Transport and Environment Reporting Mechanism (TERM)

Progress of EU transport sector towards its environment and climate objectives

Emissions from the EU transport sector are not reducing enough to limit its environmental and climate impacts in Europe. Greenhouse gas (GHG) emissions from transport have increased over the last three years, whilst average CO2 emissions of new passenger cars increased for the first time in 2017. The sector remains a significant source of air pollution, especially of particulate matter (PM) and nitrogen dioxide, although these emissions have been reduced in the last decade. It also is the main source of environmental noise in Europe.

- GHG emissions from transport have been increasing since 2014. By 2016, transport emissions were 26.1 % higher relative to 1990. Preliminary estimates from EU Member States show that GHG emissions from transport were 28 % above 1990 levels in 2017.
- The average CO_2 emissions of new passenger cars slightly increased for the first time since data monitoring started. Meanwhile average CO_2 emissions of new vans continue to fall, with the largest annual reduction occurring in 2017. However, considerable reductions still need to take place in the coming years to meet the EU's 2020/2021 targets.
- The use of diesel remains dominant in Europe, representing 67 % of total fuel sold for road transport use in 2016. However, more petrol passenger cars than diesel cars were sold in 2017 (for the first time since CO_2 monitoring for passenger cars started).
- The EU's share of renewable energy in transport rose slightly from 7.1 % in 2016 to 7.2 % in 2017. It remains well below the 10 % target set for 2020 under the EU's Renewable Energy Directive. Just two Member States (Austria and Sweden) have already reached the 10 % goal.
- Electric cars are slowly penetrating the EU market. Despite significant increases in sales in 2017, battery electric vehicles (BEV) and plug-in hybrid electric vehicles (PHEV) represent only 0.6 % and 0.8 %, respectively of new passenger car registrations in the EU.
- Transport continues to be a significant source of air pollution, especially of PM and nitrogen dioxide, although these emissions have been reduced in the last decade due to the introduction of fuel quality standards, the Euro vehicle emission standards and the use of cleaner technologies.
- Road traffic is the most widespread source of environmental noise in Europe.

This briefing, based on the 'Transport and Environment Reporting Mechanism' (TERM) indicators of the European Environment Agency (EEA), tracks the short and long-term environmental performance of the transport sector in the European Union (EU). It also assesses progress made toward key transport-related policy targets. The EEA's TERM indicators have been monitoring progress in integrating environmental objectives in transport since 2000.

The EU's transport sector is not on track towards its climate goals

Transport is a key economic sector in Europe. Reducing the pressures it exerts on the environment and climate is therefore critical to achieve the long-term vision of the EU's Seventh Environment Action Programme (7EAP), 'living well, within the limits of our planet'. The European Commission's 2011 Transport White Paper sets out an indicative target of a 20 % reduction from 2008 levels by 2030 and a 60 % reduction in transport GHG emissions by 2050 compared to 1990. The more recent European strategy for low-emission mobility reiterates this target and identifies priority areas for action (EC, 2016). Specific targets, relevant to the performance of the transport sector on climate, are presented in the following pieces of EU legislation:

- the Renewable Energy Directive (2009/28/EC), which sets a 10 % share of renewable energy in the transport sector's final energy consumption for each Member State by 2020;
- the Regulations on CO_2 emissions from new passenger cars (443/2009) and new light commercial vehicles (510/2011) setting average emission limits of 95 g CO_2/km by 2021 (new cars) and 147 g CO_2/km by 2020 (new vans).

In addition, the Fuel Quality Directive (98/70/EC) sets out reporting requirements relating to the quality of petrol and diesel fuels sold for road transport in their territories. Member States shall require suppliers to reduce gradually the life cycle GHG emissions per unit of energy from fuel and energy supplied by up to 10 % by 31 December 2020.

The latest data available on past trends show that the EU transport sector is currently not on track to reach the policy targets on total GHG emissions over the last four years, on average CO_2 emissions from new cars for the first time in 2017, on oil consumption, and on energy use from renewable sources (see Table 1). However, average CO_2 emissions from new vans seem to be on track to meet the 2020 target.

Transport GHG emissions are increasing

Between 2007 and 2013 emissions decreased each year. Since this period GHG emissions from transport (including international aviation but excluding maritime shipping[1]) have been increasing. They now account for around one quarter of the EU's total GHG emissions. By 2016, transport emissions were 26.1 % higher relative to 1990. If preliminary data for 2017 is considered, they were 28 % above 1990 levels. However, the increase in transport GHG emissions is below the expected target path until 2016 (see table 1). This increase comes despite improvements in the efficiency of transport vehicles and is broadly in line with increases in the level of economic activity — as measured by gross domestic product (GDP) — as well as increases in demand for both passenger and freight transport. The transport sector remains the only main European economic sector in which GHG emissions have increased, when compared with 1990 levels (see Figure 1).

Road transport accounts for 82 % of the transport GHG emissions and one fifth of the EU's total GHG emissions and have grown since 2014. The second and third Mobility Packages proposed by the Commission in November 2017 and May 2018 respectively include legislative initiatives on road transport vehicles and infrastructure. The initiatives focus on the reduction of GHG emissions and air pollutant emissions and aim for a broad take up of low-emission alternative fuels and low-emission vehicles on the market.

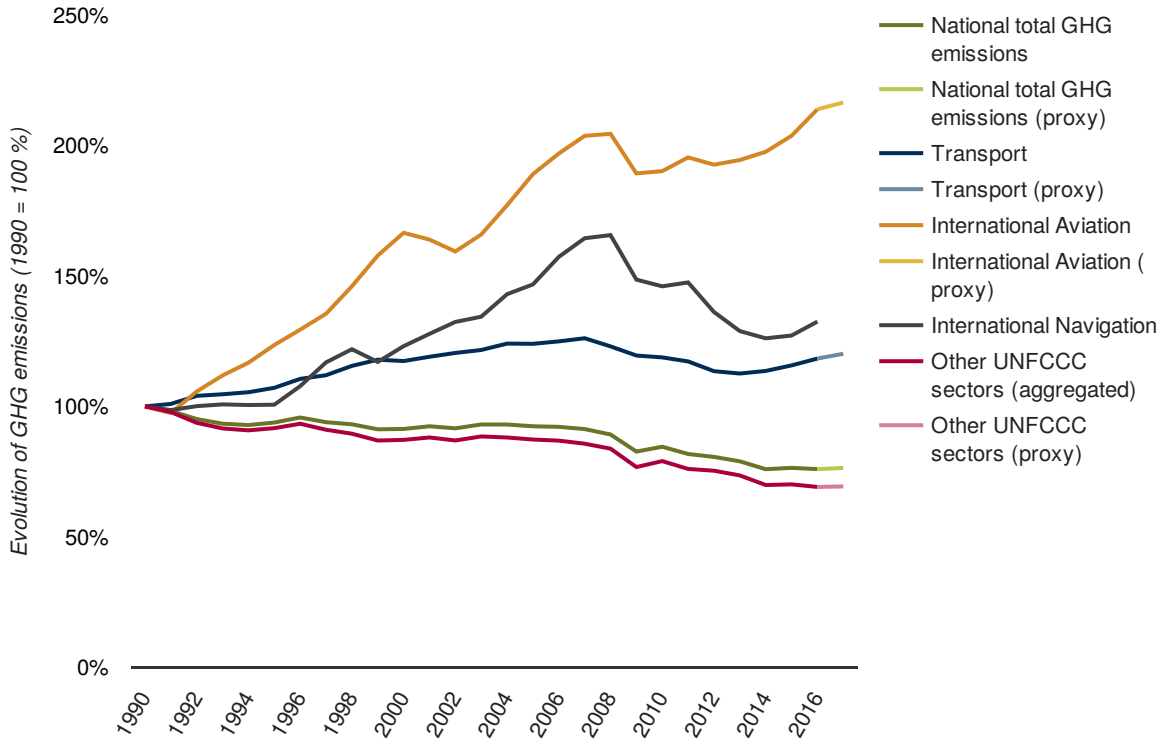
A comparison of the 2017 GHG emission levels with the 2030 indicative goals for transport outlined in the European strategy for low-emission mobility shows a further reduction of 16 % is necessary. Moreover, the long-term 2050 target (EC, 2011) requires a reduction of more than two-thirds of emissions compared with 2017 levels (see Table 1). See further information in TERM002.

GHG emissions from international aviation have more than doubled since 1990 and were almost 30 % higher in 2017 than in 2000. Emissions from the sector have increased over each of the last 5 years (2013-2017), at an average rate of over 2 % each year.

In October 2016, the International Civil Aviation Organization (ICAO) agreed on a basket of measures to address emissions from international aviation, including the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). CORSIA is a global market-based measure aiming to stabilise CO_2 emissions from international aviation at 2020 levels by requiring airlines to offset the growth of their emissions after 2020. The environmental effectiveness of offsets depends on robust implementation to ensure that the emission reductions delivered would not have occurred in the absence of the scheme.

Transport

Figure 1. EU GHG emissions in the transport sector, 1990–2017



Data sources: a. EEA. National emissions reported to the UNFCCC and to the EU Greenhouse Gas Monitoring Mechanism
b. EEA. Approximated greenhouse gas emissions in 2017

Transport

Table 1. EU progress in meeting selected transport goals on energy and climate

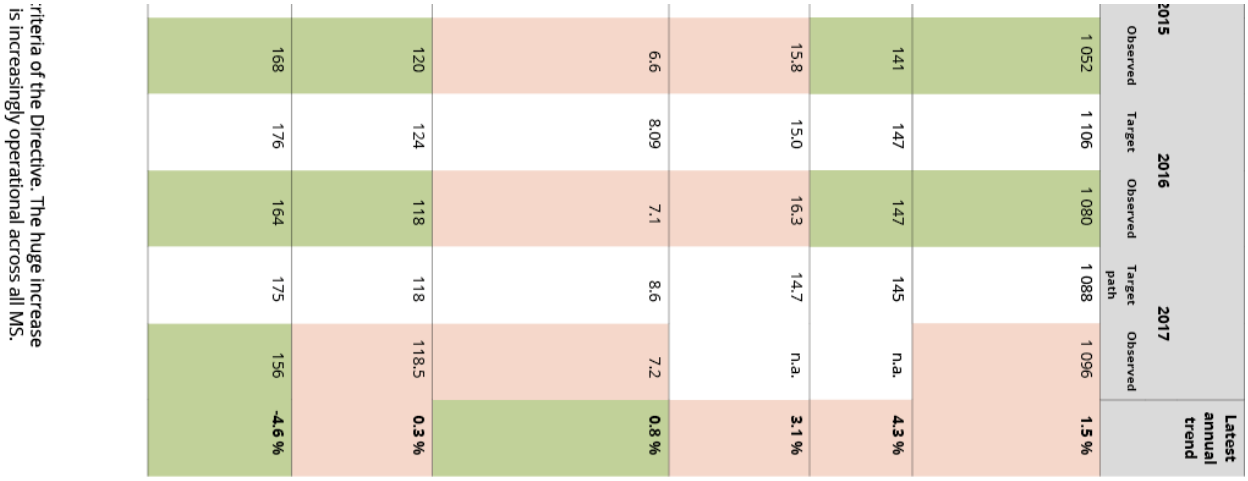
	Source	Target	Unit	Where we were: Base year		Where we want to be: Target		Where we are (current trends vs. target paths): 2000	2010		2011		2012		2013		2014		2
				Year	Value	Year	Value	Observed	Target	Observed	Target	Observed	Target	Observed	Target	Observed	Target	Observed	Target
Indicative goals	European Commission's 2011 Transport White Paper (EC, 2011; EC, 2016)	Transport GHG (including international aviation, excluding international maritime shipping) (ᵃ)	$MtCO_2$	1990	856	2030 2050	920 (+8 %) 335 (-60 %)	1 039	1 113	1 067	1 115	1 058	1 117	1 027	1 119	1 021	1 122	1 031	1 124
Indicative goals	European Commission's 2011 Transport White Paper (EC, 2011)	EU CO_2 emissions of maritime bunker fuels	$MtCO_2$	2005	163		98 (-40 %)	136	155	162	154	164	153	151	151	143	150	140	148
Indicative goals	Impact assessment accompanying document to the 2011 Transport White Paper (EC, 2011)	Reduction of transport oil consumption	million TJ	2008	17.3	2050	5.2 (-70 %)	15.9	16.8	16.4	16.5	16.3	16.2	15.6	15.9	15.4	15.6	15.6	15.3
Indicative goals	Renewable Energy Directive 2009/28/EC	10 % share of renewable energy in the transport sector final energy consumption for each Member State (here EU-28 as a proxy) (ᵃ) (ᶜ)	%	2010	5.20	2020	10.0		5.22	5.22	5.70	3.95	6.18	5.56	6.66	5.94	7.13	6.52	7.61
Binding targets	Passenger car CO_2 EC regulation 443/2009	Target average type-approval emissions for new passenger cars (ᵇ)	gCO_2/km	2010	140	2015 2021	130 95	172	140	140	138	136	136	132	134	127	132	123	130
Binding targets	Van CO_2 EC regulation 510/2011	Target average type-approval emissions for new light commercial vehicles (ᵇ)	gCO_2/km	2012	180	2017 2020	175 147						180	180	179	173	178	169	177

(ᵃ) Preliminary data for 2017

(ᵇ) EU-28 excl. Croatia until 2013. EU-28 from 2014 onwards. Data for 2017 is provisional.

(ᶜ) In the case of the Renewable Energy Directive (EU, 2009a) target, Eurostat published for the first time (2011 data) the share of biofuels in transport energy use which meet the sustainability c between 2011 and 2012 (increase by 40.8 %) is explained by the fact that in previous years the new sustainability criteria were not fully applied. The system for certifying sustainable biofuels

Transport



2015 Observed	2016 Target	2016 Observed	2017 Target path	2017 Observed	Latest annual trend
1 052	1 106	1 080	1 088	1 096	1.5 %
141	147	147	145	n.a.	4.3 %
15.8	15.0	16.3	14.7	n.a.	3.1 %
6.6	8.09	7.1	8.6	7.2	0.8 %
120	124	118	118	118.5	0.3 %
168	176	164	175	156	-4.6 %

:riteria of the Directive. The huge increase is increasingly operational across all MS.

Notes:

(a) Preliminary data for 2017

(b) EU-28 excl. Croatia until 2013. EU-28 from 2014 onwards. Data for 2017 is provisional.

(c) In the case of the Renewable Energy Directive (EU, 2009a) target, Eurostat published for the first time (2011 data) the share of biofuels in transport energy use which meet the sustainability criteria of the Directive. The huge increase between 2011 and 2012 (increase by 40.8 %) is explained by the fact that in previous years the new sustainability criteria were not fully applied. The system for certifying sustainable biofuels is increasingly operational across all MS.

For each target or goal, the base year and corresponding value serve as a starting point for the target trajectory. For the target on transport GHG emissions, the trajectory corresponds to the preferred policy option defined in the 2011 Transport White Paper to reach the objective. For the other objectives, the EEA assumes a linear trend towards the target, starting from the base year. The table provides only a selection of transport goals. Others cannot yet be fully monitored due to a lack of data and/or the complicated nature of the evaluation required.

Red-coloured cells means that the observed value exceeds the target path in the particular year, whereas green means that the observed values are in line with the target path. The red colour in the column “Latest annual trend” means that the last annual change did not follow the direction of the target.

GHG emissions from shipping are 10 % below 2005 levels but need a further decrease of 34 % from current levels by 2050

After they peaked in 2008, GHG emissions from maritime bunker fuels (or fuel use in ships in relation to international transport) sold in the EU decreased by almost one quarter during the period 2009-2014 2014, largely a result of the economic recession. However, since then, these emissions have followed an upward trend, amounting to 147 Mt CO_2 in 2016. This is still 10 % below 2005 levels. In order to reach the 40 % reduction 2050 target compared with 2005 levels (EC, 2011), GHG emissions from shipping need to a further decrease by 34 % from 2016 levels.

A new system for monitoring, reporting and verification of CO_2 emissions from maritime transport (established by Regulation (EU) 2015/757) started in 2018, introducing obligations to report data on annual maritime GHG emissions and other relevant information.

The International Maritime Organization (IMO) adopted, in April 2018, its Initial Strategy to reduce GHG emissions from ships of at least 50 % by 2050 compared to GHG emissions in 2008.

Average CO_2 emissions for new vans continue to fall, although no improvements for new passenger cars

Specific emissions from newly registered passenger cars have decreased by 15 % between 2010, when monitoring under the current regulation started, and 2017. The 2015 target of 130 g CO_2/km was met in 2013, 2 years before the deadline. However, provisional data show that average emissions slightly increased by 0.4 g CO_2/km in 2017, the first increase since monitoring started. In 2017, petrol passenger cars became the best-selling vehicles in the EU, constituting almost 53 % of sales. Diesel cars made up 45 % of new registrations.

Monitoring of CO_2 emissions from new vans started in 2012. In 2017, according to provisional data, average emissions decreased by 7.7 g CO_2/km compared with 2016, which is the largest annual decrease since 2012. During the 2012-2017 period, average specific emissions decreased by 24 g CO_2/km or 13 %. In order to meet the 2021 target of 95 g CO_2/km for passenger cars and the 2020 target of 147 g CO_2/km for vans, average CO_2 emissions will need to decrease further by almost 20 % for new passenger cars and around 6 % for vans.

See further information in TERM017.

Reducing oil consumption for transport remains challenging

Transport remains very dependent on oil, with oil-derived fuels accounting for 95 % of final energy consumption in transport. After reaching its peak in 2007, transport oil consumption (including maritime bunkers) decreased continuously until 2013, when it reached 11 % below 2007 levels. This was due to improvements in energy efficiency, the impacts of the economic recession that caused a subsequent decline in transport demand, and a period of high oil prices after 2010. Since 2014, oil consumption from transport has been following an upward trend at an average rate of 1.7 % each year. In 2016, it was 4.8% below 2008 levels.

Within the sector, road transport accounts for the largest share of oil derived fuels, as it was responsible for 77 % of total consumption in the EU in 2016. Despite a decrease since 2007, energy consumption from road transport in 2016 was still 26 % higher than in 1990. The fraction of diesel used in road transport has continued to increase between 2000 and 2016, from 51 % to

more than 67 % of total fuel sales in road transport. This confirms an increasing dieselisation of Europe's vehicle fleet over that period.

In order to reach a 70 % reduction in oil consumption from transport compared with 2008 (EC, 2011), the additional efforts needed remain challenging. Even though the EU was on the target path until 2014, it exceeded the projected downward target trend in 2015 and 2016, due to an increase in energy consumption in road transport and international aviation. Transport oil consumption will need to fall by more than two-thirds to meet the objectives of a 70 % reduction of oil consumption by 2050.

See further information in TERM001.

Only two Member States have achieved a 10 % share in renewable energy in transport

Under the Renewable Energy Directive, all EU Member States must achieve a 10 % share in renewable energy consumption by 2020 in the transport sector. Only those biofuels complying with the sustainability criteria under the Renewable Energy Directive and the Fuel Quality Directive are considered for this target. According to preliminary EEA estimates for 2017, the proportion of renewable energy use in transport grew from 7.1 % in 2016 to 7.2 % in 2017. At the EU level, the trend in renewable share remains well below the target path to reach the 2020 goal. The share of renewable energy in transport varied across countries, from 30 % (Sweden) to close to 0.4 % (Estonia). Austria and Sweden are the only two Member States which have already reached the goal of a 10 % share of energy from renewable sources in transport by 2020.

Renewable energy in this sector comes overwhelmingly from biofuels (close to 90 %), with electricity still playing a limited role. A higher share of renewable electricity use in the transport sector would reduce the pressure on biofuels to reach the EU's 10 % target (EEA, 2017).

See further information in TERM031.

The electrification of road transport increases but remains overall limited

Electric vehicles are anticipated to be a key component of Europe's mobility system, helping reduce impacts on climate change and air quality. The largest potential reduction in GHG emissions lies during the use of the BEV. However, it will depend on the electricity mix (i.e. the average mix of fuels used to produce electricity, which affects the carbon intensity of the electricity). Whereas the life-cycle emissions of a BEV using electricity generated from renewable sources could be almost 90 % lower than an equivalent ICEV (IEA, 2017), BEVs charged with electricity generated from coal currently have higher life-cycle emissions than internal combustion engine vehicles (ICEV). In addition, while BEVs have zero exhaust emissions and thus contribute to improved air quality, non-exhaust emissions (from tyre and brake wear, and road abrasion), as well as emissions from energy production, still occur. In the future, with greater use of lower carbon electricity in the European mix, GHG emission savings, as well as advantages in terms of air quality of BEVs relative to ICEVs will increase (EEA, 2018).

Electric cars are slowly penetrating the EU market. BEVs comprised 0.6 % of total new passenger car registrations in the EU in 2017. This is a 51 % increase in just one year. Sales of PHEVs increased by 35 % in 2017 compared with 2016. PHEVs represented 0.8 % of total new passenger car registrations in the EU in 2017. Most Member States in Europe have introduced financial incentives for the purchase of electrically charging vehicles and are encouraging consumers to choose cleaner vehicles. Among Member States, Sweden, Belgium, Finland had the highest sales of BEVs and PHEVs in new passenger car fleet.

See further information in TERM034.

The transport sector has significantly reduced its emissions of certain air pollutants

Between 2000 and 2016, the transport sector significantly reduced emissions of certain air pollutants: sulphur oxides (SO_X), nitrogen oxides (NO_X), and PM emissions. This was due to the introduction of fuel quality standards, the Euro vehicle emission standards and the use of cleaner technologies. With the exception of aviation, all modes of transport contributed to the decrease.

Transport is responsible for more than half of all NO_X emissions and significantly contributes to the total emissions of the other air pollutants. Road transport, in particular, continues to make a significant contribution to emissions of NO_X (37 %).The contribution of road transport to harmful NO_2 concentrations, especially in urban areas, is considerably higher, because emissions occur close to the ground and mainly in densely populated areas.

While emissions from road transport are mostly exhaust emissions arising from fuel combustion,

non-exhaust releases contribute to both non-methane volatile organic compounds (NMVOCs) (from fuel evaporation) and primary PM (from tyre- and brake-wear, and road abrasion). While emissions of $PM_{2.5}$ from road transport have declined by 50 % since 2000, the relative importance of non-exhaust emissions has increased since the introduction of vehicle particulate abatement technologies reduced exhaust emissions.

See further information in TERM003.

Noise pollution from transport significantly affects more than 100 million European citizens, particularly at night

Noise pollution is an important environmental health problem in Europe, with road traffic being the most widespread source of environmental noise in Europe. According to the latest data reported under the EU's Environmental Noise Directive, around 100 million people are exposed to average sound levels of 55 dB or higher during the day, evening and night for road traffic noise, 20 million for railway noise, 4 million for aircraft noise and 1 million for noise caused by industries. Similarly, road traffic is by far the biggest source of environmental noise during night time, affecting around 75 million people, followed by rail with 15 million people, air with 1.5 million people and industrial noise with 0.5 million people. While aircraft noise does not affect a wide geographical area, it is typically perceived as more annoying and sleep disturbing than other sources at the same noise levels.

See further information in TERM005.

Further reading – TERM indicator fact sheets

TERM001: Final energy consumption by mode of transport

TERM002: Greenhouse gas emissions from transport

TERM003: Emissions of air pollutants from transport

TERM004: Exceedance of air quality objectives due to traffic

TERM005: Population exposure to environmental noise

TERM017: Average CO_2 emissions from newly registered motor vehicles

TERM020: Real change in transport prices by mode

TERM021: Transport fuel prices and taxes

TERM031: Use of renewable fuels in transport

TERM032: Size of the vehicle fleet

Transport

TERM034: Electric vehicles as a proportion of the total fleet

TERM039: Passenger and freight transport demand

Endnote

[1] GHG emissions from international aviation and from international maritime shipping are not included in official national total GHG emissions, but are reported separately as memo items. However, the calculation of transport GHG emissions presented here includes emissions from international aviation, as those emissions are covered by the EU domestic targets on GHG emission reductions for 2020 and 2030. > Back

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