

Reducing CO₂ emissions from transport

SUMMARY

International efforts to keep global warming below 2°C and avoid catastrophic climate change require systematic cuts of greenhouse gas (GHG) emissions in all areas of human activity.

Transport currently accounts for about a quarter of EU GHG emissions, making it the second highest emitting sector after the energy industries. While in other sectors, GHG emissions have been decreasing, in the transport domain they have risen by as much as 30% over the past 25 years. Tackling growing emissions has become a matter of urgency. EU measures to cut emissions from transport focus mostly on carbon dioxide (CO₂) as the main GHG.

While at international level the EU strives for a global approach and adoption of binding targets by the relevant regulatory organisations, it has also set its own internal targets and put policies in place to reduce GHG emissions from individual transport modes. These include an emissions trading system, binding standards for new engines, rules for fuel quality and promotion of alternative fuels.

Worldwide, the imperative to reduce emissions has led many countries and cities to adopt their own legislation or put concrete measures in place, some of which are being shared, adapted and replicated.

The European Parliament continues to play an active role in promoting low-carbon transport and supporting ambitious climate policies. An EP delegation will take part in the 21st Conference of the Parties (COP 21) to the United Nations Framework Convention on Climate Change (UNFCCC) in Paris, starting on 30 November 2015.



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Glossary

Emissions trading system (ETS): international system for trading greenhouse gas emission allowances.

Greenhouse gas (GHG): a gas in the earth's atmosphere which traps heat and prevents it from escaping into space. An increase in GHG concentrations leads to global warming. The main GHG is carbon dioxide (CO₂).

Heavy-duty vehicles (HDV): trucks (over 3.5 tonnes), buses and coaches (more than eight seats).

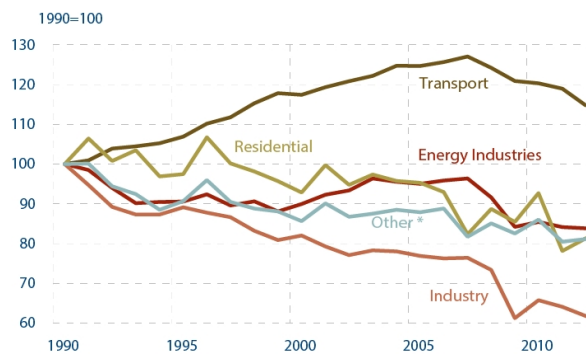
Market based measure (MBM): emissions trading, emission-related levies – charges and taxes, and emissions offsetting.

The EU context

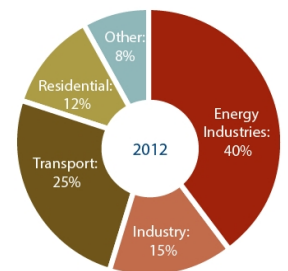
About a quarter of EU greenhouse gas (GHG) emissions currently comes from transport, making it second only to the energy industries as the sector responsible for most emissions (see Figure 1).

However, while in other sectors GHG emissions have been decreasing, in transport they have risen. The transport modes with the sharpest increase in traffic volumes have also seen the largest [increase](#) in GHG emissions: international aviation by 93%, international shipping by 32% and road transport by 17% in 2012 compared to 1990 levels. Reduction efforts in transport focus on carbon dioxide (CO₂) as the main GHG.

Figure 1 – EU CO₂ emissions: changes, 1990-2012, and situation in 2012



Data source: [Statistical Pocketbook](#), 2015.



Reduction efforts in transport focus on carbon dioxide (CO₂) as the main GHG.

EU GHG emissions targets and transport

To help meet the target of reducing global GHG emissions by the 80% thought necessary to keep global warming below 2°C, the European Commission's 2011 [White Paper on Transport](#) put forward several non-binding longer-term targets for the transport sector, with an overall goal to cut transport GHG emissions by at least 60% by 2050 (with respect to 1990 levels) as a basis for regulatory developments. Existing and subsequent EU legislation set a number of shorter-term targets and requirements, such as rules for new vehicle emission standards, CO₂ emissions from passenger cars and vans and the share of renewable energy in transport.

Since 2008, some reductions have been achieved and transport GHG emissions (including aviation) [fell](#) by 3.3% in 2012, with the biggest reduction in road transport (3.6%), followed by aviation (1.3%). Nevertheless, in 2012, EU transport emissions (including international aviation but excluding the international maritime sector) still [remained](#) 20.5% above 1990 levels and will need to fall by 67% by 2050 in order to meet the targets set in the 2011 White Paper on Transport (see Figures 2, 3 and 4).

In October 2014, the EU Heads of State or Government in the European Council [agreed](#) that Europe will reduce its GHG emissions by 40% by 2030, compared to 1990 levels. This binding target has two parts. Sectors covered by the emissions trading system (ETS, see box) will have to lower emissions by 43% from 2005 levels. Sectors outside the ETS, which include transport, will need to reduce them by 30% from 2005 levels. For these sectors, the 'Effort Sharing Decision' ([ESD](#)) establishes how many tonnes of GHG emissions each EU Member State [may](#) emit annually,¹ and is based on the country's relative wealth (GDP per capita). While the EU ETS sectors are regulated at the EU level, it is up to the Member States to define and implement national policies and measures to limit emissions from the sectors covered by the ESD. Member States report their annual GHG emissions, and exceeding the specified annual emission allocation leads to corrective action.

CO₂ emissions by mode of transport

Road transport

Road transport accounts for about [one fifth](#) of the EU's total emissions of CO₂ (cars and vans 15%, heavy duty vehicles 6%). Despite improvements in fuel consumption efficiency in recent years, emissions remain high mainly due to increasing road freight traffic (see Figure 2). The EU has adopted legislation setting binding CO₂ emission targets for [new cars](#) and vans. The 2015 [target for new cars](#) of 130 grams of CO₂/km was already achieved in 2013; the target for 2021 is 95g CO₂/km. Likewise, the 2017 [target for new vans](#) of 175g CO₂/km was already met in 2014, while the 2020 limit is 147g CO₂/km. EU legislation also obliges car-makers to provide customers with relevant [information](#), including a [label](#) showing a car's fuel efficiency and CO₂ emissions.

The recent Volkswagen (VW) [scandal](#) brought to light [discrepancies](#) between laboratory testing (type-approval) and on-road emissions (both NO_x and CO₂) from cars, revealing a persistent [gap](#) in emissions volumes between the two types of [testing](#). The

EU Emissions Trading System (ETS)

Covers: power and heat generation, energy-intensive industries, civil aviation within EEA (40% of EU GHG emissions).

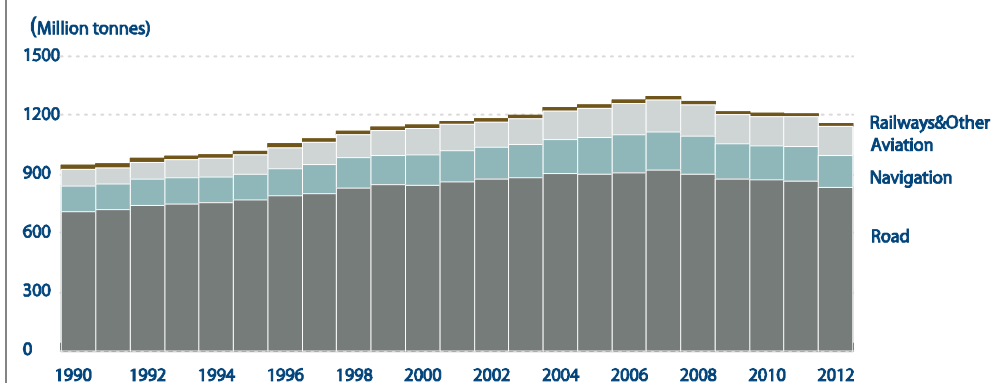
Does not cover: international aviation, other transport, buildings, agriculture and waste.

How it works: the system sets a limit on the amount of GHG emissions that can be emitted ([cap](#)), which is reduced over time, so that emissions fall. Companies receive or buy permits (allowances), each allowing one tonne of CO₂ to be emitted, which can be traded or kept for future needs. But they have to surrender enough allowances to cover all their annual emissions or get [fined](#).

To reduce emissions, companies can choose to invest in more efficient technology, shift to less carbon-intensive energy sources, purchase extra allowances, or do a mix of all these.

However, as a huge surplus of unused allowances has built up and their price fell, investments into cleaner energy slowed down. A [reform](#) of ETS is being prepared.

Figure 2 – Evolution of EU CO₂ transport emissions volumes 1990-2012

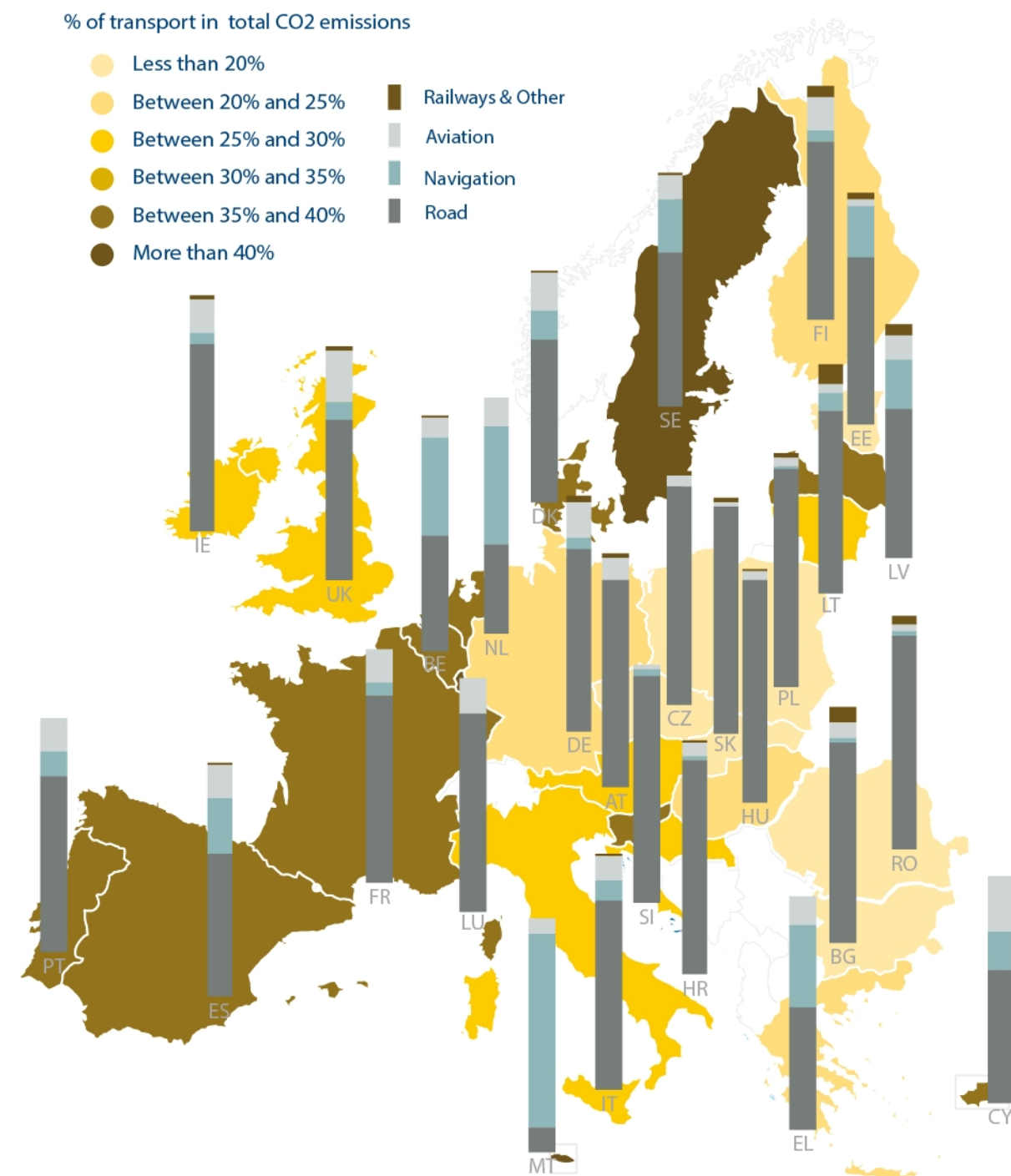


Data source: [Statistical Pocketbook](#), 2015.

EU has long been using type-approval tests for CO₂ emissions based on the new European driving cycle (NEDC) standard, regarded as [obsolete](#). The United Nations Economic Commission for Europe ([UNECE](#)) developed new standards, known as the worldwide harmonised light duty test procedure (WLTP). The European Commission proposes to phase in the WLTP in 2017, with full implementation from September 2018.

While freight transport has grown steadily between 1990 and 2010, and the related CO₂ emissions have [increased](#) by about 36%, the EU has not so far set any CO₂ limits. In 2014, the Commission adopted a HDV [strategy](#), consisting of short-term action to certify, report and monitor HDV CO₂ emissions, as a first move towards further steps.

Figure 3 – EU CO₂ emissions from transport by transport mode, 2012



Data source: [Statistical Pocketbook](#), 2015.

Water transport

While shipping is in most cases more fuel-efficient than other transport modes, its GHG emissions are growing fast. International shipping accounts for [4%](#) of the EU's GHG emissions. Despite a 10% decrease between 2007 and 2012, attributed mostly to the economic downturn, shipping emissions have doubled since 1990, due to an overall increase in maritime trade. Without action, maritime CO₂ emissions in 2050 are [expected](#) to be between 50% and 250% higher than current levels. Currently, there are no regulatory measures in place to effectively limit GHG shipping emissions.

For the EU, the preferred option to reducing emissions is a global approach led by the International Maritime Organization ([IMO](#)), which regulates the sector worldwide. However, progress at the IMO has been [slow](#). In 2011, the IMO adopted the Energy Efficiency Design Index ([EEDI](#)), which sets compulsory energy-efficiency standards for new ships. However, some new ships meet these [standards](#) despite being 10% less fuel efficient than those built back in 1990. International negotiations have yet to bring an agreement on global market-based measures (MBMs) or other instruments that would cut GHG emissions from the sector as a whole, including existing ships.

As for the EU, the 2011 White Paper on Transport [set](#) a specific target of reducing CO₂ emissions from shipping fuels by 40% (if feasible 50%) from 2005 levels by 2050. In the absence of a global monitoring tool at IMO level and as a contribution to creating one in the future, the EU [decided](#) to integrate maritime transport in the EU's GHG reduction policies and has adopted rules – which take effect from 2018 – for collecting and publishing verified annual data on CO₂ emissions from large ships using EU ports ([Regulation 2015/757/EU](#)). This is a first step towards setting reduction targets at a later stage and applying MBMs, which might take the form of a contribution-based or target-based compensation fund, or an emissions trading system.

Inland waterways (IWW) are an environment-friendly alternative to road and rail transport in terms of [energy consumption](#), which is about 17% of that of road transport and 50% of rail transport (in tonne/km of transported goods). However, some concerns remain to be solved. Inland vessels tend to remain in service for many years and only a few engines are replaced, which – in combination with few economic incentives and limited resources for large greening investments – explains why inland navigation 'is behind the curve when it comes to [greening](#)'.² Compared to road haulage, [IWW](#) causes lower CO₂ emissions per tonne kilometre, but higher air pollutant emissions for certain vessels. Currently, technical requirements for inland waterway vessels ([Directive 2006/87/EC](#)) are being reviewed. While the [review](#) focuses on reconciling the coexisting technical regulations on navigable waterways and harmonising the requirements for issuing navigation certificates in the EU, one aspect being discussed is the introduction of technical requirements for vessels powered by liquefied natural gas (LNG). The Council [agreed](#) a general approach on 11 June 2015.

Aviation

Aviation accounts for about 3% of the EU's total GHG emissions, with the largest part coming from international flights. The International Civil Aviation Organization ([ICAO](#)), which regulates commercial aviation worldwide, forecasts that by 2050 they could grow by a further 300-700%. Since the Kyoto Protocol to the UNFCCC, the ICAO has been trying to adopt a policy for reducing international emissions, with limited [progress](#).

In [2010](#), ICAO set a target to achieve a global annual average fuel efficiency improvement of 2% until 2020. A [study](#) by the International Council on Clean

Transportation warns that with the current average annual improvement rate of 1.1%, this target is unlikely to be met. In 2016, however, and following long pressure from the EU for global action, ICAO is due to decide on the implementation of a [market-based measure](#) to control emissions. While operational measures – such as modernising and improving air traffic management technologies, procedures and systems – all contribute to reducing aviation emissions, MBMs are regarded as the most cost-efficient approach.

At European level, emissions from flights within the 28 EU Member States plus Iceland, Liechtenstein and Norway have been included in the EU Emissions Trading System ([EU ETS](#)) since 2012. The relevant Directive, [2008/101/EC](#), applies to both EU and non-EU airlines. However, to allow time for ICAO negotiations on a global approach, the EU ETS requirements were [suspended](#) for flights to and from non-European countries for the period 2013-2016. The inclusion of aviation in the EU ETS was challenged by some US airlines, but the European Court of Justice [confirmed](#) that the inclusion is compatible with international law. Following the expected international development at the 2016 ICAO Assembly, the European Commission intends to propose [measures](#) with effect from 2017.

Rail

The least polluting mode of transport, rail accounts for less than [1%](#) of transport CO₂ emissions. The EU wants to improve the modal share of rail in the transport mix, for instance by supporting the European [rail network for freight](#) and the construction of cross-border [rail links](#) within the trans-European transport network. While there has been some success achieved in rail passenger transport, with high-speed rail connections replacing air transport (for instance [Madrid-Barcelona](#)), the shift from road to rail in freight transport remains, on the whole, limited.³

Focus on fuels

For its mobility and transport, Europe relies heavily on oil, mostly imported. In 2010, oil accounted for 94% of energy consumed in transport. The EU regulates the quality of fuels used and, in parallel, aims at increasing the share of alternative fuels.

The EU common rules for **fuel quality** ([Directive 2009/30/EC](#)) require the GHG intensity of fuels in vehicles to be cut by 6% by 2020 (compared to 2010). The rules apply to all petrol, diesel and biofuels used in road transport, as well as to gasoil used in non-road mobile machinery. The reduction could be achieved through the use of biofuels, electricity, the use of less carbon-intensive fossil fuels (such as natural gas, methanol, and hydrogen), and improvements at the extraction stage of fossil fuels. Emissions calculations cover the whole fuel life-cycle, including emissions from the extraction, processing and distribution of fuels.

The EU set mandatory targets for **renewable energy** ([Directive 2009/28/EC](#)) with an overall share of renewable energy (20%) and a specific target for transport (10%) by 2020. In 2013, the share of energy from renewable sources in transport [reached](#) 5.4%. While land-based biofuels have become the most important type of alternative fuel for achieving the target, rising global demand sharpened the need to minimise undesired impacts of their production. One of these impacts is the conversion of forests and wetlands into agricultural land, known as indirect land use change ([ILUC](#)).⁴ Estimates vary, but most studies [suggest](#) that ILUC can significantly decrease or even nullify the GHG emissions savings of biofuels compared to fossil fuels – on top of concerns about their impact on food security in developing countries, on biodiversity and on the

environment in general. Consequently, the EU rules for biofuel sustainability were [adapted](#) and new rules added ([Directive 2015/1513/EU](#)), regulating the effects of biofuel production on the ILUC.

In 2013, the Commission put forward a [strategy](#) for clean power in transport. The strategy outlines how alternative fuels can be used in all transport modes and focuses on technological developments, investments and raising public awareness, insisting that market development of alternative fuels should not only break the dependence on oil, but also reduce GHG emissions from transport.

National policies and initiatives led by cities

Worldwide, mitigation efforts of international bodies are complemented by national policies and action led, in particular, by cities. A recent [study](#) on climate legislation covering 98 countries and the EU [confirms](#) that new legislation is being adopted rapidly, as addressing climate change is seen as a matter of national interest.

Given that more than half of the world's population lives today in towns and cities, urban transport has turned into a major contributor to GHG transport emissions. Consequently, cities have become key actors in mitigating climate change by promoting sustainable urban mobility. The worldwide network of the world's megacities, [C40 Cities](#), addresses climate change by sharing best practice. Their transport initiatives include introducing rapid bus transit corridors, bike sharing programmes, congestion pricing and parking policies. On the European scale, the urban mobility observatory ([ELTIS](#)) facilitates the exchange of information, knowledge and experiences in the field of sustainable urban mobility, including the impact on climate.

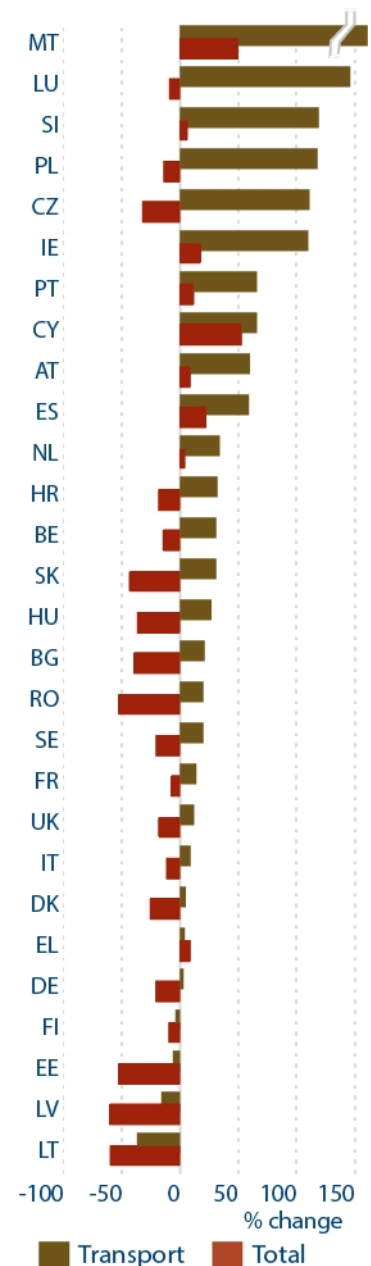
The European Parliament and GHG emissions from transport

The EP has systematically encouraged a strong policy of reducing both total and transport-related GHG emissions. In the process leading up to the adoption of the CO₂ emissions reduction targets for cars (Regulation [333/2014/EU](#)), Parliament [called](#) for the NEDC test standards to be replaced by the WLTP standards as soon as possible.

In connection with the 2030 Framework for climate and energy policies, the EP [stressed](#) the importance of biofuels in reducing GHG emissions in transport, and regretted the Commission's lack of willingness to ensure the continuation of the Fuel Quality Directive after 2020.

In the framework of the mid-term [review](#) of the [White Paper on Transport](#) from 2011, on 9 September 2015, the EP adopted a [resolution](#), 'Taking stock and the way forward towards sustainable mobility'. The EP insisted on keeping the original ambitious targets

Figure 4 – 2012 CO₂ emissions compared to 1990



Data source: [Statistical Pocketbook](#), 2015.

and asked the Commission to evaluate whether the actions proposed are sufficient to achieving the targets, and, if needed, propose additional legislative measures. The EP also asked for measures to increase the fuel efficiency of, and reduce CO₂ emissions from, HDVs. Following the EP resolution and the [EU Transport Council](#) on 8 October 2015, the European Commissioner for Transport, Violeta Bulc, announced that there will be no revision of the roadmap for a single European transport area or a new White Paper and that instead of amending or adding new objectives, Member States' efforts will focus first on applying existing provisions.

In its [resolution](#), 'Towards a new international climate agreement in Paris', of 14 October 2015, the EP warns that the climate targets cannot be reached without binding GHG reduction targets, full integration of renewables into the market, a technologically neutral approach to decarbonisation and an integrated transport and investment policy. The EP calls on all UNFCCC Parties to work through the ICAO and the IMO to develop a global policy framework in their sectors, and set adequate targets before the end of 2016 for an effective response to climate change.

Main references

Focusing on environmental pressures from long-distance transport; TERM 2014: transport indicators tracking progress towards environmental targets in Europe, European Environment Agency, EEA [Report](#) No 7/2014.

[Statistical Pocketbook](#), European Commission, 2015.

Endnotes

¹ [Decision 406/2009/EC](#) covers the six greenhouse gases controlled by the Kyoto Protocol: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (NO₂), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆).

² [Synopsis](#) of the thematic meeting, 'Greening in inland navigation from an economic perspective', Central Commission for the navigation on the Rhine, 2013.

³ Freight on road: why EU shippers prefer truck to train, [study](#), DG IPOL, Policy Department B, European Parliament, 2015. While the share of road freight intra-EU transport has increased, the share of rail freight has been constantly decreasing over recent decades, in contrast with the EU objectives (target shift of 30% from road to rail freight for distances over 300 km by 2030, and a shift of over 50% by 2050, as set out in the 2011 White Paper on transport).

⁴ The impact of biofuels on transport and the environment, and their connection with agricultural development in Europe, [study](#), DG IPOL, Policy Department B, European Parliament, 2015.

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