THE TIME FOR RADICAL MOVEMENT

A roadmap to decarbonising the European transport sector by 2040



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As the world falters from the unprecedented impacts of the COVID-19 pandemic, the virus has drastically altered the landscape of the transportation sector and the future of mobility throughout Europe and beyond. As the car industry, airlines and cruise ships grapple with steep and unexpected losses, many are already receiving bailouts in the form of public funds from European governments to keep their sector afloat.

Climate change nevertheless remains the greatest existential threat the world faces — with the transport sector as one of the biggest contributors to rising emissions and global warming. While most sources of greenhouse gas emissions have been slowing or dropping off, emissions from transport have continued to climb at an accelerated pace in the EU, up to 28% compared to 1990 levels. International aviation, international shipping and road transport have been the fastest growing sources of transport emissions in the EU since 1990. As a result, 27%¹ of EU greenhouse gas emissions were coming from transport in 2017.

Transport is also a major cause of air pollution across Europe. Emissions of air pollutants from road transport have been shown to exacerbate the symptoms and severity of COVID-19 and make the impacts of pandemics even worse², while contributing to a range of illnesses including chronic lung disease, cancer, stroke and heart disease³.

It has been reported that modelling produced for the upcoming 2021 IPCC report suggests that we may be on track to see the Earth's surface warm to 5+ degrees Celsius, voiding previously held assumptions that 3 degrees celsius would be the worst-case predictions⁴. We simply can't wait any longer for real change. In order for the transport sector to get aligned with what is needed to tackle the climate emergency and safeguard human health, Europe needs to revolutionize the way people and goods move — and we need to do it fast.

Therefore, new research produced by Climact and NewClimate Institute explores a future where the European transport sector is decarbonised by 2040 without relying on biofuels or dirty energy. This work is intended to offer a roadmap for decision-makers to pursue a transition consistent with the magnitude and speed prescribed by the scientific community and deliver a fair contribution to limiting global warming to 1.5°C.

¹ https://www.eea.europa.eu/data-and-maps/indicators/transport-emissions-of-greenhouse-gases/transport-emissions-of-greenhouse-gases-12

² <u>https://ideas.repec.org/p/bir/birmec/20-13.html</u>

^a <u>https://www.unenvironment.org/news-and-stories/story/air-pollution-know-your-enemy</u>

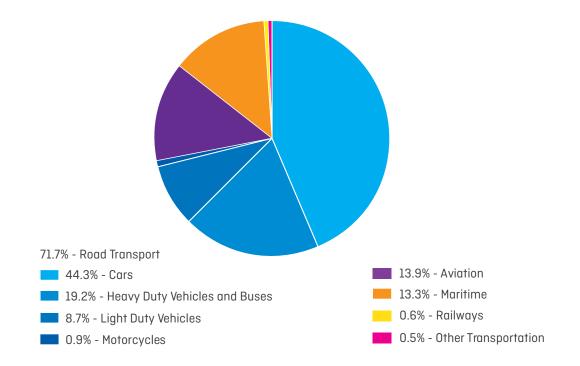
⁴ <u>https://www.theguardian.com/environment/2020/jun/13/climate-worst-case-scenarios-clouds-scientists-global-heating</u>

THE TIME FOR RADICAL MOVEMENT

STÄDTE FÜR MENSCHEN NICHT FÜR AUTOS!

GREENPEACE

Cities for people not for cars Source: Greenpeace The report addresses all transport modes: surface transport (cars, trucks, trains, public transport, cycling, walking), air transport, and water-based transport. Both freight and passenger transport are considered, and distinct assumptions are made for urban/non-urban geographies. The report shows the intermediary targets required, the challenges and the benefits associated with these profound efforts, and the policy packages that need to be implemented.



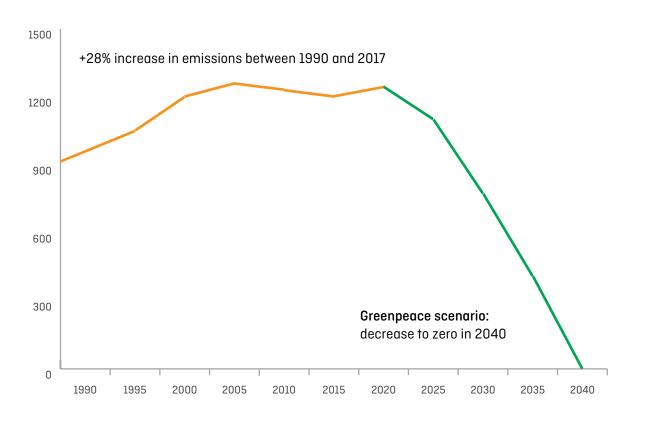
Share of transport greenhouse gases emissions in 2017 - EU28 (source EEA⁵)

While the Covid-19 pandemic has put current mobility on pause, the continent is now being confronted with a once-in-a-lifetime opportunity to re-imagine how we move in order to build resilient, equitable, and sustainable mobility systems for all. The European rail system, while robust in many ways, is nevertheless hobbled with cross-border issues around infrastructure, services and timetables.

We must address the difficult reality of how tax benefits are unfairly lopsided against a more robust rail system, with rail paying energy taxes whereas its polluting counterparts, like airlines, are exempt. Governments must rapidly improve and extend cycling and walking infrastructure while also prioritising the improvement and extension of public transport networks run on renewable energy and increased infrastructure to support the deliberate and safe uptake of micro-mobility solutions.

While it is critical that cities further commit to establishing car restrictions (such as Low Emission Zones (LEZ), congestion charging or car-free zones), government policy should nevertheless accelerate the phase out of diesel and petrol cars and support a build-up of charging infrastructure for electric vehicles as part of a mix of policy measures needed to decarbonise European transport as soon as possible.

Radical and transformational change requires bold and impactful measures. We need strong public awareness and courage coupled with the agility of policymakers to respond to the climate emergency. We are seeing cracks in a system that simply does not benefit our whole society — one that continues to invest in fossil fuels, pollution and inequality at the expense of human health and the protection of the planet. This is no longer an option. If one thing is crystal clear, it's that incremental change and marginally efficient improvements are wildly inadequate to trigger the scale of change that is required.



Emissions of the transport sector in the EU

The transport sector needs wide-scale disruption and a fundamental transformation that must start now and be implemented within this decade.

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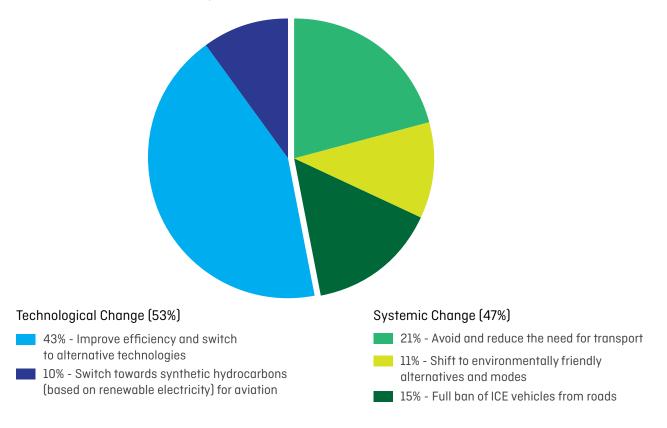
Transforming Public Transport
Source: Greenpeace

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MAIN FINDINGS

If Europe is to achieve decarbonisation by 2040 in transport, we will need all hands on deck. The approaches must include fast, disruptive action on dual fronts — societal and behavioural change, deployment of existing technology and investment in innovation.

To be both sustainable and cost-efficient, government policies should aim to reduce transport needs while simultaneously shifting mobility patterns to more climate-friendly and renewable modes, while current technology improves as soon as possible. Policies that reduce the need for transport while shifting to more environmentally friendly transport modes have received a lot less attention and lack coordination from European political leaders, which will need to change quickly. Europe can no longer afford to rule out any real solutions — we'll need all of them deployed together and fast.



Levers to reach decarbonisation by 2040

Efforts that go beyond current good practice to reduce transport demand and shift to sustainable mobility will be crucial in achieving a climate-compatible transport sector. Cities must prioritise sustainable travel by improving, extending and increasing infrastructure that supports the safe uptake of active mobility solutions, such as cycling and walking. Certain large investments in sustainable transport infrastructure will be required to enable the transition to renewable mobility, especially regarding medium to long-term investments in railways, train and bus fleets, as well as freight.

Shifting road freight to existing rail and inland waterways will be crucial, along with policies that improve sustainable infrastructure — this is especially true regarding rail — and each will need to be scaled up significantly, with intermodal freight transport being prioritized. It will be critical to avoid any further lock-ins into carbon-intensive transport projects like additional high-performance road infrastructure or new and bigger airports. The tools used to reduce the energy-inefficient volume of travels will be instrumental because they will enable a more rapid transition by reducing the scale of deployment and cost of new technologies to challenging but plausible levels.

How to decarbonize transport by 2040?

- End sales of new diesel and petrol vehicles, including hybrids, by 2028 at the latest, and phase out all internal combustion engines (ICE) vehicles across Europe by 2040.
- Reduce the light vehicle fleet size by 27% by 2030 and by 47% by 2040, compared to 2015 levels.
- Increase the occupancy and utilisation rate for all remaining passenger transport by 25% and 20% for light-duty vehicles (LDVs) between 2020 and 2050.
- Reduce the use of private vehicles from 62% of transport in large urban areas to 42% (with urban centres cutting it down even more significantly) and from 79% to 68% in non-urban areas by 2040.
- Decrease mobility demand by 12% by 2040 compared to pre-COVID levels (excluding aviation).
- Cut the number of lorries on European roads from 6 to 3.6 million by 2040, while doubling the use of inland waterways and rail transport from 29% to 58% by 2040.
- Limit the use of so-called E-fuels, produced with renewable power, to transport modes that do not have an alternative — such as aviation.
- Assuming sufficient production of renewable-based synthetic aircraft fuel at commercial scale, decrease total passenger kilometers flown by 33%. However, such "E-fuels" are far from being available at scale, meaning passenger air travel would very likely need to decrease much further.
- Cut energy consumption in surface transport, freight and aviation by 63 % by 2040 compared to 2015.

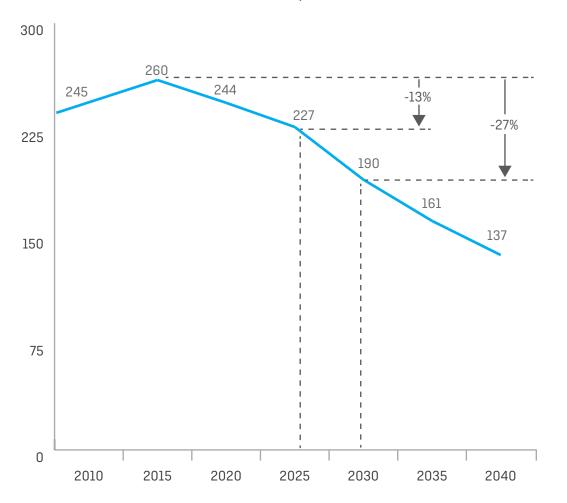
In the following section, we present the main findings, impacts and recommendations for each of the transport sectors analysed.

Surface Transport

Tackling emissions from surface transport will require policymakers to implement both demand-side measures (reduce and shift policies) as well as supply-side measures (improve and ban) simultaneously.

Europe needs a clear and ambitious pathway that phases out fossil-fueled combustion cars and vans — an absolutely critical component in decarbonising the transport sector. This entails ending new sales of these vehicles as soon as possible and by 2028 at the very latest and putting policies in place that phase out all internal combustion engines (ICE) vehicles across Europe by 2040.

A complete diesel and petrol phase out should also happen well before 2040 within dense cities that are leading the way where the alternatives are more developed. Most importantly, the overall number of cars and vans on the road will need to decrease significantly. **Compared to 2015 levels, the fleet size must be reduced by 27% by 2030 and by 47% by 2040, which means that car and van sales must also decrease substantially.** It will be essential for the automotive sector to have robust and just transition plans for the industry workforce while diversifying its activities.



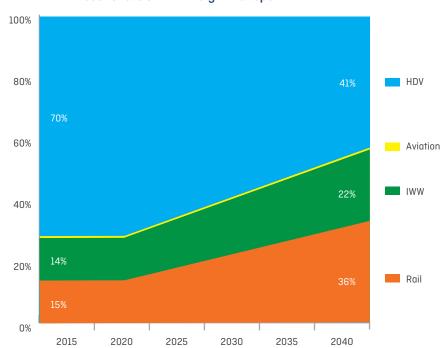
Evolution of total number of cars and vans on European roads

The occupancy and utilisation rate for all remaining passenger transport will need to increase respectively by over 25% and 20% for light-duty vehicles (LDVs) between 2020 and 2050. This means that the remaining vehicles in Europe should be used intensively through ride and car-sharing. Additionally, there will need to be a societal shift away from individual car ownership and a strong decrease in trips by car, even when electric. Private vehicle use is assumed to decrease to an average mode share of 62% to 42% in large urban areas⁶ (with urban centres going much below this figure) and from 79% to 68% in non-urban areas between 2020 and 2040. Cars must become the exception in cities, rapidly shifting private car use towards public transport, such as rail and bus, and increasing the access and infrastructure for better active mobility like walking and cycling.

Thanks to an increase in remote work and greater use of video-conferencing, better spatial planning and shorter distances, **Europeans will travel 12% fewer kilometres in 2040 compared to today (excluding aviation)**, helping to further reduce emissions in the following decades.

Freight

Freight has seen little momentum and attention when it comes to addressing its role in skyrocketing transport emissions, but it is a necessary piece of the puzzle in combating climate change. According to the European Environment Agency, CO2 emissions from rail transport are 8 times lower per tonne kilometer⁷ than those from road transport but only 15% of freight is delivered on rail. **The number of lorries on European roads must decrease from 6 to 3.6 million by 2040, while inland waterways and rail must double their usage up to 58% of freight transport in 2040**. Thus, the modal share of rail freight will need to rise from 15% to 36% by 2040, and the modal share of inland waterways must increase from 14% to 22% by 2040. Such a modal shift will require continued support for workers to protect their rights, social conditions and income in this transition.





6 This is measured by passenger-kilometers, which represents the transport of one passenger by a specific mode of transport – i.e. road, rail, air, sea, inland waterways etc – over one kilometer travelled. It is different from the modal share of trips.

7 13gC0_/tkm for rail vs. 109gC0_/tkm for road haulage (well to wheel) https://lowcarbonfreight.eu/lessons/how-to-compete-with-trucks/

Aviation

Prior to the Covid crisis, analysis has suggested that aviation emissions are on track to double or potentially triple by 2050, consuming up to one-quarter of the global carbon budget under a 1.5-degree scenario⁸. Flights departing from Europe are currently responsible for 184 million tonnes of CO2 emissions annually, with intra-EU emissions accounting for 62.1 Million tonnes CO2 (34% of the total)⁹. What this suggests is that without a cut in aviation demand, decarbonization of the transport sector will be impossible since innovation and technology alone will not be enough to tackle the climate emergency. Derived from the assumption that enough renewable-based synthetic aircraft fuel can be produced at commercial scale, the report suggests a 33% reduction of total demand (in passenger-kilometers by aviation) by 2040 — compared to pre-Covid-19 level.¹⁰

As of today, considering the slow roll-out of these fuels and the pressure it will put on the energy consumption, the reduction needed is most likely to be more important. This will require a deep cut in longdistance flights, a gradual phase-out of all short haul flights throughout Europe and attractive local tourism policies. It also means that strong political will and the need for competitive day and night train alternatives as replacements will be critical investments in the short term. Generating a mindshift is also necessary to reverse the trend, however it's crucial to acknowledge that air transport crystallizes many inequalities within Europe and around the globe. Indeed, among Europeans, only a small minority flies frequently. Moreover, a roundtrip flight from Brussels to Madrid generates about 220 kg C02, whereas there are 17 countries in which the average person produces less C02 in a year.

Energy

The efficiency gain achieved by making the changes mentioned above in surface transport, freight and aviation will bring energy consumption down in these areas by 63%¹¹ in 2040 compared to 2015. In comparison, the energy consumption is cut by 29% by 2040 in the most recent scenario published by the European Commission (EU Long Term Strategy LIFE 1.5, 2018).

Yet it will be impossible to achieve a carbon-neutral transport sector without fully decarbonizing the power sector with 100% renewable energy. While the direct and indirect electrification of several transport modes will make them more energy efficient, the consequence is that electricity demand for road transport rises to 899 TWh in 2040. This suggests an urgent need to accelerate the transition to renewable energy in the power sector. Moving forward, Europe must reduce its transport demand, switching to energy-efficient transport modes.

While the use of E-fuels (power-to-liquids) is one piece of the larger puzzle, it must be considered as a last resort and used only for transport modes that do not have an alternative — such as aviation — because many concerns remain. The efficiency across the lifecycle of E-fuels is low, and its development still in its infancy.¹² Finally, their deployment will only make sense if the electricity itself is coming from renewable sources.

^{8 &}lt;u>https://www.carbonbrief.org/aviation-consume-quarter-carbon-budget</u>

⁹ https://www.transportenvironment.org/sites/te/files/publications/Air2Rail%20Briefing%20paper%20%281%29.pdf

¹⁰ The growth in aviation was delayed due to COVID but the plan of the industry is still to go back to "normal": "In previous crises, it took 2-6 years for aviation emissions to reach pre-crisis levels. (...) The International Air Transport Association (IATA) also expects that 'air travel may recover more slowly than most of economy' and that 'international air travel may not recover 2019 levels until 2023-24' (IATA 2020a)". Lambert Schneider and Jakob Graichen, Öko Institut e.V., Should CORSIA be changed due to the COVID-19 crisis?, May 2020.

¹¹ This number does not include international shipping as this sector is usually discussed but excluded from the EU final projections and scenarios. 12 T&E suggests that an initial EU-wide e-fuels sub-target within RED II of between 1% and 2% would be feasible and recognise "that the technology is still in relatively infancy". <u>https://www.euractiv.com/section/aviation/news/green-aviation-set-for-end-of-year-lift/</u>

Methodology

Climact and NewClimate Institute have produced a study that explores a future where the European transport sector is decarbonised by 2040 without relying on biofuels or dirty energy. The use of biofuels is excluded in this study because only a relatively small amount can be guaranteed to come from eco-friendly sources.

The decarbonization of the transport sector by 2040 scenario

The built scenario used in this study describes the implications of reaching decarbonisation of the European transport sector by 2040 and explores the consequences on other sectors (such as Power & Industry). The explicit objective is to describe a transition characterized by bold actions striving for consistency with the magnitude and speed prescribed by the scientific community. As the IPCC made clear, drastically reducing emissions to reach net zero emissions by 2050 is necessary to limit global warming to 1.5°C, and this study's goal is to define and analyse how the EU can do its fair share in complying with the Paris Climate agreement goals and decarbonise by 2040.

EUCalc Model

EUCalc is an economy-wide simulation model covering all 27 countries of the EU, the UK and Switzerland, with land, air and water-based passenger and freight transport considered. It models the implications of lifestyle and technological choices on energy, GHG emissions, environment and resources up to 2050.

Avoid-Shift-Improve policy framework

Based on the results of the model which illustrate what is needed to achieve a carbon neutral transport sector in 2040, a whole package of policies are laid out and analysed to help us achieve this. These policies are either helping to 'avoid/reduce', 'shift' or 'improve' transport, covering the need for demand reduction and technological improvements in transport.

INDICATORS	
1 - AVOID TRANSPORT	
Transport demand (passenger-kilometers)	
Occupancy (passenger-km per km-vehicle)	
Utilization rate (vehicle-km per vehicle per year)	
2 - SHIFT TRANSPORT	
Modal share (% per mode)	
3 - IMPROVE TRANSPORT	
Technology share (% per technology)	
Energy efficiency (per passenger-km)	
Fuel (% per fuel)	

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Bicycle Infrastructure Source: Greenpeace

POLICY RECOMMENDATIONS

Radical + Transformative Change Requires Bold and Impactful Measures

As the EU and national governments have signed onto the EU Green Deal, billions of Euros from public funds have been distributed to some of the most polluting sectors of the transportation industry — many in the form of car purchase schemes and bailouts to the aviation¹³ and the car industry. They did so without any meaningful climate or social conditions in return. As governments are on track to spend hundreds of billions in public funds to reboot the economy,¹⁴ they must ensure the investment strategy is just and green and in line with the Paris Agreement's goals. Thus, new measures and regulations must be enforced to cut the transport demand and its greenhouse gas emissions.

When it comes to European mobility, there are huge policy gaps where current measures are not getting us to where we need to go — in fact quite the opposite. Governments are simply not prepared for the challenge ahead and it is time for decision makers to go big, think outside the box, and be truly visionary in defining the future of mobility.

This will take courage, conviction and coordination — and we need to start seeing it now.

Therefore, Greenpeace recommends 3 key policy areas that European decision-makers must pursue to put transport on the right track to decarbonization:

13 European airlines bailouts tracker: https://www.greenpeace.org/eu-unit/issues/climate-energy/2725/airline-bailout-tracker/ 14 EU Heads of states agreed to a 750 billion euro recovery fund and a 1.1 trillion euro 2021-2027 budget in July of 2020. Shift funds from polluting transport sectors towards clean and public mobility solutions that support people and cities in the transition towards a climate friendly mobility.

- Bailouts and publicly supported investments in local, national and European recovery and budgets including the European Investment Bank loans — must serve as the foundation of a comprehensive plan to boost a European-wide network sustainable mobility solutions. This consists of efficient, affordable and accessible regional, long distance day and night trains, clean ferries, public transport, cycling and walking infrastructure, shared-mobility services, inter-modality and local tourism. Rebuilding the infrastructure won't be enough, the EU must improve cross-borders trains by removing network bottlenecks and harmonizing the railway system, tickets and timetables. Protecting passengers rights across borders is also essential to allow Europeans to travel in a more sustainable way.
- Airport and motorway expansion should not be allowed in Europe and should be excluded from public funding in order to avoid further lock-in of carbon intensive transport modes. As part of its climate roadmap, the European Investment Bank (EIB) should set an explicit ban on any investments in capacity increase for motorways or airports. Instead the EIB should support the electrification of public bus fleets and the renewal and increase of the fleet of passengers and freight trains, ultimately replacing car and plane trips in the future.
- All types of support to internal combustion engine (ICE) vehicles along with SUVs should not be eligible for public funds, including the European and national recovery plans. The ICE technology will keep us hooked to fossil fuels for too long and should be stopped and the trend of massive cars like SUVs is the opposite of an efficient use of resources and space. Car ownership in the EU-28 area increased considerably between 2000 and 2017, growing from 411 cars per 1 000 inhabitants to 516,¹⁵ with cars are parked 92% of their time.¹⁶ While cars will still be necessary for certain uses, those can be served without the need to own one car per household.
- Instead, attractive financial incentives should be made available to help individual households and businesses shift from car ownership to a cleaner mobility alternative: subscription to public transport (train included) and to shared-mobility services, purchase of bikes, electric bikes and cargo bikes. These financial incentives should be available to all Europeans. Purchase incentives for electric vehicles should encourage shared-use of cars and help households with limited financial capacity and access to cleaner transport options.
- Keeping the temporary measures that give more space to pedestrians and cyclists during the Covid-19 pandemic will be necessary, yet it is critical that governments understand these measures should be viewed as one part of a larger, more radical climate approach. Car free cities must be further rewarded for their climate action via higher resources from the national and EU funds.
- In an attempt to further reduce mobility demand, urban planning should be designed in a way that puts essentials within close walking or cycling distance like in a "city of short distances"¹⁷ and redistributes public space to the people. National and local decision makers should use their power to ban fossil fuels cars on their streets through, for example, the implementation of ambitious ultra low emissions zones, starting in the most polluted cities.

16 Report by Ellen MacArthur Foundation https://www.ellenmacarthurfoundation.org/assets/downloads/Mobility_All_Mar19.pdf

17 In "Plan Melbourne 2017-2050", the Australian city has adopted the "20-minute neighbourhoods principle" which is described as " (living locally'—giving people the ability to meet most of their daily needs within a 20-minute walk from home, with safe cycling and local transport options." The "15 minutes city" or "city of the short distances" is a concept that was developed by Carlo Moreno, a professor and architect urban planner from Paris who then joined Mayor Hidalgo's campaign. Hidalgo promoted it and made it very popular with her elections campaign. It is now identified as a key action by the network of cities C40.

¹⁵ EEA https://www.eea.europa.eu/data-and-maps/indicators/size-of-the-vehicle-fleet/size-of-the-vehicle-fleet-10

Introduce binding regulations to cut emissions and reduce demand of the EU's most polluting transport modes to decarbonize transport by 2040.

- Criteria conditioned to bailout plans should make all companies comply with yearly emissions reduction targets aligned with the Paris Agreement 1,5°C goal and implement binding measures to get there.
- European and national governments must implement an immediate ban on short haul flight connections where there is a viable bus, train, or ferry option for journeys under six to eight hours, or a night train, with the aim of progressively banning all short-haul flights as alternatives develop. Rapidly reopening and modernizing night trains within the member states and across Europe will be key to complement the day trains' offer and make this shift happen.
- In addition to the ban on airport expansion, new measures will be needed to reduce air travel and tackle the emissions of long haul flights, such as VAT, kerosene tax and fair and efficient ticket taxes. In 2019, the kerosene tax exemption alone accounted for 27 billion euros.¹⁸ These measures will apply the polluterpays principle and introduce equity with other transport modes like rail.
- A common European approach in banning the sale of new ICE vehicles, including hybrids, as soon as possible and by 2028 at the very latest will be crucial, with all new vehicles shifting to light battery-electric. Member states should also be allowed to take this measure before that date. To minimize the negative effects of battery electric vehicles, social and environmental standards for car production and the automotive supply chain particularly regarding batteries needs to be strengthened. Stringent efficiency standards for cars must be implemented irrespective of their size and weight. Stopping the surge of SUVs is indeed crucial since it was "the second biggest reason for global emissions growth in the last 10 years" according to IEA.¹⁹
- Nearly a quarter of greenhouse gases emissions of transports are due to freight and they have been increasing due to expanding road freight. To decarbonize freight by 2040, the EU should introduce a target of at least 58% of non road freight by 2040 and take measures to slow down the transport demand. Without a strict application of both the user-pay and polluter-pay principles, a fair competition will not apply between trains and trucks, thus the needed reduction of road freight will not be reached. Last but not least, a European wide action plan for rail freight should be urgently deployed to provide a better framework for rail freight, financial incentives and investments in the existing railways infrastructures. EU funds must be primarily used to answer the needs of the rail freight sector.

18 Imposing a fuel tax on all departing flights to all destinations at the 33 cents EU energy tax minimum would cause ticket prices to rise 10%; flights, passengers and CO2 emissions all fall 11%, people affected by noise drop 8% and fiscal revenues rise to €27 billion. https://www.transportenvironment.org/publications/ leaked-european-commission-study-aviation-taxes

19 IEA https://www.iea.org/commentaries/growing-preference-for-suvs-challenges-emissions-reductions-in-passenger-car-market



- Despite multi-billion euro bailout plans to save companies offering jobs with poor working conditions, thousands of workers have already been left behind since the beginning of the COVID crisis. Just and green transition plans should be implemented without any delay for the workers who lost their job because of the economic crisis. This goes for all working in vulnerable transport sectors, which will inevitably face a transformation while they cut their emissions.
- While some workers can find a more sustainable job in the decarbonization of the same sector, many will need to retrain in other areas of the economy. That's why the access to retraining programme must be guaranteed for all by the public authorities.
- We also want workers to have their income and pension secured until they find a quality job with solid working conditions as part of the transition plan. A just transition should be based on a social dialogue with all relevant parties and include collective bargaining with workers and their unions.
- The redeployment of workers from the aviation, automotive and the road freight sectors towards more sustainable sectors is possible²⁰ but needs to be accompanied and anticipated with strong political will.



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Greenpeace is politically and financially independent. Greenpeace exists because this fragile Earth deserves a voice. It needs solutions. It needs change. It needs action!

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You can find the original report linked HERE