Phase-out of fossil fuel vehicles

Phase-out of fossil fuel vehicles means stopping selling and using vehicles which are powered by fossil fuels, such as gasoline, diesel, kerosene and fuel oil: it is one of the three most important parts of the general fossil fuel phase-out process, the others being the phase-out of fossil fuel power plants for electricity generation and decarbonization of industry.[1]

Many countries and cities around the world have stated they will ban the sale of passenger vehicles (primarily cars and buses) powered by fossil fuels such as petrol, liquefied petroleum gas and diesel at some time in the future.[2][3] Synonyms for the bans include phrases like "banning gas cars",[4] "banning petrol cars",[5] "the petrol and diesel car ban",[6] or simply "the diesel ban".[7] Another method of phase-out is the use of zero-emission zones in cities.

A few places have set dates for banning other types of vehicles, such as fossil fuelled ships and lorries.

Contents

Background

Reasons for banning further sale of fossil fuel vehicles include: reducing health risks from pollution particulates, notably diesel PM10s and other emissions, notably nitrogen oxides;[8] meeting national greenhouse gas, such as CO_2, targets under international agreements such as the Kyoto Protocol and

the Paris Agreement; or energy independence. The intent to ban vehicles powered by fossil fuels is attractive to governments as it offers a simpler compliance target,[9] compared with a carbon tax or phase-out of fossil fuels.[10]

The automotive industry is working to introduce electric vehicles to adapt to bans[3] with varying success and it is seen by some in the industry as a possible source of money in a declining market. A 2020 study from Eindhoven University of Technology showed that the manufacturing emissions of batteries of new electric cars are much smaller than what was assumed in the 2017 IVL study[note 1] (around 75 kg CO_2/kWh) and that the lifespan of lithium batteries is also much longer than previously thought (at least 12 years with a mileage of 15,000 km annually): they are cleaner than internal combustion cars powered by diesel or petrol.[13]

A BMW i3 being charged in Amsterdam. Electric cars have a world market share of around 5% in 2021.[11][12]

There is some opposition to simply moving from fossil-fuel powered cars to electric cars, as they would still require a large proportion of urban land.[14] On the other hand, there are many types of (electric) vehicles that take up little space, such as (cargo) bicycles and electric motorcycles and scooters.[15] Making cycling and walking over short distances, especially in urban areas, more attractive and feasible with measures such as removing roads and parking spaces and improving cycling infrastructure and footpaths (including pavements), provides a partial alternative to replacing all fossil-fuelled vehicles by electric vehicles.[15][16] Although there are as yet very few completely carfree cities (such as Venice), several are banning all cars in parts of the city, such as city centers.[17][18]

Methods

The banning of fossil-fuelled vehicles of a defined scope requires authorities to enact legislation that restricts them in a certain way. Proposed methods include:

- A prohibition on further sales or registration of new vehicles powered with specific fuels from a certain date in a certain area.[19] At the date of implementation existing vehicles would remain legal to drive on public highways.[20]
- A prohibition on the importation of new vehicles powered with specific fuels from a certain date into a certain area. This is planned in countries such as Denmark, Israel and Switzerland;[21][22][23] However, some countries, such as Israel, have no legislation on the subject.[24]
- A prohibition on any use of certain vehicles powered with specific fuels from a certain date within a certain area. Restrictions such as these are already in place in many European cities, usually in the context of their low-emission zones (LEZs).[25]

Fuel cell (electric) vehicles (FCVs or FCEVs) also allow running on (some) non-fossil fuels (i.e., hydrogen, ethanol,[26] methanol,[27] ...).

Cities generally use the introduction of low-emission zones (LEZs) or zero-emission zones (ZEZs), sometimes with an accompanying air quality certificate sticker such as Crit'air (France), in order to restrict the use of fossil-fuelled cars in some or all of its territory.[19] These zones are growing in number, size and strictness.[19][28] Some city bans in countries such as Italy, Germany and Switzerland are only temporarily activated during particular times of the day, during winter, or when there is a

smog alert (for example, in Italy in January 2020); these do not directly contribute to the phase-out of fossil fuel vehicles, but they make owning and using such vehicles less attractive as their utility is restricted.[29][30][31]

Some countries have given consumers various incentives such as subsidies or tax breaks in order to stimulate the purchase of electric vehicles, while fossil-fuelled vehicles are taxed increasingly heavily.[19]

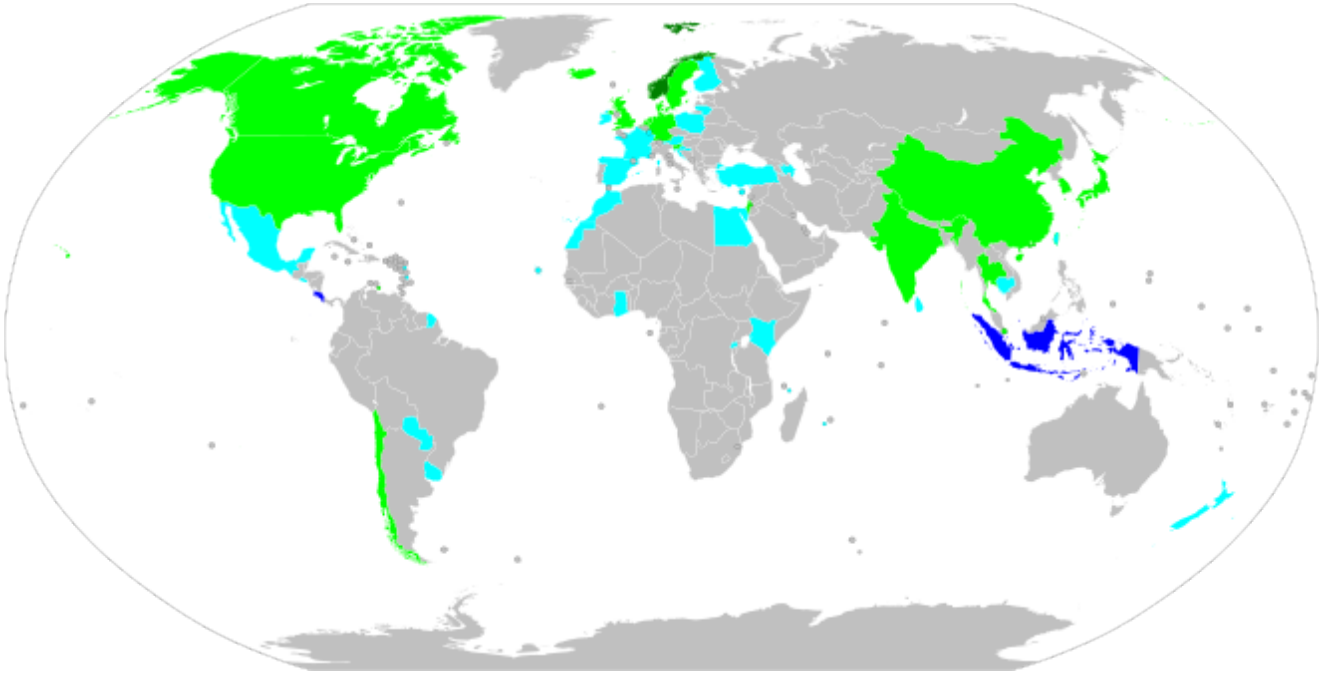
Places with planned fossil-fuel vehicle restrictions

Countries

Countries with proposed bans or implementing 100% sales of zero-emissions vehicles include China, Japan, the UK, South Korea, Iceland, Denmark, Sweden, Norway, Slovenia, Germany, France, Belgium, the Netherlands, Portugal, Canada, the 12 U.S. states that adhered to California's Zero-Emission Vehicle (ZEV) Program, Sri Lanka, Cabo Verde, and Costa Rica.[2]

In 2018, Denmark proposed an EU-wide prohibition on petrol and diesel cars, but that turned out to be contrary to EU regulations. In October 2019, Denmark made a proposal for phasing out fossil fuel vehicles on the member state level by 2030 and was supported by 10 other EU member states.[21]

In July 2021, the European Commission proposed a 100% reduction of emissions for new sales of cars and vans as of 2035.[32][33]



Map of proposed bans.

Country	Start year	Status	Scope	Details
Austria	2040	Signatory of the Glasgow Declaration[34]	Emitting	New vehicle sales by 2040 at latest
Azerbaijan	2040	Signatory of the Glasgow Declaration[34]	Emitting	New vehicle sales by 2040 at latest
Belgium	2026[35] 2029[36]	Climate plan	2026: No further tax deductibility of Diesel, petrol employee company cars 2029: (Flanders region) Diesel, petrol	2026: Only for new cars which are provided as compensation to employees 2029: (Flanders region) New car and van sales
Cambodia	2040	Signatory of the Glasgow Declaration[34]	Emitting	New vehicle sales by 2040 at latest
Canada	2035[note 2]	climate plan[37][38]	Emitting	New light-duty vehicle sales
Cape Verde	2040	Signatory of the Glasgow Declaration[34]	Emitting	New vehicle sales by 2040 at latest
Chile	2035	Chilean government Green New Deal.[39]	Diesel, petrol	New vehicle sales
China	2035	Government climate plan.[40]	Diesel, petrol	New car sales.
Costa Rica	2050[41][42]	Proposed by Costa Rica President Carlos Alvarado as a "roadway" in 2019.	Diesel, petrol	New light vehicle sales
Croatia	2040	Signatory of the Glasgow Declaration[34]	Emitting	New vehicle sales by 2040 at latest
Cyprus	2040	Signatory of the Glasgow Declaration[34]	Emitting	New vehicle sales by 2040 at latest
Denmark	2030–2035[43]		Diesel, petrol	New vehicle sales (2030), hybrid vehicles will continue to be allowed until 2035.[43]
Dominican Republic	2040	Signatory of the Glasgow Declaration[34]	Emitting	New vehicle sales by 2040 at latest

Country	Start year	Status	Scope	Details
Egypt	2040	Government plan	Petrol, diesel, non-electric	New car sales
El Salvador	2040	Signatory of the Glasgow Declaration[34]	Emitting	New vehicle sales by 2040 at latest
Finland	2040	Signatory of the Glasgow Declaration[34]	Emitting	New vehicle sales by 2040 at latest
Germany	2030	Bundesrat decision[44]	Emitting	New car sales[44]
Ghana	2040	Signatory of the Glasgow Declaration[34]	Emitting	New vehicle sales by 2040 at latest
Hong Kong	2030–2035	Hong Kong Legislature plan, Special Administrative Region of the People's Republic Of China.	Diesel, petrol	New ICE-only powered car and motorcycle sales (2030), new hybrid car sales (2035).
Iceland	2030	climate plan[45]	Cars than run exclusively on Diesel, petrol	New car sales, but with exceptions for regional considerations (areas where it would be difficult to ban petrol or Diesel cars)[45]
India	2030	Government pledge	Petrol, diesel, non-electric	New car sales
Indonesia	2050[46]	Proposed by the Government as a "roadway" in 2021	Diesel, petrol	All motorcycle sales (2040), all car sales (2050)
Ireland	2040	Signatory of the Glasgow Declaration[34]	Emitting	New vehicle sales by 2040 at latest
Israel	2030		Emitting, non-electric	New car sales, newly imported vehicles
Japan	2035	Japanese government plan	cease sales of new Diesel-, petrol-only cars	Diesel and petrol hybrid cars to continue to be sold indefinitely[47]
Kenya	2040	Signatory of the Glasgow Declaration[34]	Emitting	New vehicle sales by 2040 at latest
Lithuania	2040	Signatory of the Glasgow Declaration[34]	Emitting	New vehicle sales by 2040 at latest
Luxembourg	2040	Signatory of the Glasgow Declaration[34]	Emitting	New vehicle sales by 2040 at latest

Country	Start year	Status	Scope	Details
Macau	2030–2035	Macau Legislature plan, Special Administrative Region of the People's Republic Of China.	Diesel, petrol	New ICE-only powered car and motorcycle sales (2030), new hybrid car sales (2035).
Mexico	2040	Signatory of the Glasgow Declaration[34]	Emitting	New vehicle sales by 2040 at latest
Morocco	2040	Signatory of the Glasgow Declaration[34]	Emitting	New vehicle sales by 2040 at latest
Netherlands	2030[48]	coalition agreement[49]	Diesel, petrol	New passenger car sales. Commercial vehicles to continue to use petrol and diesel until 2040.
New Zealand	2040	Signatory of the Glasgow Declaration[34]	Emitting	New vehicle sales by 2040 at latest
Norway	2025	tax and usage incentives[50]	Diesel, petrol	All new passenger cars. Commercial vehicles to continue to use petrol and diesel until 2035.
Paraguay	2040	Signatory of the Glasgow Declaration[34]	Emitting	New vehicle sales by 2040 at latest
Poland	2040	Signatory of the Glasgow Declaration[34]	Emitting	New vehicle sales by 2040 at latest
Rwanda	2040	Signatory of the Glasgow Declaration[34]	Emitting	New vehicle sales by 2040 at latest
Singapore	2030[51]	February 2021 Climate plan, brought forward ten years earlier since 2020 announcement.	Diesel, petrol, non-electric	New car sales
Slovenia	2031	emission limit of 50 g/km[52][53]	Allow Diesel and petrol if emissions < 50 gr/km	New car registration
South Korea	2030–2035	Government climate plan	Petrol, diesel	New vehicle sales (2030), hybrid vehicles will continue to be allowed until 2035.
Spain	2040[3]		ICE	New passenger car sales only. Commercial vehicles[54] and motorcycles[55] to continue to use petrol or diesel.

Country	Start year	Status	Scope	Details
Sweden	2030	coalition agreement[56]	Diesel, petrol	New car sales
Taiwan	2040[57]		Diesel, petrol	All bus and government-owned car use (2030), all motorcycle sales (2035), all car sales (2040)[57]
Thailand	2035[58]		Diesel, petrol	New car sales
Turkey	2040	Signatory of the Glasgow Declaration[34] and declaration on lorries and buses[59]	Emitting	New vehicle sales by 2040 at latest
United Kingdom	2030–2035,[60][61] 2040[62]		Diesel, petrol	New non-electric car sales from 2030, new hybrid car sales from 2035, new CO2 emitting lorry and bus sales from 2040
United States	2035	US President Joe Biden's Build Back Better Plan and American Jobs Plan legislation.	Bans new car sales of diesel-only and gasoline-only vehicles	New sales of buses and government-owned vehicles (2030), new sales of privately owned vehicles (2035). Diesel and gasoline plug-in hybrid vehicles will currently to continue to be sold indefinitely as the US government and United States Environmental Protection Agency classify them as plug-in electric vehicles.
Uruguay	2040	Signatory of the Glasgow Declaration[34]	Emitting	New vehicle sales by 2040 at latest

Some politicians in some countries have made broad announcements[63][22] but have implemented no legislation[64] and therefore there is no phase-out and no binding legislation.[65] Ireland, for example, had made announcements but ultimately did not ban diesel nor petrol vehicles.[66][67]

The International Energy Agency predicted in 2021 that 70% of India's new car sales will be fossil powered in 2030,[68] despite earlier government announcements which were discarded in 2018.[69]

As of late 2021, France opposed a ban on combustion-powered cars and in particular of hybrid vehicles.[70]

Cities and territories

Some cities or territories have planned or taken measures to partially or entirely phase out fossil fuel vehicles earlier than their national governments. In some cases, this is achieved through local or regional government initiatives, in other cases through legal challenges brought on by citizens or civil

organisations enforcing partial phase-outs based on the right to clean air.[71]

European emission standards						
(older)	1992	1996	2000	2005	2009	2014
Euro 0	Euro 1	Euro 2	Euro 3	Euro 4	Euro 5	Euro 6

Some cities listed have signed the Fossil Fuel Free Streets Declaration, committing to ban emitting vehicles by 2030,[72] but this does not necessarily have force of law in those jurisdictions. The bans typically apply to a select number of streets in the urban centre of the city where most people live, not to its entire territory. Some cities take a gradual approach to prohibit the most polluting categories of vehicles first, then the next-most polluting, all the way up to a complete ban on all fossil-fuel vehicles; some cities have not yet set a deadline for a complete ban, and/or are waiting for the national government to set such a date.[73][74][75]

In California, emissions requirements for automakers to be permitted to sell any vehicles in the state was expected to force 15% of new vehicles offered for sale between 2018 and 2025 to be zero emission. Much cleaner emissions and increased efficiency in petrol engines mean this will be met with just 8% ZEV vehicles.[76] The "Ditching Dirt Diesel" law SB 44 sponsored by Nancy Skinner and adopted on 20 September 2019 requires the California Air Resources Board (CARB) to 'create a comprehensive strategy for deploying medium- and heavy-duty vehicles' to make California meet federal ambient air quality standards, and 'establish goals and spur technology advancements for reducing GHG emissions from the medium- and heavy-duty vehicle sectors by 2030 and 2050'. It stops short of directly requiring a phase-out of all diesel vehicles by 2050 (as the original bill did), but it would be the most obvious means of achieving the reduction goals.[77][78]

In the European Union, Council Directive 96/62/EC on ambient air quality assessment and management and Directive 2008/50/EC on ambient air quality form the legal basis for EU citizens' right to clean air.[79] On 25 July 2008 in the case Dieter Janecek v Freistaat Bayern CURIA, the European Court of Justice ruled that under Directive 96/62/EC[80] citizens have the right to require national authorities to implement a short-term action plan that aims to maintain or achieve compliance to air quality limit values.[81] The ruling of the German Federal Administrative Court in Leipzig of 5 September 2013 significantly strengthened the right of environmental associations and consumer protection organisations to sue local authorities to enforce compliance with air quality limits throughout an entire city.[79] The Administrative Court of Wiesbaden declared on 30 June 2015 that financial or economic aspects were not a valid excuse to refrain from taking measures to ensure that the limit values were observed, the Administrative Court of Düsseldorf ruled on 13 September 2016 that driving bans on certain diesel vehicles were legally possible in order to comply with the limit values as quickly as possible, and on 26 July 2017 the Administrative Court of Stuttgart ordered the state of Baden-Württemberg to consider a year-round ban on diesel-powered vehicles.[79] By mid-February 2018, citizens in the EU member states the Czech Republic, France, Germany, Hungary, Italy, Romania, Slovakia, Spain and the United Kingdom were suing their governments for violating the limit of 40 micrograms per cubic meter of breathable air as stipulated in the Ambient Air Quality Directive.[71]

A landmark ruling by the German Federal Administrative Court in Leipzig on 27 February 2018 declared that the cities of Stuttgart and Düsseldorf were allowed to legally prohibited older, more polluting diesel vehicles from driving in zones worst affected by pollution, rejecting appeals made by German states against the bans imposed by the two cities' local courts. The case was strongly influenced by the ongoing Volkswagen emissions scandal (also known as Dieselgate), which in 2015 revealed that many Volkswagen diesel engines were deceptively tested and marketed as much cleaner than they were. The decision was predicted to set a precedent for other places in the country and in Europe.[7] Indeed, the ruling triggered a wave of dozens of local diesel restrictions, brought about by

Environmental Action Germany (DUH) suing city authorities and winning legal challenges across Germany.[82] While some groups and parties such as the AfD again tried to overturn them, others such as the Greens advocated for a national phaseout of diesel cars by 2030.[83][84] On 13 December 2018, the European Court of Justice overturned a 2016 European Commission relaxation of car NOx emission limits to 168 mg/km, which the Court declared illegal. This allowed the cities of Brussels, Madrid and Paris, who had filed the complaint, to proceed with their plans to also reject Euro 6 diesel vehicles from their urban centres, based on the original 80 mg/km limit set by EU law.[85][86][note 3]

City or territory	Country	Ban announced	Ban commences	Scope	Details
Aachen	Germany	2018	2019[84]	Diesel	Older diesel vehicles (2019), unless pollution reduces.[84]
Amsterdam	Netherlands	2019	2030[89]	Diesel, petrol	Euro I–III diesel cars (2020), non-electric buses (2022), pleasure crafts and (light) mopeds (2025), all vehicles (2030).[90]
Antwerp	Belgium	2016	2017–2025[91]	Diesel, lpg, petrol	Euro I–II diesels and 0 petrol/lpg (2017), Euro III diesels and 1 petrol/lpg (2020), Euro IV diesels and 2 petrol/lpg (2025).[91]
Arnhem	Netherlands	201?, 2018	2014–2019[92]	Diesel	Euro I–III diesel trucks (2014), all Euro I–III diesel vehicles (2019)*.[92][note 4]
Athens	Greece	2016	2025[93]	Diesel	All vehicles
Auckland	New Zealand	2017	2030[3]	Diesel, petrol	All vehicles, electric buses by 2025
Balearic Islands	Spain	2018	2025−2035[94]	Diesel, petrol	All vehicles
Barcelona	Spain	2017	2030[3]	Diesel, petrol	All vehicles, electric buses by 2025
Berlin	Germany	2018	2019[84]	Diesel	Euro I–V diesel vehicles (2019).[84]
Bonn	Germany	2018	2019[84]	Diesel	Older diesel vehicles (2019).[84]
Bristol	United Kingdom	2019	2021[95]	Diesel	All private vehicles (city center from 7 am to 3 pm)
British Columbia	Canada	2018	2025[96]	Diesel, petrol	All vehicles by 2040, 10% ZEVs by 2025
Brussels Region	Belgium	2018	2030–2035[97][98]	Diesel, petrol	Euro 0–I diesels (2018),[99] Euro II diesels and 0–1 petrols (2019), Euro III diesels (2020),[98] Euro IV diesels (2022), Euro V diesels and Euro 2 petrol (2025), all diesels (2030), all petrol vehicles (2035)[100]
California	United States	2020	2035	Net-emitting vehicles	All passenger vehicles and light-duty trucks.[101][102]
Cape Town	South Africa	2017	2030[3]	Diesel, petrol	All vehicles, electric buses by 2025
Cologne	Germany	2018	2019[84]	Diesel	Older diesel vehicles (2019).[84]
Copenhagen	Denmark	2017	2030[3]	Diesel, petrol	All vehicles, electric buses by 2025
Darmstadt	Germany	2018	2019[103]	Diesel	Euro I–V diesel vehicles on two streets (2019).[103]
Düsseldorf	Germany	20??	2014[104]	Diesel, petrol	Euro I–III diesel vehicles and Euro 0 petrol vehicles (2014).[104]

City or territory	Country	Ban announced	Ban commences	Scope	Details
Eindhoven	Netherlands	2020	2030[105]	Diesel, petrol	Euro I–III diesel trucks (2007), Euro I–III diesel buses (2021), Euro IV diesel trucks (2022), all Euro IV diesel vehicles (2025), all vehicles (2030).[105]
Essen	Germany	2018[84]	20??	Diesel	Older diesel vehicles.[84]
Frankfurt	Germany	2018	2019[84]	Diesel	Euro I–V diesel vehicles and Euro 1–2 petrol vehicles (2019).[84][106]
Gelsenkirchen	Germany	2018[84]	20??	Diesel	Older diesel vehicles.[84]
Ghent	Belgium	2016[107]	2020–2028[108]	Diesel, lpg, petrol	Euro I–III diesel and 1 petrol/lpg (2020)*, Euro IV–V diesel and 2–3 petrol/lpg (2025–28)*.[108][note 5]
Hainan	China	2018	2030[109]	Diesel, petrol	All vehicles
Hamburg	Germany	2018[110]	2018[110]	Diesel	Euro I–V diesel vehicles in one street, older diesel trucks in another street (2020).[110]
Heidelberg	Germany	2017	2030[3]	Diesel, petrol	All vehicles, electric buses by 2025
Lausanne	Switzerland	2021	2030[111]	Thermic vehicles	Zero mobility-related direct emissions
Lombardy	Italy	2018	2019–2020[112]	Diesel, petrol	Euro I–III diesel and Euro 1 petrol (1 April 2019), Euro IV diesel (1 October 2020).[112]
London	United Kingdom	2017	2020–2030[3][113]	Diesel, petrol	All vehicles, electric buses by 2025 (two zero emissions zones by 2022)[113]
Los Angeles	United States	2017	2030[3]	Diesel, petrol	All vehicles, electric buses by 2025
Madrid	Spain	2016	2025[93]	Diesel	Euro I–III diesel and Euro 1–2 petrol vehicles (2018),[90] all vehicles (2025).[93]
Massachusetts	United States	2020	2035[114]	Diesel, petrol	Will set equivalent regulations to match California's Advanced Clean Cars Program
Mainz	Germany	2018	2019[84]	Diesel, petrol	Euro I–III diesel vehicles and Euro 0 petrol vehicles (2019).[84][115]
Mexico City	Mexico	2016	2025[93]	Diesel	All vehicles
Milan	Italy	2017	2030[3]	Diesel	All diesel vehicles, electric buses by 2025
Moscow	Russia	20??, 2019[116]	2013–20?[116]	Non-electric	Euro I–IV bus purchases (2013), all non-electric bus purchases (2021), Euro I–III vehicles (20??), all non-electric vehicles (20??).[116]
Munich	Germany	20??	2012[117]	Diesel, petrol	Euro I–III diesel vehicles and Euro 0 petrol vehicles (2012).[117]

City or territory	Country	Ban announced	Ban commences	Scope	Details
New York State	United States	2021	2035[118]	Non-ZEV	New passenger cars and trucks and off-road vehicles and equipment
New York City	United States	2020	2040[119]	Non-electric vehicles	All vehicles owned or operated by New York City
Nijmegen	Netherlands	2018	2021[75]	Diesel	Euro I–III diesel cars (2021).[75]
Oslo	Norway	2019	2030[19]	Emitting	City centre fossil-free (2024), entire city fossil-free (2030).[19]
Oxford	United Kingdom	2017	2020−2035[3]	Diesel, petrol	All vehicles (initially during daytime hours on six streets)[120][121]
Paris	France	2016	2025[93]	Diesel	All vehicles
Quebec	Canada	2020	2035	Diesel, petrol	Ban of new gas-powered vehicle sales by 2035.[122]
Quito	Ecuador	2017	2030[3]	Diesel, petrol	All vehicles, electric buses by 2025
Rome	Italy	2018	2024[123]	Diesel	All vehicles, only from historical center
Rotterdam	Netherlands	2015[124]	2016[124]	Diesel	Euro I–III diesel trucks (2016). Other bans were dropped in 2019.[124]
Seattle	United States	2017	2030[3]	Diesel, petrol	All vehicles, electric buses by 2025
Stockholm	Sweden	2017	2020-2022	Diesel, petrol	Euro I–IV vehicles (2020), Euro V vehicles (2022) on one street[125]
Stuttgart	Germany	2018	2019–2020[126][103]	Diesel	Euro I–IV diesel vehicles (2019),[126] Euro V diesel vehicles (2020).[103]
The Hague	Netherlands	2019	2030[74]	Diesel, petrol	Two-stroke mopeds (2020), Euro I–III diesel vehicles (2021), all vehicles (2030).[74]
Utrecht	Netherlands	2013,[127] 2020[73]	2030[73]	Diesel, petrol	Pre-2001 diesel vehicles from 2015,[127] pre-2004 diesels from 2021,[73] pre-2009 (Euro I–IV) diesels from 2025,[73] all vehicles from 2030.[73]
Vancouver	Canada	2017	2030[3]	Diesel, petrol	All vehicles, electric buses by 2025
Wallonia	Belgium	2018	2023–2030[128]	Diesel, petrol	Euro 0–I (2023), Euro II (2024), Euro III (2025), Euro IV (2026), Euro V diesel vehicles (2028), Euro VI diesel vehicles (2030).[128]
Wiesbaden	Germany	2018	2019[84]	Diesel, petrol	Euro I–III diesel vehicles and Euro 0 petrol vehicles (2019).[84][115]

Manufacturers with planned fossil-fuel vehicle phase-out roadmaps

In 2017, Volvo announced plans to phase out internal combustion-only vehicle production by 2019, after which all new cars manufactured by Volvo will either be fully electric or electric hybrids.[129] In 2020, the Volvo Group with other truck makers including DAF Trucks, Daimler AG, Ford, Iveco, MAN SE, and Scania AB pledged to end diesel truck sales by 2040.[130]

In 2018, Volkswagen Group's strategy chief said "the year 2026 will be the last product start on a combustion engine platform" for its core brand, Volkswagen.[131]

In 2021, General Motors announced plans to go fully electric by 2035.[132] In the same year, the CEO of Jaguar Land Rover, Thierry Bolloré also claimed it would "achieve zero tailpipe emissions by 2036" and that its Jaguar brand would be electric-only by 2025.[133] By March, Volvo Cars announced that by 2030 it "intends to only sell fully electric cars and phase out any car in its global portfolio with an internal combustion engine, including hybrids."[134] In April 2021, Honda announced that it will stop selling gas-powered vehicles by 2040.[135] In July 2021, Mercedes-Benz announced that its new vehicle platforms will be EV-only by 2025.[136] In Oct 2021, Rolls-Royce announced that it will be fully electric by 2030.[137]

Railways

While railway electrification is often pursued for reasons unrelated to the emissions caused by fossil fuels, there has been an increased push in the 21st century to replace diesel locomotives with alternatives such as battery electric multiple units,[138] hydrogen fuel trains like the Alstom Coradia iLint or overhead wire electrification.[139] To date the only country to have electrified its entire mainline railway network, Switzerland, pursued this phase-out of fossil fuel vehicles before the term or concept existed in the modern form, in large part because importing coal for steam locomotives had proven difficult during the World Wars but Switzerland has plenty of domestic hydropower resources to power electric trains.[140][141] Israel Railways which had no electrified mainline rail services prior to 2018 when the Tel Aviv-Jerusalem railway became the first line to see electric train operation, plans to electrify most [note 6] or all of its network[142] and to phase out diesel locomotives and diesel multiple units.[143] The project was further accelerated in 2020 as the temporary shutdown of rail traffic due to the COVID-19 pandemic in Israel allowed faster construction[144] and ERTMS level 2 was being rolled out.[145] However, in 2019 Israel Railways ordered diesel powered rolling stock to replace the aging IC3 trains with media reports citing delays in the electrification program as the main reason.[146]

Shipping

Emissions will be banned from Norway's Geirangerfjord and Nærøyfjord world heritage sites from 2026.[147]

Aviation

Norway, and possibly some other Scandinavian countries, are aiming for all domestic flights to be emission free by 2040.[148][149] A major obstacle to decarbonizing air travel is the low energy density of current and foreseeable battery technology.[150][151] Thus alternatives to electric planes such as so called sustainable aviation fuels[152][153] or e-fuels (fuels derived from electrochemical conversion of substances like water and carbon dioxide into hydrocarbons) are also proposed as a future replacement of current jet fuels.[154][155][156] In 2021 the first production scale plant for e-fuels to be used in aviation opened in northern Germany. Production capacity is planned to reach 8 barrels a day

by 2022.[157] Lufthansa will be among the chief users of the synthetic fuel produced in the new facility.[158] Germany's plan to transform aviation to net zero carbon emissions relies heavily on e-fuels.[159]

Besides the need to rapidly scale up currently minuscule production capacity, the main obstacles to wider deployment of sustainable aviation fuels and e-Fuels are their much higher cost in the absence of meaningful carbon pricing in aviation.[160] Furthermore, with electricity still being largely generated with fossil fuels and current CORSIA regulations for sustainable aviation fuels allowing up to 90% of emissions compared to conventional fuels, even those options are currently far from carbon neutral.[161]

Unintended side-effects

Second-hand vehicle dumping

As more fossil fuel vehicles are discarded in certain countries or regions (e.g., the European Union due to the European Green Deal), more and more of these vehicles end up in developing countries. In the case of the European Union, there is already an export market which includes millions of used cars which are sent to Eastern Europe and the Caucasus, central Asia and Africa.[162][163] According to UNECE, the global on-road vehicle fleet is to double by 2050 (from 1.2 billion to 2.5 billion,[164] see introduction), with most future car purchases taking place in developing countries. Some experts predict that the number of vehicles in developing countries will increase by 4 or 5-fold by 2050 (compared to current car use levels), and that the majority of these will be second-hand.[165][166] There are currently no global or even regional agreements that rationalise and govern the flow of second-hand vehicles.[165] Others say that new electric 2-wheelers may sell widely in developing countries as they are affordable.[167]

Besides the fact that (internal combustion engine) cars that may no longer comply to local environmental standards are exported to developing countries (where such stringent legislation on vehicle emissions does not exist), there is also the fact that fuel efficiency levels of these vehicles become worse as they age (and in some developing countries, such as Uganda, the average age of a car imported is already 16.5 years and it will likely be driven for another 20 years).[165][168] In addition, national vehicle inspection requirements vary widely depending on the country.

Potential solutions

- **Export prohibitions**: some proposed that the European Union could implement a rule that does not allow the most polluting cars to leave the EU.[162] The European Union itself is of the opinion that it "should stop exporting its waste outside of the EU" and it will therefore "revisit the rules on waste shipments and illegal exports".[169]
- **Import prohibitions**: include used vehicle bans, used vehicle import age limits, taxation and inspection tests as a precondition to vehicle registration[170]
- **Convert fossil fuel vehicles to electric:** As of 2021 this is expensive so tends only to be done for classic cars.[171]
- **Mandatory recycling**: the European Commission is considering plans to introduce rules on mandatory recycled content in specific product groups, for instance for packaging, vehicles, construction materials and batteries.[172] The EU announced a new Circular Economy Action Plan

in March 2020,[173] and it mentioned that "the Commission will also propose to revise the rules on end-of-life vehicles with a view to promoting more circular business models.[174]

- **Scrappage programs**: governments can offer a premium to owners to have their fossil fuelled vehicles voluntarily scrapped, and to buy a cleaner vehicle from that money (if they so choose). For example, the city of Ghent offers a scrapping premium of 1000 euros for diesel vehicles and 750 euros for petrol vehicles; as of December 2019, the city had allocated 1.2 million euros for this purpose to the scrapping fund.[107]

Mobility transition

In Germany, activists have coined the term *Verkehrswende* (mobility transition, analogous to "Energiewende", energy transition) for a project of not only changing the motive power of cars (from fossil fuels to renewable power sources) but the entire mobility system to one of walkability, complete streets, public transit, electrified railways and bicycle infrastructure.

See also

- Fuel substitution: central lever to be deployed in decarbonizing transport[175]
- Alternative fuel vehicle: many of which use an internal combustion engine
- Directive 2008/50/EC, a 2010 EU directive limiting NO_2 emissions, which is the subject of many legal challenges across Europe
- Electric vehicle conversion: removing the engine of an internal combustion-powered vehicle and replacing it with an electric motor, creating reduced manufacturing emissions (as most car parts are reused) and costs compared to manufacturing/buying a new one
- Electrofuel: a type of synthetic fuel made from electricity (e.g., made using wind, water or solar power), many of which can be burnt in internal combustion engines
- Environmental impact of aviation
- Flexible-fuel vehicle and dual-fuel vehicle: have an internal combustion engine and can run on multiple fuels, sometimes even combining renewable/bio fuels and fossil fuels
- Fossil fuel lobby
- Fuel cell vehicle: vehicles that generate electricity using oxygen from the air and compressed hydrogen
- Hydrogen internal combustion engine vehicle: burns hydrogen in an internal combustion engine
- Leapfrogging
- Smart mobility
- Short-haul flight ban

Notes

1. Romare, M. & Dahllöf, L. *The Life Cycle Energy Consumption and Greenhouse Gas Emissions from Lithium-Ion Batteries.* 58 (2017). 'IVL' stands for Institutet för Vatten- och Luftvårdsforskning (Institute of Water and Air Navigation Research).
2. brought forward 5 years since 2017 announcement
3. The 80 mg/km limit is defined in Regulation (EC) No 692/2008, Table 2 of Annex XVII and Footnote 1 of Annex XI.[86][87] The European Court of Justice ruled that the European Commission illegally circumvented this limit by introducing a 'temporary conformity factor of 2,1 (...) in order to allow manufacturers to gradually adapt to the RDE [Real Driving Emissions] rules' in Regulation

(EU) 2016/646, Preamble 10 and Annex II '2.1.2 Temporary conformity factors'. This meant 2.1 times 80 mg/km = 168 mg/km.[86][88]

4. *Access for banned diesel vehicles is only possible by buying a one-day exemption for 36 euros, which the owner is allowed to do up to 12 times (a year?). Old diesel cars for transporting disabled people are exempt.[92]
5. *From 2020 on, vehicles are gradually prohibited from most to least polluting; banned vehicles can only get temporary access by buying Low Emission Zone (LEZ) day ticket, which the owner is allowed to do up to 8 times a year.[108]
6. There is still no clear decision whether the old Jaffa-Jerusalem railway is to be electrified, shut down, kept as a heritage railway or converted to hydrogen fuel or battery-electric operation

References

1. "Net Zero by 2050 – Analysis" (https://www.iea.org/reports/net-zero-by-2050). *IEA*. Retrieved 4 October 2021.
2. International Energy Agency (IEA), Clean Energy Ministerial, and Electric Vehicles Initiative (EVI) (June 2020). "Global EV Outlook 2020: Entering the decade of electric drive?" (https://www.iea.org/reports/global-ev-outlook-2020). IEA Publications. Retrieved 15 June 2020. See Table 2.1
3. Burch, Isabella (March 2020). "Survey of Global Activity to Phase Out Internal Combustion Engine Vehicles" (https://theclimatecenter.org/wp-content/uploads/2020/03/Survey-on-Global-Activities-to-Phase-Out-ICE-Vehicles-update-3.18.20-1.pdf) (PDF).
4. Muoio, Danielle. "These countries are banning gas-powered vehicles by 2040" (https://www.businessinsider.com/countries-banning-gas-cars-2017-10). *Business Insider*.
5. Slezak, Michael (30 July 2017). "As the UK plans to phase out petrol cars, is Australia being left behind?" (https://www.theguardian.com/environment/2017/jul/30/as-other-countries-give-petrol-cars-an-end-date-is-australian-being-left-behind). *the Guardian*.
6. "How will the petrol and diesel car ban work?" (https://www.bbc.com/news/uk-40726868). *BBC News*. 4 February 2020. Retrieved 16 September 2020.
7. "Diesel ban approved for German cities to cut pollution" (https://www.bbc.com/news/business-43211946). *BBC News*. 27 February 2018. Retrieved 14 September 2020.
8. "Diesel car pollution is significantly higher in London suburbs" (https://airqualitynews.com/2020/08/19/diesel-car-pollution-is-significantly-higher-in-london-suburbs/). *Air Quality News*. 19 August 2020. Retrieved 13 September 2020.
9. Weaver, R. Kent. "Target Compliance: The Final Frontier of Policy Implementation" (https://www.brookings.edu/wp-content/uploads/2016/06/0930_compliance_weaver.pdf) (PDF). *Brookings Institution*.
10. "International Trade Governance and Sustainable Transport: The Expansion of Electric Vehicles" (https://www.ictsd.org/sites/default/files/research/international-trade-governance-and-sustainable-transport-mahesh-sugathan.pdf) (PDF). *International Centre for Trade and Sustainable Development*. December 2017.
11. "Trends and developments in electric vehicle markets – Global EV Outlook 2021 – Analysis" (https://www.iea.org/reports/global-ev-outlook-2021/trends-and-developments-in-electric-vehicle-markets). *IEA*. Retrieved 4 October 2021.
12. "Electric vehicle sales surge in 2021" (https://www.power-technology.com/news/electric-vehicle-sales-surge-in-2021/). *www.power-technology.com*. Retrieved 4 October 2021.

13. Heleen Ekker (1 September 2020). "Nieuwe studie: elektrische auto gaat langer mee dan gedacht" (https://nos.nl/artikel/2346236-nieuwe-studie-elektrische-auto-gaat-langer-mee-dan-gedacht.html) [New study: electric car lasts longer than earlier thought]. *NOS* (in Dutch). Retrieved 11 September 2020.
14. Gonsalvez, Venkat Sumantran, Charles Fine and David (16 October 2017). "Our cities need fewer cars, not cleaner cars" (https://www.theguardian.com/environment/2017/oct/16/our-cities-need-fewer-cars-not-cleaner-cars-electric-green-transport). *the Guardian*.
15. Richard Casson (25 January 2018). "We don't just need electric cars, we need fewer cars" (https://www.greenpeace.org/international/story/13968/we-dont-just-need-electric-cars-we-need-fewer-cars/). Greenpeace. Retrieved 17 September 2020.
16. Francesca Perry (30 April 2020). "How cities are clamping down on cars" (https://www.bbc.com/future/article/20200429-are-we-witnessing-the-death-of-the-car). *BBC Future Planet*. Retrieved 17 September 2020.
17. "Urban Mobility - Do We Want or Need Car-Free Cities?" (https://www.provizsports.com/en-us/blog/urban-mobility/). *www.provizsports.com*. Retrieved 19 September 2020.
18. Peters, Adele (30 January 2020). "Here are 11 more cities that have joined the car-free revolution" (https://www.fastcompany.com/90456075/here-are-11-more-neighborhoods-that-have-joined-the-car-free-revolution). *Fast Company*. Retrieved 19 September 2020.
19. Frank Jacobs (17 September 2020). "EV incentives and city bans in Europe: an overview" (https://www.fleeteurope.com/en/new-energies/europe/features/ev-incentives-and-city-bans-europe-overview). *Fleet Europe*. Retrieved 19 September 2020.
20. "How will the petrol and diesel car ban work?" (https://www.bbc.com/news/uk-40726868). *BBC News*. 4 February 2020. Retrieved 19 September 2020.
21. Jonas Ekblom (4 October 2019). "Denmark calls for EU strategy to phase out diesel and petrol cars from 2030" (https://www.reuters.com/article/us-eu-autos-denmark-idUSKBN1WJ1YW). *Reuters*. Retrieved 14 September 2020.
22. Shoshanna Solomon (27 February 2018). "Israel aims to eliminate use of coal, gasoline and diesel by 2030" (https://www.timesofisrael.com/israel-aims-to-eliminate-use-of-coal-gasoline-and-diesel-by-2030/). *The Times of Israel*. Retrieved 16 September 2020.
23. Kyle Hyatt (15 August 2018). "Swiss government bans diesel models from Mercedes and Porsche" (https://www.cnet.com/roadshow/news/swiss-diesel-ban-porsche-mercedes-2018/). *CNET*. Retrieved 16 September 2020.
24. "Israel Pledges to Stop Using Fossil Fuels by 2050" (https://www.haaretz.com/israel-news/.premium-israel-pledges-to-stop-using-fossil-fuels-by-2050-1.9367763). *Haaretz*.
25. "How to get rid of dirty diesels on city roads" (https://www.transportenvironment.org/sites/te/files/publications/TE%20Air%20Quality%20Report_FINAL_12032018%20NEW.pdf) (PDF). Transport & Environment. March 2018. Retrieved 16 September 2020.
26. "Researchers develop new composite membrane for direct ethanol fuel cells" (https://www.greencarcongress.com/2020/05/20200505-defc.html). *Green Car Congress*. Retrieved 19 September 2020.
27. "Element 1, CO-WIN road testing medium-duty fuel cell truck with onboard methanol-based hydrogen generation" (https://www.greencarcongress.com/2020/09/20200917-e1.html). *Green Car Congress*. Retrieved 19 September 2020.
28. Frank (9 August 2021). "Europe's tightening city bans: a complex (and simple) story" (https://www.fleeteurope.com/en/new-energies/europe/features/europes-tightening-city-bans-complex-and-simple-story). *Fleet Europe*. Retrieved 10 October 2021.
29. "Zufahrtsbeschränkungen in Europa" (https://www.adac.de/verkehr/abgas-diesel-fahrverbote/fahrverbote/fahrverbote-ausland/) (in German). ADAC. 18 February 2020. Retrieved 16 September 2020.

30. Susan Misicka (7 November 2019). "Banning dirty cars to help fight Geneva's smog" (https://www.swissinfo.ch/eng/swiss-first_banning-dirty-cars-to-help-fight-geneva-s-smog/45353700). *Swissinfo*. Retrieved 16 September 2020.
31. Reuters Staff (14 January 2020). "Rome bans all diesel cars in battle to curb pollution" (https://www.reuters.com/article/us-italy-pollution/rome-bans-all-diesel-cars-in-battle-to-curb-pollution-idUSKBN1ZD1MZ). *Reuters*. Retrieved 16 September 2020.
32. "COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS 'Fit for 55': delivering the EU's 2030 Climate Target on the way to climate neutrality" (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021DC0550). *eur-lex.europa.eu*. Retrieved 29 July 2021.
33. "Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Regulation (EU) 2019/631 as regards strengthening the CO2 emission performance standards for new passenger cars and new light commercial vehicles in line with the Union's increased climate ambition" (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52021PC0556). *eur-lex.europa.eu*. Retrieved 29 July 2021.
34. "COP26 declaration on accelerating the transition to 100% zero emission cars and vans" (https://www.gov.uk/government/publications/cop26-declaration-zero-emission-cars-and-vans/cop26-declaration-on-accelerating-the-transition-to-100-zero-emission-cars-and-vans). *UK Government*. 10 November 2021. Retrieved 10 November 2021.
35. "Vanaf 2026 enkel elektrische bedrijfswagens fiscaal aftrekbaar (maar voordeel zakt geleidelijk)" (https://www.standaard.be/cnt/dmf20210518_92159320) [From 2026 only electric company cars will be tax deductible (but the benefit will gradually decrease)]. *De Standaard* (in Dutch). 17 September 2020. Retrieved 3 October 2021.
36. "Vanaf 2029 moeten alle nieuwe auto's elektrisch zijn, maar zullen we die wel allemaal kunnen opladen?" (https://www.vrt.be/vrtnws/nl/2021/11/02/elektrische-auto-s-opladen/) [From 2029 all new sold cars have to be electric.]. *VRT NWS* (in Dutch). 4 November 2021. Retrieved 4 November 2021.
37. Canada, Environment and Climate Change (29 December 2017). "Canada's actions to reduce emissions" (https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/reduce-emissions.html). *aem*. Retrieved 27 May 2020.
38. Canada, Transport (29 June 2021). "Building a green economy: Government of Canada to require 100% of car and passenger truck sales be zero-emission by 2035 in Canada" (https://www.canada.ca/en/transport-canada/news/2021/06/building-a-green-economy-government-of-canada-to-require-100-of-car-and-passenger-truck-sales-be-zero-emission-by-2035-in-canada.html). *www.canada.ca*.
39. "Chile to ban sale of light and medium internal combustion engines in 2035" (https://www.electrive.com/2021/10/18/chila-to-ban-sale-of-internal-combustion-engines-in-2035/). 18 October 2021.
40. "China plans to phase out conventional gas-burning cars by 2035" (https://asia.nikkei.com/Business/Automobiles/China-plans-to-phase-out-conventional-gas-burning-cars-by-2035).
41. Schwanen, Tim (19 September 2019). "The five major challenges facing electric vehicles" (https://www.bbc.com/news/uk-49578790). Retrieved 25 September 2019.
42. https://presidencia.go.cr/comunicados/2019/02/sintesis-plan-nacional-de-descarbonizacion-2018-2050/ "SÍNTESIS: PLAN NACIONAL DE DESCARBONIZACIÓN 2018-2050 [...] 2050: 100% de las ventas de vehículos ligeros nuevos será de vehículos cero emisiones
43. Sam Morgan (2 October 2018). "Denmark to ban petrol and diesel car sales by 2030" (https://www.euractiv.com/section/electric-cars/news/denmark-to-ban-petrol-and-diesel-car-sales-by-2030/). *Euractiv*. Retrieved 14 September 2020.

44. Sven Böll (8 October 2016). "Bundesländer wollen Benzin- und Dieselautos verbieten" (https://www.spiegel.de/auto/aktuell/bundeslaender-wollen-benzin-und-dieselautos-ab-2030-verbieten-a-1115671.html). *Der Spiegel* (in German). Retrieved 19 September 2020.
45. Arnar Thor Ingolfsson (9 October 2018). "Stefna að bensín- og dísilbílabanni 2030" (https://www.mbl.is/frettir/innlent/2018/09/10/stefna_ad_bensin_og_disilbilabanni/) [Policy for petrol and diesel car ban 2030] (in Icelandic). Morgunblaðið – via mbl.is. "Mögulega verði þannig gerðar undanþágur, með vísan til byggðasjónarmiða, á þeim svæðum þar sem erfitt væri að nota aðra bíla en þá sem ganga fyrir bensíni og dísilolíu"
46. "Dadah... Mobil Bensin Setop Dijual di Indonesia Tahun 2050" (https://oto.detik.com/mobil/d-5763207/dadah-mobil-bensin-setop-dijual-di-indonesia-tahun-2050) [Bye... Petrol cars will stop for sale in Indonesia in 2050]. *detikcom* (in Indonesian).
47. Peter Landers; Chieko Tsuneoka (25 December 2020). "Japan to Phase Out Gasoline-Powered Cars, Bucking Toyota Chief" (https://web.archive.org/web/20210104160527/https://www.wsj.com/articles/japan-to-phase-out-gasoline-powered-cars-bucking-toyota-chief-11608887640). *The Wall Street Journal*. Dow Jones & Company. Archived from the original (https://www.wsj.com/articles/japan-to-phase-out-gasoline-powered-cars-bucking-toyota-chief-11608887640) on 4 January 2021. Retrieved 4 October 2021. "Japan would still permit the sale of hybrid gas-electric cars after 2035 under the plan"
48. "The countries and states leading the phase out of fossil fuel cars" (https://thedriven.io/2020/11/12/the-countries-and-states-leading-the-phase-out-of-fossil-fuel-cars/). *The Driven*. 12 November 2020. Retrieved 6 December 2020.
49. "Nieuw initiatief wil overgang naar elektrisch rijden versnellen" (https://www.rtlnieuws.nl/tech/artikel/5234136/nieuw-initiatief-moet-overgang-naar-elektrisch-rijden-versnellen). *RTL Nieuws* (in Dutch). 1 June 2021. Retrieved 18 July 2021.
50. "Nine countries say they'll ban internal combustion engines" (https://qz.com/1341155/nine-countries-say-they-will-ban-internal-combustion-engines-none-have-a-law-to-do-so/). 7 August 2018 – via qz.com.
51. https://theicct.org/sites/default/files/publications/update-govt-targets-ice-phaseouts-jun2021_0.pdf
52. "Slovenia All In on Electric/Hybrid Cars" (http://sloveniatimes.com). *BalkanInsider*. 12 October 2017. Retrieved 3 October 2021. "prohibited after 2030"
53. "Po letu 2030 nič več novih avtomobilov na notranje izgorevanje" (https://www.rtvslo.si/okolje/onesnazevanje/po-letu-2030-nic-vec-novih-avtomobilov-na-notranje-izgorevanje/434986). *RTVSLO.si*.
54. "¡La prohibición de los coches de gasolina y diésel en España ya tiene fecha!" (https://www.marca.com/coches-y-motos/trafico/2021/05/14/609e669cca4741f5388b456f.html). *MARCA*. 14 May 2021.
55. "El Gobierno prohibirá los coches de gasolina en 2040 y ¿qué pasará con las motos?" (https://www.lavanguardia.com/motor/actualidad/20210622/7530366/ley-cambio-climatico-gobierno-prohibicion-coches-diesel-gasolina-no-motos.html). *La Vanguardia*. 22 June 2021.
56. Kristensson, Johan. "Ny regering – nu väntar förbud mot bensinbilar" (https://www.nyteknik.se/fordon/ny-regering-nu-vantar-forbud-mot-bensinbilar-6945094). *Ny Teknik* (in Swedish). Retrieved 26 May 2019.
57. Chen Wei-han (22 December 2017). "Cabinet to ban sales of fossil fuel-powered vehicles" (https://www.taipeitimes.com/News/front/archives/2017/12/22/2003684414). *Taipei Times*. Retrieved 14 September 2020.
58. Thanthong-Knight, Randy (22 April 2021). "Thailand Lays Out Bold EV Plan, Wants All Electric Cars by 2035" (https://www.bloomberg.com/news/articles/2021-04-22/thailand-lays-out-bold-ev-plan-wants-all-electric-cars-by-2035). *Bloomberg*. Retrieved 8 May 2021.
59. "Fossil fuel buses face ban from 2040 as transport leads Cop26 agenda" (https://www.independent.co.uk/climate-change/news/cop26-transport-day-boris-johnson-b1954953.html). *The Independent*. 10 November 2021. Retrieved 12 November 2021.

60. "UK plans to bring forward ban on fossil fuel vehicles to 2030" (https://www.theguardian.com/environment/2020/sep/21/uk-plans-to-bring-forward-ban-on-fossil-fuel-vehicles-to-2030). *the Guardian*. 21 September 2020. Retrieved 21 September 2020.
61. Rincon, Paul (24 September 2020). "UK can be 'Saudi Arabia of wind power' - PM" (https://www.bbc.com/news/science-environment-54285497). *BBC News*. Retrieved 25 September 2020.
62. "UK confirms pledge for zero-emission HGVs by 2040 and unveils new chargepoint design" (https://www.gov.uk/government/news/uk-confirms-pledge-for-zero-emission-hgvs-by-2040-and-unveils-new-chargepoint-design). *GOV.UK*. Retrieved 10 November 2021.
63. "China to ban all petrol and diesel cars" (https://www.independent.co.uk/news/world/asia/china-petrol-diesel-car-ban-gasoline-production-sales-electric-cabinet-official-state-media-a7938726.html). *The Independent*. 10 September 2017.
64. "Israel Pledges to Stop Using Fossil Fuels by 2050" (https://www.haaretz.com/israel-news/.premium-israel-pledges-to-stop-using-fossil-fuels-by-2050-1.9367763). *Haaretz*.
65. Chris Randall. "Austria considers combustion ban for 2030" (https://web.archive.org/web/20210719094323/https://www.electrive.com/2021/07/19/austria-considers-combustion-ban-for-2030/). *Elecdrive*. Archived from the original (https://www.electrive.com/2021/07/19/austria-considers-combustion-ban-for-2030/) on 19 July 2021. Retrieved 2 October 2021. "the “Mobility Master Plan 2030” is not binding"
66. George, Lee (7 October 2020). "Ban on sale of petrol, diesel cars from 2030 not in new Climate Action Bill" (https://www.rte.ie/news/2020/1007/1169885-climate-action-bill/). *RTE News*. RTE. Retrieved 16 April 2021.
67. "Kerry motor dealers welcome omission of car ban from Climate Bill" (https://www.radiokerry.ie/news/kerry-motor-dealers-welcome-omission-car-ban-climate-bill-222862). *RadioKerry.ie*.
68. "Electric Vehicles This Week: Assessing India's 2030 Electric Mobility Goals & More" (https://inc42.com/infocus/electric-vehicles-this-week/electric-vehicles-this-week-assessing-indias-2030-electric-mobility-goals-more/). 29 April 2021.
69. "Government finally wakes up: Sets a realistic goal of 30% electric vehicles by 2030 from existing 100% target" (https://www.financialexpress.com/auto/car-news/government-finally-wakes-up-sets-a-realistic-goal-of-30-electric-vehicles-by-2030-from-existing-100-target/1091075/). 8 March 2018.
70. Ania Nussbaum; Tara Patel (12 July 2021). "France Pushes Back Against EU Banning Combustion Cars by 2035" (https://www.bloomberg.com/news/articles/2021-07-12/france-pushes-back-against-eu-banning-combustion-cars-by-2035). *Bloomberg*. Retrieved 4 October 2021. "France is resisting the European Union effectively phasing out combustion-engine car sales by 2035, advocating for a more lenient target for the end of the decade and a longer leash for plug-in hybrid models"
71. Gropp, Martin (21 February 2018). "Fahrverbot-Kommentar: Der Diesel, die Luft und das Verbot" (https://www.faz.net/1.5457894). *Frankfurter Allgemeine Zeitung* (in German). ISSN 0174-4909 (https://www.worldcat.org/issn/0174-4909). Retrieved 23 February 2018.
72. "C40 : Fossil-Fuel-Free Streets Declaration" (https://www.c40.org/other/fossil-fuel-free-streets-declaration). *www.c40.org*. Retrieved 23 January 2019.
73. "Gemeente wil luchtkwaliteit Utrecht verbeteren; Strengere eisen milieuzone en snorfiets naar de rijbaan" (https://www.duic.nl/algemeen/gemeente-wil-luchtkwaliteit-utrecht-verbeteren-strengere-eisen-milieuzone-en-snorfiets-naar-de-rijbaan/). *De Utrechtse Internet Courant* (in Dutch). 8 July 2020. Retrieved 14 September 2020.
"Utrecht kiest voor gezonde lucht" (https://www.utrecht.nl/bestuur-en-organisatie/beleid/beleid-luchtkwaliteit/utrecht-kiest-voor-gezonde-lucht/). *Utrecht.nl* (in Dutch). Municipality of Utrecht. July 2020. Retrieved 14 September 2020.

74. Malou Seijdel (10 October 2019). "Oude dieselauto's en vervuilende brommers komen centrum Den Haag straks niet meer in" (https://www.ad.nl/den-haag/oude-dieselauto-s-en-vervuilende-brommers-komen-centrum-den-haag-straks-niet-meer-in~a7816946/). *Algemeen Dagblad* (in Dutch). Retrieved 14 September 2020.
75. Geert Willems (3 June 2019). "Oude diesel snel de stad uit, maar Nijmegen wil wel dat het ordelijk verloopt" (https://www.gelderlander.nl/nijmegen/oude-diesel-snel-de-stad-uit-maar-nijmegen-wil-wel-dat-het-ordelijk-verloopt~acb53f2e/). *De Gelderlander* (in Dutch). Retrieved 14 September 2020.
76. "What Will It Not as Much as You Might Think" (https://blog.ucsusa.org/dave-reichmuth/what-will-it-take-for-automakers-to-meet-californias-ev-requirements-not-as-much-as-you-might-think). *Union of Concerned Scientists*.
77. "Gov. Newsom Signs SB 44, "Ditching Dirty Diesel" " (https://sd09.senate.ca.gov/news/20190920-gov-newsom-signs-sb-44-%E2%80%9Cditching-dirty-diesel%E2%80%9D). Senate of California. 20 September 2019. Retrieved 17 September 2020.
78. Matt Cole (23 September 2019). "New California laws further tighten state's emissions standards for trucks" (https://www.ccjdigital.com/california-tightens-truck-emissions-regs-with-two-new-laws/). *CCJ Digital*. Commercial Carrier Journal. Retrieved 17 September 2019.
79. "Legal Actions for Clean Air" (https://www.right-to-clean-air.eu/fileadmin/Redaktion/Downloads/Right-to-Clean-Air_Europe_Backgroundpaper_EN.pdf) (PDF). *Right to Clean Air*. Deutsche Umwelthilfe. 25 November 2019. Retrieved 16 September 2020.
80. Europa (1996). "Summaries of EU legislation – Management and quality of ambient air" (http://europa.eu/legislation_summaries/other/l28031a_en.htm). Retrieved 24 January 2015.
81. European Court of Justice, CURIA (2008). "PRESS RELEASE No 58/08 Judgment of the Court of Justice in Case C-237/07" (http://curia.europa.eu/en/actu/communiques/cp08/aff/cp080058en.pdf) (PDF). Retrieved 24 January 2015.
82. "In deze Duitse steden komt in 2019 een dieselverbod" (https://www.duitslandnieuws.nl/blog/2018/12/11/in-deze-duitse-steden-komt-in-2019-een-dieselverbod/). *Duitslandnieuws.nl* (in Dutch). 11 December 2018. Retrieved 16 September 2020.
83. Sandor Zsiros & Damon Embling (25 April 2019). "Germany's diesel car ban revs up political debate" (https://www.euronews.com/2019/04/25/germany-s-diesel-car-ban-revs-up-political-debate). *Euronews*. Retrieved 14 September 2020.
84. Reuters Staff (15 November 2018). "Factbox: German cities ban older diesel cars" (https://ar.reuters.com/article/us-germany-emissions-factbox-idUSKCN1NK28L). *Reuters*. Retrieved 15 September 2020.
85. Sandra Laville (13 December 2018). "EU relaxation of diesel emission limits was illegal, court rules" (https://www.theguardian.com/business/2018/dec/13/eu-relaxation-of-diesel-emission-limits-was-illegal-court-rules). *The Guardian*. Retrieved 16 September 2020.
86. Anna Krajinska (8 May 2019). "EU must withdraw carmakers' 'license to pollute' as data shows new cars meet limits" (https://www.transportenvironment.org/newsroom/blog/eu-must-withdraw-carmakers%E2%80%99-%E2%80%98license-pollute%E2%80%99-data-shows-new-cars-meet-limits). *Transport & Environment*. Retrieved 16 September 2020.
87. "Commission Regulation (EC) No 692/2008 of 18 July 2008 implementing and amending Regulation (EC) No 715/2007 of the European Parliament and of the Council on type-approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance information" (https://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX:32008R0692). *Official Journal of the European Union*. Eur-Lex. 18 July 2008. Retrieved 16 September 2020.

88. "Commission Regulation (EU) 2016/646 of 20 April 2016 amending Regulation (EC) No 692/2008 as regards emissions from light passenger and commercial vehicles (Euro 6)" (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32016R0646). *Official Journal of the European Union*. Eur-Lex. 20 April 2016. Retrieved 16 September 2020.
89. "City of Amsterdam to ban polluting cars from 2030" (https://www.reuters.com/article/us-netherlands-pollution-amsterdam/city-of-amsterdam-to-ban-polluting-cars-from-2030-idUSKCN1S81XV). *Reuters*. 2 May 2019. Retrieved 2 May 2019.
90. Daniel Boffey (3 May 2019). "Amsterdam to ban petrol and diesel cars and motorbikes by 2030" (https://www.theguardian.com/world/2019/may/03/amsterdam-ban-petrol-diesel-cars-bikes-2030). *The Guardian*. Retrieved 14 September 2020.
91. "17 procent van alle wagens in Vlaanderen mag vanaf 1 januari niet meer in Antwerpen en Gent: deze diesels zijn verboden" (https://www.hln.be/auto/17-procent-van-alle-wagens-in-vlaanderen-mag-vanaf-1-januari-niet-meer-in-antwerpen-en-gent-deze-diesels-zijn-verboden~ab687ca3/). *Het Laatste Nieuws* (in Dutch). 11 November 2019. Retrieved 14 September 2020.
92. Eric van der Vegt (1 January 2019). "Milieuzone voor oude dieseltjes in Arnhem van kracht" (https://www.gelderlander.nl/arnhem/milieuzone-voor-oude-dieseltjes-in-arnhem-van-kracht~a5e26ac2/). *De Gelderlander* (in Dutch). Retrieved 14 September 2020.
93. Harvey, Fiona (2 December 2016). "Four of world's biggest cities to ban diesel cars from their centres" (https://www.theguardian.com/environment/2016/dec/02/four-of-worlds-biggest-cities-to-ban-diesel-cars-from-their-centres). *the Guardian*. Retrieved 8 April 2018.
94. "Mallorca Goes Deep Green" (https://www.affordablemallorca.com/insights/mallorca-goes-deep-green). *Affordable Mallorca*.
95. Laville, Sandra (5 November 2019). "Bristol council votes to ban diesel cars in first for a UK city" (https://www.theguardian.com/environment/2019/nov/05/bristol-becomes-first-uk-city-ban-diesel-cars). *The Guardian*. ISSN 0261-3077 (https://www.worldcat.org/issn/0261-3077). Retrieved 13 November 2019.
96. "B.C. plans to ban new gas, diesel car sales by 2040 - NEWS 1130" (https://www.citynews1130.com/2018/11/20/ban-new-gas-diesel-car-2040/). *www.citynews1130.com*.
97. gjs. "Brussel gaat dieselwagens verbannen vanaf 2030, regering wil ook maatregelen tegen benzinewagens" (https://www.nieuwsblad.be/cnt/dmf20180531_03538640). *Het Nieuwsblad* (in Dutch). Retrieved 25 January 2019.
98. "Vanaf vandaag (strengere) lage-emissiezones in Gent, Antwerpen en Brussel: met welke wagen mag je waar nog binnen?" (https://www.vrt.be/vrtnws/nl/2019/12/13/lage-emissiezones-antwerpen-en-brussel-strenger-op-1-januari-di/). *VRT NWS* (in Dutch). VRT. 1 January 2020. Retrieved 16 September 2020.
99. Erik Kouwenhoven (1 October 2018). "Oude diesels mogen vanaf vandaag Brussel niet meer in, boete 350 euro" (https://www.ad.nl/auto/oude-diesels-mogen-vanaf-vandaag-brussel-niet-meer-in-boete-350-euro~aef88a73/). *Algemeen Dagblad* (in Dutch). Retrieved 14 September 2020.
100. Frederik Vertongen, Nunzia Petralia (25 June 2021). "Brussel kondigt "einde van diesel- en benzinetijdperk" aan, diesel- en benzinemotoren tegen 2035 niet meer welkom" (https://www.vrt.be/vrtnws/nl/2021/06/25/brussels-gewest-kondigt-einde-van-diesel-en-benzinetijdperk-a/). *VRT.be* (in Dutch). Retrieved 6 July 2021.
101. "California Governor Signs Order Banning Sales Of New Gasoline Cars By 2035" (https://www.npr.org/2020/09/23/916209659/california-governor-signs-order-banning-sales-of-new-gasoline-cars-by-2035). *NPR.org*. Retrieved 24 September 2020.
102. Exec. Order No. N-79-20 (https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf) (September 23, 2020; in English) *Governor of California*. Retrieved on 2020-09-25.
103. Reinder Hummel (19 February 2020). "The German diesel ban" (https://www.germanemissionssticker.com/the-german-diesel-ban/). The German Emissions Sticker. Retrieved 15 September 2020.

104. "Environmental Zone Düsseldorf" (https://www.environmentalbadge.com/environmental-zone-dusseldorf/). *EnvironmentalBadge.com*. Retrieved 15 September 2020.
105. Michel Theeuwen (10 June 2020). "Eindhoven zet kleine stapjes op weg naar nul-emissiezone binnen Ring" (https://www.ed.nl/eindhoven/eindhoven-zet-kleine-stapjes-op-weg-naar-nul-emissiezone-binnen-ring~a30338cf/). *Eindhovens Dagblad* (in Dutch). Retrieved 14 September 2020.
106. "German court says Frankfurt must ban older diesel cars" (https://www.businessinsider.com/r-german-court-says-frankfurt-must-ban-older-diesel-cars-2018-9?international=true&r=US&IR=T). *Business Insider*. Reuters. 5 September 2018. Retrieved 17 September 2020.
107. Sandra Stacius (9 December 2019). "Meest vervuilende auto's mogen Gent niet meer binnen vanaf 1 januari 2020: hoe zal het in zijn werk gaan?" (https://www.vrt.be/vrtnws/nl/2019/12/09/vervuilende-auto-s-mogen-gent-niet-meer-binnen-vanaf-1-januari-2/). *VRT NWS* (in Dutch). Retrieved 19 September 2020.
108. "Hoe weet je of je voertuig de lage-emissiezone (LEZ) mag inrijden?" (https://stad.gent/nl/mobiliteit-openbare-werken/lage-emissiezone/hoe-weet-je-je-voertuig-de-lage-emissiezone-lez-mag-inrijden) (in Dutch). Stad Gent. Retrieved 14 September 2020.
109. "2030, Pulau Ini Larang Penjualan Mobil Berbahan Bakar Fosil - Otomotif Tempo.co" (https://otomotif.tempo.co/read/1184014/2030-pulau-ini-larang-penjualan-mobil-berbahan-bakar-fosil/full&view=ok).
110. Philip Oltermann (23 May 2018). "Hamburg becomes first German city to ban older diesel cars" (https://www.theguardian.com/world/2018/may/23/hamburg-first-german-city-ban-older-diesel-cars-air-quality-pollution). *The Guardian*. Retrieved 15 September 2020.
111. webmaster@lausanne.ch, Bureau de la communication-Web & multimédia –. "Plan climat lausannois" (https://www.lausanne.ch/portrait/climat/plan-climat.html). *Site officiel de la Ville de Lausanne* (in French). Retrieved 18 January 2021.
112. "Stop alle auto con motore diesel Euro 3 in Lombardia" (https://motori.virgilio.it/notizie/stop-ai-diesel-euro-3-in-lombardia/115091/?ref=libero). *Motori Virgilio* (in Italian). 26 September 2018. Retrieved 14 September 2020.
113. "UK's first 24/7 zero emission street to launch on 18 March" (https://news.cityoflondon.gov.uk/uks-first-247-zero-emission-street-to-launch-on-18-march/). *UK's first 24/7 zero emission street to launch on 18 March*. Retrieved 29 March 2020.
114. https://www.bizjournals.com/boston/news/2020/12/31/ma-emissions-roadmap-envisions-2020s-as-decade-of.html
115. "Environmental Zone Mainz and Wiesbaden" (https://www.environmentalbadge.com/environmental-zone-mainz-and-wiesbaden/). *EnvironmentalBadge.com*. Retrieved 15 September 2020.
116. "Мэрия Москвы поддерживает предложение СПЧ по ограничению транспорта низких экологических классов" (http://president-sovet.ru/presscenter/news/read/5208/). *president-sovet.ru* (in Russian). Council under the President of the Russian Federation for the Development of Civil Society and Human Rights. 28 January 2019. Retrieved 16 September 2020.
117. "Environmental Zone Munich" (https://www.environmentalbadge.com/environmental-zone-munich/). *EnvironmentalBadge.com*. Retrieved 15 September 2020.
118. "In Advance of Climate Week 2021, Governor Hochul Announces New Actions to Make New York's Transportation Sector Greener, Reduce Climate-Altering Emissions" (https://www.governor.ny.gov/news/advance-climate-week-2021-governor-hochul-announces-new-actions-make-new-yorks-transportation). *Pressroom of the Office of the Governor* (Press release). 8 September 2021. Retrieved 9 September 2021.
119. "New York City Executive Order 53" (https://www1.nyc.gov/assets/home/downloads/pdf/executive-orders/2020/eo-53.pdf) (PDF). *Official website of New York City*. Retrieved 21 September 2020.

120. Smith, Lydia (11 October 2017). "Oxford to ban all petrol and diesel vehicles and become 'world's first zero-emissions zone' " (https://www.independent.co.uk/news/uk/home-news/oxford-ban-petrol-diesel-vehicles-world-first-zero-emissions-zone-a7995706.html). *The Independent*. Independent Print Limited. Retrieved 7 July 2019.
121. "Oxford Zero Emission Zone (ZEZ) frequently asked questions" (https://www.oxford.gov.uk/info/20216/air_quality_management/1306/oxford_zero_emission_zone_zez_frequently_asked_questions). *Oxford City Council*. 2019. Retrieved 7 July 2019.
122. "Quebec to ban sale of new gas-powered vehicles as of 2035" (https://www.cbc.ca/news/canada/montreal/gas-vehicles-ban-electric-quebec-1.5802374). *cbc.ca*. CBC. 14 November 2020. Retrieved 15 November 2020.
123. "Rome latest city to announce car ban, will ban diesel cars from historical center starting 2024" (https://electrek.co/2018/02/28/rome-bans-diesel-cars-2024/). 28 February 2018.
124. After a legal battle, the 2016 ban on pre-1992 petrol cars and pre-2001 diesel cars was dropped in 2019, but the ban on pre-2005 (Euro IV) trucks was maintained. "Rotterdam weert vervuilende oude auto's" (https://nos.nl/artikel/2033290-rotterdam-weert-vervuilende-oude-auto-s.html). *NOS* (in Dutch). 30 April 2015. Retrieved 14 September 2020.
Erik Kouwenhoven (9 December 2019). "Oude diesels volgend jaar weer welkom in Rotterdam" (https://www.ad.nl/auto/oude-diesels-volgend-jaar-weer-welkom-in-rotterdam~a7a8b1d1/). *Algemeen Dagblad* (in Dutch). Retrieved 14 September 2020.
125. Stockholm, Traffic department (1 June 2021). "Miljözon Hornsgatan" (https://trafik.stockholm/trafiksakerhet-trafikregler/miljozoner/miljozon-hornsgatan/).
126. "Stuttgart to introduce diesel driving ban in 2019" (https://www.dw.com/en/stuttgart-to-introduce-diesel-driving-ban-in-2019/a-44634246). *Deutsche Welle*. 11 July 2018. Retrieved 15 September 2020.
127. "Oude dieselauto's niet meer welkom in Utrecht" (https://www.topics.nl/oude-dieselauto-s-niet-meer-welkom-in-utrecht-apn3537168ad/). *Algemeen Dagblad* (in Dutch). 1 November 2013. Retrieved 14 September 2020.
128. "Mon Véhicule" (https://www.walloniebassesemissions.be/fr/mon-vehicule/). *Wallonie Basses Emission* (in French). Government of the Walloon Region. 2018. Retrieved 16 September 2020.
129. Ricker, Thomas (5 July 2017). "Volvo to end gas-only cars by 2019" (https://www.theverge.com/2017/7/5/15921208/volvo-all-electric-by-2019). *The Verge*.
130. Gislam, Steven (14 December 2020). "Truckmaker alliance pledges to end diesel sales by 2040" (https://industryeurope.com/api/content/18bdc9da-3e05-11eb-917a-1244d5f7c7c6/). *Industry Europe*.
131. "Volkswagen says last generation of combustion engines to be launched in 2026" (https://www.reuters.com/article/us-volkswagen-emissions-combustion-idUSKBN1O32O6). 4 December 2018 – via www.reuters.com.
132. industry, Paul A. EisensteinPaul A. Eisenstein is an NBC News contributor who covers the auto. "GM to go all-electric by 2035, phase out gas and diesel engines" (https://www.nbcnews.com/business/autos/gm-go-all-electric-2035-phase-out-gas-diesel-engines-n1256055). *NBC News*.
133. Jolly, Jasper (15 February 2021). "JLR to make Jaguar brand electric-only by 2025" (https://www.theguardian.com/business/2021/feb/15/jlr-to-make-jaguar-brand-electric-only-by-2025). *The Guardian*. Retrieved 15 February 2021.
134. "Volvo Cars to be fully electric by 2030" (https://www.media.volvocars.com/global/en-gb/media/pressreleases/277409/volvo-cars-to-be-fully-electric-by-2030) (Press release). 2 March 2021. Retrieved 2 March 2021.
135. Hawkins, Andrew J. (23 April 2021). "Honda will phase out gas-powered cars by 2040" (https://www.theverge.com/2021/4/23/22399212/honda-gas-car-phase-out-2040-electric-vehicle). *The Verge*.

136. Gardner, Greg. "Mercedes-Benz To Spend $47 Billion To Speed Conversion To Electric-Only Lineup" (https://www.forbes.com/sites/greggardner/2021/07/22/mercedes-benz-to-spend-47-billion-to-speed-conversion-to-electric-only-production/). *Forbes*.
137. "A PROPHECY FULFILLED, A PROMISE KEPT, A REMARKABLE UNDERTAKING UNDERWAY. ROLLS-ROYCE MOTOR CARS ANNOUNCES FIRST FULLY ELECTRIC CAR" (https://www.press.rolls-roycemotorcars.com/rolls-royce-motor-cars-pressclub/article/detail/T0346152EN/a-prophecy-fulfilled-a-promise-kept-a-remarkable-undertaking-underway-rolls-royce-motor-cars-announces-first-fully-electric-car?language=en). *www.press.rolls-roycemotorcars.com*.
138. https://www.ndr.de/nachrichten/schleswig-holstein/Akku-Zuege-kommen-Ende-2022-in-SH-aufs-Gleis,akkuzug102.html
139. https://www.welt.de/wirtschaft/article230480863/Wasserstoffzuege-Siemens-und-Alstom-arbeiten-an-der-Technologie.html
140. https://www.swissinfo.ch/ger/wissen-technik/geschichte_unter-strom---wie-die-schweiz-elektrifiziert-wurde/44217906
141. https://hls-dhs-dss.ch/de/articles/013845/
142. https://db-engineering-consulting.com/en/projects/israel-railways-railway-electrification-program/
143. https://hamodia.com/2018/07/26/israel-railways-announces-plans-electrification/
144. https://en.globes.co.il/en/article-tel-aviv-railway-electrification-work-speeds-up-1001323882
145. https://railpage.com.au/news/s/israel-electrification-programme-accelerated-as-etcs-level-2-tested
146. https://en.globes.co.il/en/article-israel-railways-to-buy-carriages-engines-for-nis-24b-1001281527
147. "Fording the fjords | SKF Marine News" (https://engineeringatsea.skf.com/fording-the-fjords/). 28 January 2021. Retrieved 4 October 2021.
148. Nilsen, Thomas; Observer, The Independent Barents (15 March 2021). "Norwegian airline Widerøe aims to launch all-electric plane by 2026" (https://www.rcinet.ca/eye-on-the-arctic/2021/03/15/norwegian-airline-wideroe-aims-to-launch-all-electric-plane-by-2026/). *Eye on the Arctic*. Retrieved 4 October 2021.
149. "Nordic States Set Electric-Planes Pace After Green-Cars Push" (https://www.bloomberg.com/news/articles/2020-12-13/nordic-nations-set-pace-in-electric-planes-after-green-cars-push). *Bloomberg.com*. 13 December 2020. Retrieved 4 October 2021.
150. https://aviationbenefits.org/faqs/electric-aircraft/
151. https://www.theverge.com/2018/8/14/17686706/electric-airplane-flying-car-battery-weight-green-energy-travel
152. https://www.seattletimes.com/opinion/sustainable-aviation-fuel-an-important-step-in-international-trade/
153. https://simpleflying.com/wizz-air-sustainable-aviation-fuel/
154. https://www.petro-online.com/news/analytical-instrumentation/11/breaking-news/what-are-e-fuels/53168
155. https://www.wsj.com/articles/can-e-fuels-save-the-combustion-engine-11621037390
156. https://stay-grounded.org/e-fuels-a-realistic-alternative-for-powering-aviation/
157. "Aviation: Germany opens world's first plant for clean jet fuel" (https://www.dw.com/en/sustainable-aviation-fuel-power-to-liquid/a-59398405). *DW.COM*. Retrieved 23 November 2021.
158. https://www.aircargonews.net/policy/environment/kn-and-lufthansa-cargo-partner-on-ptl-aviation-fuel/
159. https://www.greenairnews.com/?p=1116
160. https://www.theguardian.com/environment/2021/nov/11/low-carbon-aviation-fuels-activists-stay-grounded

161. https://www.evalueserve.com/how-germanys-ptl-roadmap-for-aviation-fuel-outlines-its-larger-green-plans/
162. "[Opinion] Second-hand cars flaw in EU Green Deal" (https://euobserver.com/opinion/147236). *EUobserver*.
163. Used vehicle background overview, see page 19 (https://www.unece.org/fileadmin/DAM/trans/doc/2017/itc/UNEP-ITC_Background_Paper-Used_Vehicle_Global_Overview.pdf)
164. Used vehicle background overview (https://www.unece.org/fileadmin/DAM/trans/doc/2017/itc/UNEP-ITC_Background_Paper-Used_Vehicle_Global_Overview.pdf)
165. "Geneva meeting on used cars exporting pollution to developing countries" (https://www.devex.com/news/geneva-meeting-on-used-cars-exporting-pollution-to-developing-countries-89976).
166. "Regulation for 2nd hand vehicles" (https://www.globalfueleconomy.org/media/45362/wp7_regulation_for_2nd-hand_vehicles-lr.pdf) (PDF).
167. Rajper, Sarmad Zaman; Albrecht, Johan (2020). "Prospects of Electric Vehicles in the Developing Countries: A Literature Review" (https://doi.org/10.3390%2Fsu12051906). *Sustainability*. **12** (5): 1906. doi:10.3390/su12051906 (https://doi.org/10.3390%2Fsu12051906).
168. Used vehicle background overview, see page 5 (https://www.unece.org/fileadmin/DAM/trans/doc/2017/itc/UNEP-ITC_Background_Paper-Used_Vehicle_Global_Overview.pdf)
169. "European Green Deal Communication" (https://ec.europa.eu/info/sites/info/files/european-green-deal-communication_en.pdf) (PDF).
170. Used vehicle background overview, see page 23 (https://www.unece.org/fileadmin/DAM/trans/doc/2017/itc/UNEP-ITC_Background_Paper-Used_Vehicle_Global_Overview.pdf)
171. "The classic cars being converted to electric vehicles" (https://www.bbc.com/news/business-58578061). *BBC News*. 3 October 2021. Retrieved 4 October 2021.
172. "Commission's "Green Deal" could lead to ban on EU waste exports | EUWID Recycling and Waste Management" (https://www.euwid-recycling.com/news/policy/single/Artikel/european-commission-presents-green-deal.html). *www.euwid-recycling.com*.
173. "First circular economy action plan" (https://ec.europa.eu/environment/topics/circular-economy/first-circular-economy-action-plan_en). *ec.europa.eu*.
174. "EUR-Lex - 52020DC0098 - EN - EUR-Lex" (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2020%3A98%3AFIN). *eur-lex.europa.eu*.
175. "Register of Commission expert groups and other similar entities" (https://ec.europa.eu/transparency/expert-groups-register/screen/index.cfm?do=groupDetail.groupDetailDoc&id=34596&no=1). *ec.europa.eu*.
