vehicles over the next 20 years are an important signal to car manufacturers to align their vehicle production around electric power. Helping to facilitate and accelerate these plans are national tax policies such as incentives for the purchase of zero-emission vehicles and significantly higher taxes for high-emitting vehicles, and local actions such as cities imposing urban vehicle access regulations.

Such announcements are also important signals to the European Union to put in place a comprehensive phase-out strategy at the EU level via the coming revision of the EU car CO_2 standards. Additional measures beyond CO_2 regulations at the European level, such as allowing member states to mandate national phase-outs and enforce penalties for noncompliance, can be an additional push for car manufacturers to align their strategies, but the legal basis for such bans has yet to be reviewed at the European level.

Experiences from local, state, and national governments such as London, British Columbia, France, and Spain show that it takes a couple of years to go through official administrative processes to adopt relevant regulations and implement necessary measures. The growing number of phase-out announcements illustrates the commitment of local and national governments in Europe to reach 100% zero-emission goals in transport.