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**First reading of the indicators on transport and environment
not covered by the Guidelines****Indicators on transport not covered by the Guidelines for the
Application of Environmental Indicators in Eastern Europe,
the Caucasus and Central Asia****Note by the secretariat***Summary*

The Joint Task Force on Environmental Indicators, at its sixth session, requested the secretariat to prepare proposals, in the light of the latest developments in other forums, for additional indicators on transport and green economy to be considered at its seventh session (ECE/CEP-CES/GE.1/2012/10, para. 59 (e)).

This present document, on transport indicators not covered by the Guidelines for the Application of Environmental Indicators in Eastern Europe, the Caucasus and Central Asia,¹ was prepared by the secretariat with the assistance of a consultant. It is submitted to the Joint Task Force to serve as the basis for a decision to include additional selected indicators in the Guidelines.

¹ *Environmental indicators and indicator-based assessment reports: Eastern Europe, Caucasus and Central Asia*, United Nations publication, Sales No. E 07.II.E.9, Part One.

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I. Introduction

1. During the past few decades various international and national organizations have been developing sets of indicators to measure and assess the impact of transport on the environment and human health.

2. The European Environment Agency (EEA) has developed a set of 40 indicators for the transport sector (TERM), three of which are included in the Core Set of Environmental Indicators (CSI).² The indicators describe the development of the sector and implications for the environment and transport policy actions. These indicators are listed in an annex to the present document. The EEA indicator fact sheets on the transport sector constitute the basis for regular environment reporting (environmental indicator reports).³

3. Certain basic transport-related indicators have been developed by the Organization for Economic Cooperation and Development (OECD) and by the Statistical Office of the European Union (Eurostat) (see annex); however these are not focused on environmental issues explicitly.

4. The United Nations Economic Commission for Europe (ECE) Working Party on Transport Statistics collects data on transport regularly and has developed six main indicators for road transport (see annex).

5. The analysis of transport-related indicators used by EEA, OECD/Eurostat and ECE has led to the conclusion that four of these indicators have already been included in the ECE Guidelines for the Application of Environmental Indicators in Eastern Europe, Caucasus and Central Asia (Guidelines).⁴ However, to harmonize further reporting on transport-related indicators across the pan-European region the present document presents a proposal to incorporate six additional indicators in the Guidelines. Some of these indicators could be produced using basic data collected for indicators already included in the Guidelines. For the others, additional data collection and/or calculations will be required.

6. On the basis of the above, the following six indicators are recommended for use in the countries of Eastern and South-Eastern Europe, the Caucasus and Central Asia (the target countries):

- (a) Use of cleaner and alternative fuels;
- (b) Exceedances of air quality objectives due to traffic;
- (c) Transport accident fatalities;
- (d) Waste from road vehicles;
- (e) Fuel prices;
- (f) Proportion of vehicle fleet meeting certain emission standards.

² See *Environmental Indicator Report 2012: Ecosystem Resilience and Resource Efficiency in a Green Economy in Europe* (Copenhagen, EEA, 2012).

³ The fact sheets are available from the EEA website at <http://www.eea.europa.eu/data-and-maps/indicators>.

⁴ *Environmental indicators and indicator-based assessment reports: Eastern Europe, Caucasus and Central Asia*, United Nations publication, Sales No. E 07.II.E.9, Part One. The revised Guidelines are available, by indicator, from <http://www.unece.org/environmental-policy/areas-of-work/environmental-monitoring/areas-of-work/enveuropemonitoringandr-en/revised-guidelines-on-the-application-of-environmental-indicators.html>.

7. A detailed description of the new indicators proposed in paragraph 6 is given in section II below.

II. Proposed additional indicators

A. Use of cleaner and alternative fuels

1. General description

(a) Brief definition

Shares of low sulphur fuels (<50 parts per million (ppm) sulphur), zero sulphur fuels (<10 ppm) and biofuels⁵ in total fuel consumption by road transport (in % of fuels sold for transport purposes).

(b) Unit of measurement

Petrol and diesel fuels are measured in millions of litres and presented as shares of regular, low-sulphur and zero-sulphur fuel, respectively. Final energy consumption of biofuels, diesel and gasoline for road transport are measured in Terajoules net calorific values and presented as a percentage of biofuels with regard to the sum of all three fuels.

2. Relation to other indicators from the Guidelines

This indicator relates to indicators A-1 (Emissions of pollutants into the atmospheric air), A-2 (Ambient air quality in urban areas) and B-3 (Greenhouse gas emissions).

3. Relevance for environmental policy

(a) Purpose

The indicator provides a measure of existing pressure on the environment in terms of emissions of harmful substances and greenhouse gases (GHGs) (mainly carbon dioxide (CO₂)) into the atmospheric air.

(b) Background

The road transport sector represents an important share of total emissions of both air pollutants and GHGs (mainly CO₂). In addition, the contribution of exhaust emissions to urban air pollution is even more significant, as exhaust gases and particulate matter (PM) are being emitted in the lowest layer of the atmosphere. A reduction in the sulphur content of petrol and diesel fuels is expected to have a large impact on exhaust emissions, as it will enable the introduction of more sophisticated after-treatment systems, such as nitrogen oxides (NO_x) catalysts and diesel particulate filters. Promotion of biofuels in the transport sector is essential for reducing GHGs and especially CO₂.

(c) International agreements and targets

Global level

The United Nations Framework Convention on Climate Change (UNFCCC) binds the Parties to reduce their GHG emissions, ensure collection of the relevant information, and

⁵ "Biofuels" means liquid or gaseous fuel for transport produced from biomass.

develop strategies for adaptation to climate change and for cooperation in research and in developing new technologies. UNFCCC requires all Parties to carry out GHG emission inventories. In addition, the annex I countries must regularly submit “national communications” to the Conference of the Parties describing their efforts undertaken to implement the Convention, including projection of GHG emissions for the next 10–20 years. The Kyoto Protocol to the UNFCCC stipulates that annex I Parties (mainly industrialized countries) must individually or jointly reduce their aggregate emissions of a “basket” of six GHGs by 5% below 1990 levels (i.e., target value of 95% of the 1990 levels). In order to eliminate weather factors (the impact of colder winters in particular years), the compliance with the target value was to be assessed on the basis of average annual GHG emissions for the period 2008–2012. In order to achieve the group target, each Party had to accomplish its own specific task in the area of GHG emissions reduction. The Russian Federation and Ukraine, for instance, had to stabilize their emissions at 1990 levels, whereas the EU-15⁶ countries had to reduce their levels by 8%. Leaders at the World Summit on Sustainable Development held in Johannesburg in 2002, as well as at the United Nations Conference on Sustainable Development (Rio+20 Conference) in 2012, made commitments to an urgently needed and substantial increase in the use of renewable (non-carbon) energy sources, as well as the setting up of programmes leading to more sustainable consumption and production patterns, with a special focus on a reduction in energy use, including for the transport sector.

Regional level

The ECE Convention on Long-range Transboundary Air Pollution requires implementation of measures to prevent, control and reduce emissions of air pollutants and to exchange information on them. The Convention and its eight Protocols together set targets for the reduction of specific emissions, prescribe stringent emission limit values for mobile and stationary emission sources and quality standards for fuels, propose concrete pollution reduction measures and establish requirements regarding the submission of data on emissions of the above-mentioned pollutants. The “older” protocols on sulphur, NO_x and non-methane volatile organic compounds (NMVOC) have been followed up by the Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone which represents a new “multi-pollutant/multi-effect” approach and sets emission reduction targets (emission ceilings) for sulphur dioxide (SO₂), NO_x, ammonia (NH₃) and NMVOC which were to be reached by 2010. In 2012, a substantial revision of the Gothenburg Protocol was adopted, including new national emission ceilings (expressed in percentage reductions from 2005 levels) to be reached by 2020. With the adoption of the revision emission ceilings were also set for a fifth controlled pollutant, namely fine particulate matter (PM_{2.5}).⁷

The ECE Transport, Health and Environment Pan-European Programme (THE PEP) proposes to reduce emissions of transport-related GHGs, air pollutants and noise by supporting a shift in the vehicle fleet towards zero- or low-emission vehicles and fuels based on renewable energy.

⁶ The 15 member countries in the European Union prior to 1 May 2004, i.e., Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and the United Kingdom of Great Britain and Northern Ireland.

⁷ I.e., particles less than 2.5 micrometres in diameter.

*Subregional level**(i) Eastern Europe, the Caucasus and Central Asia*

The Environmental Strategy for Countries of Eastern Europe, the Caucasus and Central Asia, adopted by the Fifth “Environment for Europe” Ministerial Conference (Kyiv, 2003),⁸ foresees, in particular, energy-efficiency measures in environmental policies and programmes for mitigating climate change and for achieving the Kyoto Protocol targets, as well as the development and implementation of national transport strategies for sustainable development using less energy-intensive modes of transport and the introduction of incentives for environmentally sustainable transport, including public transport.

(ii) European Union

The European Union (EU) takes the lead in climate change-related issues, including reduction of GHG emissions, and has established a specialized Directorate General for Climate Action within the European Commission. The Second European Climate Change Programme was launched in 2005 followed in 2011 by the Roadmap for moving to a competitive low carbon economy in 2050. Both of these documents give high priority to reducing GHG emissions from the transport sector. The EU Thematic Strategy on the Urban Environment of 2006 calls for the use of “cleaner” modes of transport and for improving population mobility. The Renewable Energy Directive⁹ requires the achievement of a 10% share of energy from renewable sources in each member State’s transport energy consumption by 2020. The EU white paper (COM(2011) 144 final), “Roadmap to a Single European Transport Area — Towards a competitive and resource efficient transport system”, was adopted in 2011. It proposes to halve the use of “conventionally fuelled” cars in urban transport by 2030 and to phase them out in cities by 2050. The EU Fuel Quality Directive¹⁰ requires that the sulphur content in both petrol and diesel fuel placed on the EU market must not exceed 10 milligrams per litre (mg/l).

4. Methodology and guidelines**(a) Data collection and calculations**

The shares of low- and zero-sulphur petrol and diesel are calculated by dividing the consumption of each fuel by the total fuel consumption of petrol and diesel, respectively. The share of biofuels is based on their energy content and is thus calculated by dividing the energy consumption of biofuels by the energy consumption of all petrol and diesel sold for transport purposes.

(b) Internationally agreed methodologies and standards

The ECE, International Transport Forum (ITF) and Eurostat *Common Questionnaire on Transport Statistics* (2002) was developed jointly by these bodies to coordinate the data

⁸ ECE/CEP/94/Rev.1, para. 61.

⁹ Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

¹⁰ Directive 98/70/EC of the European Parliament and of the Council of 13 October 1998 relating to the quality of petrol and diesel fuels and amending Council Directive 93/12/EEC.

collection by ECE, Eurostat and ITF. There is also an EEA fact sheet for the indicator “Use of cleaner and alternative fuels (CSI 037)”.¹¹

5. Data sources and reporting

In a number of countries of Eastern Europe, the Caucasus and Central Asia, data on fuel consumption (mainly petrol and diesel fuel) are published regularly in statistical yearbooks. The ministries of transport in several of these countries also collect and report data annually to the ECE Transport Division.

6. References at the international level

- (a) UNFCCC;¹²
- (b) ECE Convention on Long-range Transboundary Air Pollution and its protocols;¹³
- (c) ECE Transport Statistics for Europe and North America (annual publication);
- (d) *Illustrated Glossary for Transport Statistics*, ECE, Eurostat and ITF, 4th ed., 2009;
- (e) Thematic Strategy on the Urban Environment (COM/2005/0718 final);
- (f) Directive 98/70/EC of the European Parliament and of the Council of 13 October 1998 relating to the quality of petrol and diesel fuels and amending Council Directive 93/12/EEC, as amended by Directive 2009/30/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 98/70/EC as regards the specification of petrol, diesel and gas-oil and introducing a mechanism to monitor and reduce greenhouse gas emissions and amending Council Directive 1999/32/EC as regards the specification of fuel used by inland waterway vessels and repealing Directive 93/12/EEC;
- (g) Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC;
- (h) EU white paper, “Roadmap to a Single European Transport Area — Towards a competitive and resource efficient transport system.” (COM/2011/0144 final);
- (i) EU Action Plan on Urban Mobility (COM/2009/0490 final);
- (j) ECE Transport Division;¹⁴
- (k) THE PEP;¹⁵
- (l) European Commission Air policy website;¹⁶
- (m) European Commission Climate Action policy website;¹⁷
- (n) European Commission Mobility and Transport website;¹⁸

¹¹ See <http://www.eea.europa.eu/data-and-maps/indicators/use-of-cleaner-and-alternative-fuels/use-of-cleaner-and-alternative-3>.

¹² See <http://unfccc.int/2860.php>.

¹³ See <http://www.unece.org/env/lrtap/welcome.html>.

¹⁴ See <http://www.unece.org/trans/welcome.html>.

¹⁵ See <http://www.unece.org/thepep/en/welcome.html>.

¹⁶ See http://ec.europa.eu/environment/air/index_en.htm.

¹⁷ See http://ec.europa.eu/policies/climate_action_en.htm.

¹⁸ See http://ec.europa.eu/transport/index_en.htm.

- (o) ITF;¹⁹
- (p) EEA Transport website;²⁰
- (q) EEA Air website;²¹
- (r) Eurostat transport statistics;²²
- (s) OECD statistics.²³

B. Exceedances of air quality objectives due to traffic

1. General description

(a) Brief definition

1. The number or percentage of days during a year with air pollution levels exceeding the established limit values (maximum allowable annual and short-term concentrations (MACs)) for total suspended particulates (TSP), coarse PM (PM₁₀),²⁴ PM_{2.5}, nitrogen dioxide (NO₂), carbon monoxide (CO), ground-level ozone (O₃) and polycyclic aromatic hydrocarbons (expressed as benzo(a)pyrene) in urban areas with regular observations of air quality at sampling points (monitoring stations) classified as traffic sampling points (traffic monitoring stations).
2. Absolute values of concentration of pollutants in the air at sampling points (monitoring stations) classified as traffic sampling points (traffic stations).
3. Percentage of urban population in a country exposed to air pollution above the established limit values.

(b) Unit of measurement

1. Days or percentage of days during a year with exceeded short-term/daily average limit values.
2. Concentration of pollutants (micrograms (µg) or nanograms (ng), as appropriate for a particular pollutant) in a cubic metre (m³) of air.
3. Percentage of population living in areas with exceeded limit values.

2. Relation to other indicators from the Guidelines

This indicator relates to indicators A-1 (Emissions of pollutants into the atmospheric air) and A-2 (Ambient air quality in urban areas).

¹⁹ See <http://www.internationaltransportforum.org/>.

²⁰ See <http://www.eea.europa.eu/themes/transport>.

²¹ See <http://www.eea.europa.eu/themes/air>.

²² See <http://epp.eurostat.ec.europa.eu/portal/page/portal/transport/data>.

²³ See <http://www.oecd.org/statistics/>.

²⁴ I.e., particles between 2.5 and 10 micrometers in diameter.

3. Relevance for environmental policy

(a) Purpose

The indicator provides a direct measure of the state of the environment in terms of air quality and the impact of air pollution from transport on the population and vegetation/ecosystems and an implicit measure of the pressure of transport on air quality.

(b) Background

Road transport is one of the largest contributors to NO_x emissions, emissions of primary PM₁₀ and PM_{2.5}, as well as emissions of O₃ precursors and secondary particulate formation precursors such as CO, NH₃ and NMVOC. Increased concentrations of pollutants in the lower layers of the atmosphere can have various adverse impacts on human health, vegetation/ecosystems and materials. Exposure to PM, measured as concentrations of PM₁₀ or PM_{2.5} in ambient air, represents, together with heavy metals and persistent organic pollutants (POPs), one of the largest human health risks from air pollution. Short-term inhalation of high concentrations of suspended PM₁₀ and PM_{2.5} may cause increased symptoms for asthmatics, respiratory symptoms, reduced lung capacity and increased risk of serious diseases. Moreover, there is considerable evidence of negative impact on human health from CO, NO_x and O₃ in ambient air.

(c) International agreements and targets

Regional level

The ECE Convention on Long-range Transboundary Air Pollution and its eight protocols commit the Parties to reducing and preventing air pollution by the emissions of SO₂, NO_x, NH₃, NMVOC, O₃, PM, lead, mercury, cadmium and POPs. However, ambient air quality limit values are not laid down.

The World Health Organization (WHO) Regional Office for Europe (WHO/Europe), in its air quality guidelines,²⁵ sets out limit values for 32 main air pollutants. A 2005 revised edition of the guidelines²⁶ updates limits for SO₂, NO₂, PM and O₃.

Subregional level

(i) *Eastern Europe, the Caucasus and Central Asia*

The Environmental Strategy for Countries of Eastern Europe, the Caucasus and Central Asia foresees, in particular, the optimization of standards for ambient air pollution in cities with respect to environmental impacts and to combined health impacts (based on WHO criteria).

(ii) *European Union*

In the EU, Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe regulates ambient air concentrations of PM₁₀, PM_{2.5}, SO₂, NO₂, NO_x, CO, benzene, lead and O₃ and sets detailed rules for air quality assessment. Concentrations of arsenic, cadmium, nickel and polycyclic aromatic

²⁵ *Air Quality Guidelines for Europe*, 2nd ed., WHO Regional Publications, European Series, No. 91 (Copenhagen, WHO Regional Office for Europe, 2000).

²⁶ *Air Quality Guidelines — Global update 2005: Particulate matter, ozone, nitrogen dioxide and sulfur dioxide* (Copenhagen, WHO Regional Office for Europe, 2005).

hydrocarbons (represented by benzo(a)pyrene) in ambient air are regulated by the Directive 2004/107/EC (see international references, paragraph (h) below).²⁷

4. Methodology and guidelines

(a) Data collection and calculations

Data is collected via an air quality monitoring network consisting of fixed manual or automated monitoring stations which may be complemented by mobile stations. The selection strategy for traffic sampling point locations should focus on areas with the highest concentration of mobile emission sources (city centres and highways). The monitoring network should also provide a public alert system when limit values are exceeded. National calibration laboratories should be established and quality assurance/quality control (QA/QC) procedures introduced. For the purpose of this indicator, the urban population is the total number of people living in cities with at least one traffic monitoring station. The indicator should be calculated for exceedance of limit values (MACs) for at least a limited number of priority pollutants, such as SO₂, NO₂, TSP, PM₁₀ and O₃.

(b) Internationally agreed methodologies and standards

Global and regional level

Global agreed methodologies and standards include *WHO Air Quality Guidelines for Europe*, covering 32 pollutants, and International Organization for Standardization (ISO) air quality standards (ISO 13.040).

Regional level

At the regional level, agreed methodologies and standards include the ECE 2012 *Guidelines for Developing National Strategies to Use Air and Water Quality Monitoring as Environmental Policy Tools — Eastern Europe, the Caucasus, Central Asia and South-Eastern Europe* (ECE/CEP/168).

Subregional level: European Union

EU Directive 2008/50/EC on ambient air quality and cleaner air for Europe sets detailed rules for air quality assessment, including data quality objectives, assessment requirements (measurement or modelling), the minimum number and siting of sampling points and reference methods. Detailed rules for reporting are set by Commission Implementing Decision 2011/850/EU laying down rules for Directives 2004/107/EC and 2008/50/EC as regards the reciprocal exchange of information and reporting on ambient air quality. The EEA has also produced a fact sheet for the indicator “Exceedance of air quality objectives due to traffic (TERM 004)”.²⁸

5. Data sources and reporting

Data on ambient air pollution concentrations are routinely collected in national monitoring networks. General data on air quality in cities are published in annual environmental reports, while actual data are being published at the municipal level. The WHO Healthy Cities Network and the WHO/Europe on Environment and Health Process collect air

²⁷ More information on limit values applied in the EU can be found in the description of indicator A-2 (Ambient air quality in urban areas).

²⁸ See <http://www.eea.europa.eu/data-and-maps/indicators/exceedances-of-air-quality-objectives/exceedances-of-air-quality-objectives-2>.

quality data from participating national agencies. Eurostat, EEA and OECD collect air quality data from their member States.

6. References at the international level

- (a) *Air Quality Guidelines for Europe*, 2nd ed., WHO Regional Publications, European Series, No. 91 (Copenhagen, WHO Regional Office for Europe, 2000);
- (b) *Air Quality Guidelines — Global update 2005: Particulate matter, ozone, nitrogen dioxide and sulfur dioxide* (Copenhagen, WHO Regional Office for Europe, 2005);
- (c) *Guidelines for Developing National Strategies to Use Air and Water Quality Monitoring as Environmental Policy Tools — Eastern Europe, the Caucasus, Central Asia and South-Eastern Europe* (ECE/CEP/168);
- (d) Human Exposure Assessment, Environmental Health Criteria Document 214 of the International Programme on Chemical Safety (WHO, 2000);²⁹
- (e) *Monitoring ambient air quality for health impact assessment*, WHO Regional Publications, European Series, No. 85 (Copenhagen, WHO Regional Office for Europe, 1999);
- (f) Environmental Health Indicators: Framework and Methodologies, prepared by D. Briggs, Occupational and Environmental Health Series (WHO/SDE/OEH/99.10) (WHO, 1999);
- (g) Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe;
- (h) Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury and polycyclic aromatic hydrocarbons in ambient air;
- (i) Commission Implementing Decision 2011/850/EU of 12 December 2011 laying down rules for Directives 2004/107/EC and 2008/50/EC of the European Parliament and of the Council as regards the reciprocal exchange of information and reporting on ambient air quality;
- (j) Commission Decision 2004/461/EC of 29 April 2004 establishing a questionnaire to be used for annual reporting on ambient air quality assessment under Council Directives 96/62/EC and 1999/30/EC and under Directives 2000/69/EC and 2002/3/EC of the European Parliament and of the Council;
- (k) *Air Quality in Europe – 2012 Report*, EEA report No 4/2012 (Copenhagen, European Environment Agency, 2012);
- (l) Convention on Long-range Transboundary Air Pollution and its protocols;³⁰
- (m) WHO/Europe air quality website;³¹
- (n) EEA Air pollution website;³²
- (o) Eurostat environment statistics;³³

²⁹ This document is available online from <http://www.inchem.org/documents/ehc/ehc/ehc214.htm>.

³⁰ See <http://www.unece.org/env/lrtap/welcome.html>.

³¹ See <http://www.euro.who.int/en/what-we-do/health-topics/environment-and-health/air-quality>.

³² See <http://www.eea.europa.eu/themes/air>.

- (p) European Commission air policy website;³⁴
- (q) The European Environment Information and Observation Network (Eionet).³⁵

C. Transport accident fatalities

1. General description

(a) Brief definition

The number of persons killed each year in transport accidents, by mode of transport, expressed both as absolute totals and per million population. The modes of transport covered by this indicator are road, rail, air, inland waterways and sea transport.

(b) Unit of measurement

The number of persons killed in traffic accidents is measured in absolute numbers. Relative change in road fatalities is measured in relation to a base year (suggested base year is 2000). It can be also measured as road fatalities per million population: absolute number of people killed in traffic accidents/1 million people.

2. Relation to other indicators from the Guidelines

This indicator does not relate to other indicators from the Guidelines.

3. Relevance for environmental policy

(a) Purpose

This indicator is a measure of the impact of transport on human health.

(b) Background

Road transport is the dominant cause of transport fatalities. Despite the decrease in transport fatalities in many European countries (e.g., from more than 56,000 deaths in 2000 to less than 35,000 in 2009 in the EU-27)³⁶ caused by improved road design, changes in legislation, the enforcement of driving laws, higher vehicle safety standards, the introduction of speed limits, stricter rules on truck and bus driving hours and reduced truck overloads, the number of lost human lives is still high. The indicator provides an insight into the trends in fatalities of road, rail, air and water transport and demonstrates the relative safety of different modes and the need for improvement of safety measures as well as infrastructure.

(c) International agreements and targets

Regional level

The 1968 ECE Convention on Road Traffic and the European Agreement Supplementing the Convention form the legal framework for road safety in the ECE region. ECE pioneered road safety activities in the United Nations system with the establishment of an Ad Hoc

³³ See <http://epp.eurostat.ec.europa.eu/portal/page/portal/environment/introduction>.

³⁴ See http://ec.europa.eu/environment/air/index_en.htm.

³⁵ See <http://www.eionet.europa.eu/>.

³⁶ The EU-27 are the 27 States members of the EU prior to the accession of Croatia in 2013.

Working Group on the prevention of road accidents in 1950. In 1988, the Working Party on Road Traffic Safety (WP.1), an intergovernmental body, was established. Today, WP.1 remains the only permanent body in the United Nations system that focuses on improving road safety. Its primary function is to serve as the guardian of the United Nations legal instruments aimed at harmonizing traffic rules.³⁷

Subregional: European Union

In its 2001 white paper, “European transport policy for 2010: time to decide”,³⁸ the European Commission set a target of a 50% reduction in road transport fatalities for EU-27 countries between 2000 and 2010. The 2011 white paper, “Roadmap to a Single European Transport Area — Towards a competitive and resource efficient transport system”³⁹ aims to:

- (a) Harmonize and deploy road safety technology — such as driver-assistance systems, (smart) speed limiters, seat-belt reminders, eCall,⁴⁰ cooperative systems and vehicle-infrastructure interfaces — as well as improved road-worthiness tests, including for alternative propulsion systems;
- (b) Focus on training and education of all users;
- (c) Promote the use of safety equipment (seat belts, protective clothes, anti-tampering devices), including through safer infrastructure and vehicle technologies, paying particular attention to vulnerable users, such as cyclists and motorcyclists, as well as pedestrians;
- (d) Develop a comprehensive strategy of action for road injuries and emergency services, including common definitions and standard classifications of injuries and fatalities, in view of adopting an injury-reduction target;
- (e) Move close to zero fatalities in road transport by 2050. In line with this goal, the EU aims at halving road casualties by 2020.

4. Methodology and guidelines

(a) Data collection and calculations

Data on transport accidents are being collected by relevant national authorities (ministries of transport or ministries of interior). The relative change in mortality is measured as the division of the total number of deaths in this category by the total number of population (in millions).

(b) Internationally agreed methodologies and standards

The *Common Questionnaire on Transport Statistics* (2002) was developed jointly by ECE, ITF and Eurostat. There is also an EEA fact sheet for the indicator, “Transport accident fatalities (TERM 009)”.⁴¹

³⁷ See <http://www.unece.org/trans/main/welcwp1.html>.

³⁸ COM(2001) 370 final. Available from http://ec.europa.eu/transport/themes/strategies/2001_white_paper_en.htm.

³⁹ COM/2011/0144 final. Available from <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52011DC0144:EN:NOT>.

⁴⁰ In case of a crash, an eCall-equipped car automatically calls the nearest emergency centre.

⁴¹ See <http://www.eea.europa.eu/data-and-maps/indicators/transport-accident-fatalities/transport-accident-fatalities-assessment-published>.

5. Data sources and reporting

The ECE Working Party on Transport Statistics, EEA, Eurostat and OECD collect data on transport accidents regularly. Many countries in Eastern Europe, the Caucasus and Central Asia report their national data to ECE using the *Common Questionnaire on Transport Statistics*.

6. References at the international level

- (a) ECE Transport Statistics for Europe and North America (annual publication);
- (b) *Illustrated Glossary for Transport Statistics*, ECE, Eurostat and ITF, 4th ed., 2009;
- (c) EU white paper, “European transport policy for 2010: time to decide”, COM(2001) 370 final;
- (d) EU white paper, “Roadmap to a Single European Transport Area — Towards a competitive and resource efficient transport system (COM/2011/0144 final);
- (e) ECE Transport Division;⁴²
- (f) ITF;⁴³
- (g) EEA transport website;⁴⁴
- (h) Eurostat transport statistics;⁴⁵
- (i) OECD statistics.⁴⁶

D. Waste from road vehicles

1. General description

(a) Brief definition

Percentage of waste originating from scrapped road cars that has been reused or recycled.

(b) Unit of measurement

Percentage of the total mass of scrapped vehicles that has not been reused or recycled.

2. Relation to other indicators from the Guidelines

This indicator is related to indicator I-3 (Waste reuse and recycling).

3. Relevance for environmental policy

(a) Purpose

This indicator is a measure of pressure on the environment.

⁴² See <http://www.unece.org/trans/welcome.html>.

⁴³ See <http://www.internationaltransportforum.org/>.

⁴⁴ See <http://www.eea.europa.eu/themes/transport>.

⁴⁵ See <http://epp.eurostat.ec.europa.eu/portal/page/portal/transport/data>.

⁴⁶ See <http://www.oecd.org/statistics/>.

(b) Background

The number of scrapped cars is growing significantly throughout Europe, as increasing wealth enables more and more people to own cars, or to replace older vehicles with more modern ones. The increase in the number of scrapped cars is steeper for the countries of Eastern Europe, the Caucasus and Central Asia than for the EU, due not only to sharper rises in economic growth, but also as their vehicle fleets are growing more rapidly and more old vehicles are being scrapped following better inspection and maintenance programmes, as well as environmental or safety concerns. Existing cars contain materials such as lead, mercury, cadmium, hexavalent chromium and other environmentally harmful substances. By weight, about three-quarters of a car is steel and aluminium, which are recyclable. The rest, which is mainly plastics, is disposed of by incineration or in landfills. Cars also contain dangerous liquid substances (anti-freeze, brake fluid, oil, etc.) that are harmful to the environment if not handled properly.

(c) International agreements and targets*Subregional level**(i) Eastern Europe, the Caucasus and Central Asia*

The ECE Environmental Strategy for Countries of Eastern Europe, the Caucasus and Central Asia calls for the development of intersectoral waste management action plans and Government support for waste treatment facilities.

(ii) European Union

The EU Waste Framework Directive⁴⁷ provides for increased efforts to prevent and reduce waste generation, recover wastes and develop new techniques for final disposal of waste. Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of life vehicles sets the following targets: The rate for recovery (in average weight per vehicle and year) should reach:

- (a) 85% no later than 1 January 2006;
- (b) 95% no later than 1 January 2015.

The rate for re-use and recycling (in average weight per vehicle per year) should reach:

- (a) 80% no later than 1 January 2006;
- (b) 85% no later than 1 January 2015.

4. Methodology and guidelines**(a) Data collection and calculations**

“Reuse and recycling” is defined as any reprocessing of waste material in a production process that diverts it from the waste stream, except reuse as fuel (energy recovery). Reprocessing (whether into the same type of product or for different purposes) should be included. The indicator is derived by dividing the quantity of reused and recycled parts by the total quantity of scrapped vehicles, expressing the result as a percentage.

⁴⁷ Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives.

(b) Internationally agreed methodologies and standards

The United Nations Statistics Division (UNSD)/United Nations Environment Programme (UNEP) Questionnaire on Environment Statistics (tables R2 and R3) provides a methodology for calculating waste reuse and recycling. In the EU, waste statistics, including waste generation and waste disposal, are covered by a specialized regulation (2150/2002).

5. Data sources and reporting

In countries of Eastern Europe, the Caucasus and Central Asia, data on reuse and recycling of waste are collected by ministries responsible for urban affairs and the environment and by State statistical agencies.

6. References at the international level

- (a) Regulation (EC) No 2150/2002 of the European Parliament and of the Council of 25 November 2002 on waste statistics;
- (b) Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives;
- (c) Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of life vehicles;
- (d) UNSD/UNEP Questionnaire on Environment Statistics;⁴⁸
- (e) European Commission waste policy;⁴⁹
- (f) Eurostat environment statistics database;⁵⁰
- (g) Eionet;⁵¹
- (h) EEA waste and material resources website.⁵²

E. Fuel prices**1. General description****(a) Brief definition**

The average annual price per litre of petrol and the annual average price per litre of diesel (optionally, the average annual price per litre of all transport fuel can be expressed in unleaded petrol equivalents,⁵³ as per the EEA methodology).

(b) Unit of measurement

Price per litre in national currency in constant prices and in United States dollars (USD) in constant prices calculated on the basis of purchasing power parity (PPP).

⁴⁸ See <http://unstats.un.org/unsd/environment/questionnaire.htm>.

⁴⁹ See <http://ec.europa.eu/environment/waste/index.htm>.

⁵⁰ See <http://epp.eurostat.ec.europa.eu/portal/page/portal/environment/data/database>.

⁵¹ See <http://www.eionet.europa.eu/>.

⁵² See <http://www.eea.europa.eu/themes/waste>.

⁵³ "Unleaded petrol equivalent" is a consumption-weighted average price of unleaded petrol, leaded petrol and diesel, corrected using energy content to the equivalent amount of unleaded petrol.

2. Relation to other indicators from the Guidelines

This indicator is not related to any other indicator.

3. Relevance for environmental policy

(a) Purpose

This indicator represents an indirect measure of pressure on the environment.

(b) Background

Fossil fuel consumption is directly linked to the emission of CO₂ (a primary GHG). Links between fuel consumption and other pollutants (e.g., NO_x, hydrocarbons (HC), PM, etc., and noise) depend on the vehicle technology used (European emission (Euro) standards and noise classes, type of engine and fuel needed) and trip conditions, as well as the quality of fuel. An increase in fuel prices can result in a decrease in fuel and transport demand and consequently in a decrease of emissions, thereby leading to a decrease in pressures on the environment. This is known as the price elasticity of demand. A 10% increase in fuel price can lead to a decrease in:

- (a) Total fuel demand by 6%;
- (b) Total vehicle kilometres by 3%;
- (c) Vehicle stock by 3%.⁵⁴

This implies that a 10% increase in the fuel price will, in the long run, decrease CO₂ emissions by 4%–10%, compared with the situation where prices remain stable, and vice versa. The effect on fuel demand is larger than on vehicle kilometres since the fuel efficiency of vehicles continues to improve.

(c) International agreements and targets

There is no explicit agreement or target for this indicator. However, correct fuel pricing may contribute to achieving targets adopted under certain international conventions (UNFCCC, the ECE Convention on Long-range Transboundary Air Pollution).

4. Methodology and guidelines

(a) Data collection and calculations

Data on fuel costs in countries of Eastern Europe, the Caucasus and Central Asia are collected by their ministries of finance or economy. Recalculations of current prices to constant prices and recalculations of national currency to USD in PPP should be done in a standard way applied by the ministry of finance.

(b) Internationally agreed methodologies and standards

Internationally agreed methodologies and standards include the International Energy Agency (IEA) *Energy Prices and Taxes* journal Methodology Notes issue, and the EEA fact sheet for the indicator fuel prices (TERM 021).⁵⁵

⁵⁴ See P. Goodwin, J. Dargay and M. Hanley, “Elasticities of road traffic and fuel consumption with respect to price and income: a review”, *Transport Reviews*, vol. 24, No. 3 (2004), pp. 275–292.

⁵⁵ See <http://www.eea.europa.eu/data-and-maps/indicators/fuel-prices-and-taxes/assessment>.

5. Data sources and reporting

EEA, IEA and OECD collect data on fuel prices and taxes from their member States. Data on fuel costs in countries of Eastern Europe, the Caucasus and Central Asia are collected by the ministries of finance and economy.

6. References at the international level

- (a) IEA *Energy Prices and Taxes*: Methodology Notes, 2nd Quarter 2012;
- (b) IEA prices and taxes statistics;⁵⁶
- (c) OECD statistics;⁵⁷
- (d) EEA indicators and fact sheets about Europe's environment.⁵⁸

F. Proportion of vehicle fleet meeting certain emission standards

1. General description

(a) Brief definition

This indicator defines the share of the road motor vehicle fleet meeting certain emission standards (ECE, Euro standards).

(b) Unit of measurement

The number of motor vehicles by emission standards (in thousands) and the percentage of each emission standard group in each category of the road vehicle fleet (passenger cars, motor coaches, buses and trolleys, trucks and road tractors).

2. Relation to other indicators from the Guidelines

This indicator relates to indicator H-4 (Average age of the road motor vehicle fleet).

3. Relevance for environmental policy

(a) Purpose

The compliance with emission standards of the vehicle fleet is a driving force indicator which shows the technical status of the fleet.

(b) Background

Transport is an important source of emissions of pollutants and GHGs, as well as of other negative impacts on human health and the environment. These effects decrease with higher emission standards. Outdated vehicle equipment not complying with emission standards is a serious problem in the countries of Eastern Europe, the Caucasus and Central Asia. A key priority of State policy for the development of transport systems in these countries should be to improve vehicle fleet composition by replacing older, more polluting vehicles with newer, cleaner ones.

⁵⁶ See <http://www.iea.org/statistics/topics/pricesandtaxes/>

⁵⁷ See <http://www.oecd.org/statistics/>.

⁵⁸ See http://www.eea.europa.eu/data-and-maps/indicators/#c5=&c7=all&c0=10&b_start=0.

(c) International agreements and targets*Regional level*

THE PEP promotes the introduction of systems for controlling the use of vehicles with a long period of use in countries of Eastern Europe, the Caucasus and Central Asia, the implementation of necessary changes in taxation and the establishment of national vehicle certification systems. The “younger” categories of cars comply with ECE standards (ECE/Euro), limiting emissions of pollutants into the air. The ECE Working Party on Pollution and Energy⁵⁹ is the subsidiary body of the World Forum for Harmonization of Vehicle Regulations (WP.29). The Working Party prepares regulatory proposals on pollution and energy efficiency for WP.29. This group of experts conducts research and analysis to develop emission and energy requirements for vehicles.

*Subregional level**(i) Eastern Europe, the Caucasus and Central Asia*

The Environmental Strategy for Countries of Eastern Europe, the Caucasus and Central Asia includes the development and implementation of national transport strategies for sustainable development, which should include support to the introduction of cleaner vehicles with higher emission standards.

(ii) European Union

Legislation on pollutant emissions from new motor vehicles has been in force in the EU since 1970 and relates to CO, HC, NO_x and PM.⁶⁰ The EU legislation currently in force:

(a) For light duty vehicles Regulation (EC) No. 715/2007 introduces common requirements for emissions from motor vehicles and their specific replacement parts (Euro 5 and Euro 6 standards);

(b) For heavy-duty vehicles Directive 2005/55/EC and Directive 2005/78/EC⁶¹ (implementing provisions), which define the emission standards currently in force, Euro IV and V, as well as the next stage (Euro VI, which will enter into force in 2014). In addition, Directive 2005/55/EC defines a non-binding standard called an enhanced environment-friendly vehicle (EEV).

In addition, the EU white paper, “Roadmap to a Single European Transport Area — Towards a competitive and resource efficient transport system”, adopted in 2011, proposes to halve the use of “conventionally fuelled” cars in urban transport by 2030 and to phase them out in cities by 2050.

4. Methodology and guidelines**(a) Data collection and calculations**

Data should cover the stock of road motor vehicles, namely, all road vehicles registered on a given date in a country and licensed to use roads open to public traffic. Data should be presented for each of the five categories of road motor vehicles: (a) passenger cars; (b) motor coaches; (c) buses and trolleys; (e) trucks; and (f) road tractors. For each category, the number of vehicles should be broken down by emission standards as

⁵⁹ See http://www.unece.org/trans/main/wp29/meeting_docs_grpe.html.

⁶⁰ PM emissions standards apply to diesel-fuelled vehicles only.

⁶¹ See section 6 (e) and (f) for the full names of these Directives.

follows:⁶² Pre-Euro, Euro 1 (I), Euro 2 (II), Euro 3 (III), Euro 4 (IV), Euro 5 (V); and Euro 6 (VI) starting from 2014. Each individual emission standard group may be also presented as a percentage of the total by each vehicle category. The shares may be compared with a baseline year demonstrating trends in the vehicle fleet composition with respect to emission standards.

(b) Internationally agreed methodologies and standards

The ECE, ITF and Eurostat *Common Questionnaire on Transport Statistics* (2002) was developed jointly by these bodies to coordinate the data collection by ECE, Eurostat and ITF. There is also an EEA fact sheet for the indicator: “Proportion of vehicle fleet meeting certain emission standards (TERM 034)”.⁶³

5. Data sources and reporting

Data on the emission standards of vehicles are available from various specialized sources.

6. References at the international level

- (a) ECE Transport Statistics for Europe and North America (annual publication);
- (b) *Illustrated Glossary for Transport Statistics*, ECE, Eurostat and ITF, 4th ed., 2009;
- (c) EU white paper, “Roadmap to a Single European Transport Area — Towards a competitive and resource efficient transport system” (COM/2011/0144 final);
- (d) Regulation (EC) No 715/2007 of the European Parliament and of the Council of 20 June 2007 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;
- (e) Directive 2005/55/EC of the European Parliament and of the Council of 28 September 2005 on the approximation of the laws of the member States relating to the measures to be taken against the emission of gaseous and particulate pollutants from compression-ignition engines for use in vehicles, and the emission of gaseous pollutants from positive-ignition engines fuelled with natural gas or liquefied petroleum gas for use in vehicles;
- (f) Commission Directive 2005/78/EC of 14 November 2005 implementing Directive 2005/55/EC of the European Parliament and of the Council on the approximation of the laws of the member States relating to the measures to be taken against the emission of gaseous and particulate pollutants from compression-ignition engines for use in vehicles, and the emission of gaseous pollutants from positive ignition engines fuelled with natural gas or liquefied petroleum gas for use in vehicles and amending Annexes I, II, III, IV and VI thereto;
- (g) ECE Transport Division;⁶⁴
- (h) THE PEP;⁶⁵
- (i) ITF;⁶⁶

⁶² Roman numerals (in parentheses) are used for heavy duty vehicles.

⁶³ See <http://www.eea.europa.eu/data-and-maps/indicators/proportion-of-vehicle-fleet-meeting/proportion-of-vehicle-fleet-meeting-6>.

⁶⁴ See <http://www.unece.org/trans/welcome.html>.

⁶⁵ See <http://www.unece.org/thepep/en/welcome.html>.

- (j) EEA transport website,⁶⁷
- (k) Eurostat transport statistics.⁶⁸

⁶⁶ See <http://www.internationaltransportforum.org/>.

⁶⁷ See <http://www.eea.europa.eu/themes/transport>.

⁶⁸ See <http://epp.eurostat.ec.europa.eu/portal/page/portal/transport/data>.

Annex

List of transport-related indicators

European Environment Agency

- Passenger transport demand (CSI 035)
- Freight transport demand (CSI 036)
- Use of cleaner and alternative fuels (CSI 037)
- Transport final energy consumption by mode (TERM 001)
- Transport emissions of greenhouse gases (TERM 002)
- Transport emissions of air pollutants (TERM 003)
- Exceedances of air quality objectives due to traffic (TERM 004)
- Traffic noise: exposure and annoyance (TERM 005)
- Fragmentation of ecosystems and habitats by transport infrastructure (TERM 006)
- Proximity of transport infrastructures to designated areas (TERM 007)
- Land take by transport infrastructure (TERM 008)
- Transport accident fatalities (TERM 009)
- Accidental and illegal discharges of oil by ships at sea (TERM 010)
- Waste from road vehicles (TERM 011)
- Urban spatial characteristics and transport (TERMS 014)
- Accessibility to basic services and markets by transport mode (TERM 015)
- Access to transport services (TERM 016)
- Capacity of infrastructure networks (TERM 018)
- Transport infrastructure investments (TERM 019)
- Real change in transport prices by mode (TERM 020)
- Fuel prices (TERM 021)
- Transport taxes and charges (TERM 022)
- Transport subsidies (TERM 023)
- Expenditure on personal mobility (TERM 024)
- External costs and charges per vehicle type (TERM 025)
- Internalisation of external costs (TERM 026)
- Energy efficiency and specific CO₂ emissions (TERM 027)
- Specific air pollutant emissions (TERM 028)
- Occupancy rates of passenger vehicles (TERM 029)
- Load factors for freight transport (TERM 030)
- Size of the vehicle fleet (TERM 032)

- Average age of the vehicle fleet (TERM 033)
- Proportion of vehicle fleet meeting certain emission standards (TERM 034)
- Integrated transport and environment strategies (TERM 035)
- Institutional cooperation on transport and environment (TERM 036)
- National transport and environment monitoring systems (TERM 037)
- Uptake of strategic environmental assessment in the transport sector (TERM 038)
- Public awareness and behaviour (TERM 040)

Organization for Economic Cooperation and Development

- 1A Road network length: all roads
- 1B Road network length: motorways
- 2 Road vehicle stocks
 - 2A Motor vehicles
 - 2B Passenger cars in use
 - 2C Goods vehicles in use
- 3 Road traffic volumes
 - 3A Motor vehicles
 - 3B Passenger cars
 - 3C Goods vehicles
- 4 Transport by mode
 - 4A Passengers
 - 4B Freight
- 5 Total final energy consumption by the transport sector
- 6A Consumption of road fuels
- 6B Road fuel prices and taxes
- Road injury accidents

Statistical Office of the European Union – Eurostat (selected indicators)

- Length of motorways (total)
- Stock of vehicles
- Total road freight transport
- People killed in road accidents

United Nations Economic Commission for Europe: road traffic indicators

Road accidents

Size of vehicle fleet (number, first registration)

- Passenger cars
- Goods cars

Motor vehicles movement on national territory (million vehicle-kilometres)

- Motorcycles
- Passenger cars
- Motor coaches, buses and trolleybuses
- Lorries and road tractors

Passenger transport on national territory (million passenger-kilometres)

- Motorcycles
- Passenger cars
- Motor coaches, buses and trolleybuses

Goods carried in thousand tons

- National transport
- International transport — loaded
- International transport — unloaded
- Cross trade road transport
- Road cabotage transport

Goods carried in million tons-kilometres

- National transport
- International transport — loaded
- International transport — unloaded
- Cross trade road transport
- Road cabotage transport

United Nations Economic Commission for Europe: Guidelines for the Application of Environmental Indicators in Eastern Europe, Caucasus and Central Asia

- H-1: Passenger transport demand
- H-2: Freight transport demand
- H-3: Composition of road motor vehicle fleet by fuel type
- H-4: Average age of road motor vehicle fleet