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D2.1 Reports on analyses key issues related to TDG in PC

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Content

1. About the project

Dangerous goods (DG) are materials that, due to their characteristics, can constitute a risk to people, animals, or the environment. The involvement of DG in an accident could lead to fires, explosions, and the release of toxic gases, producing serious consequences to human health and the environment. To diminish risks, the transport of dangerous goods (TDG) in Europe is subjected to different regulations with the constant raising need for educated and skilled personnel. The main aims and specific objectives of the project are:

- To identify key risks of the transport of dangerous goods (TDG) by road in WB partner countries according to different regulations.
- To improve existing and develop new curricula for undergraduate and master studies in accordance with Bologna requirements and national accreditation standards implementing new subjects studying the transport of dangerous goods by road. These subjects should cover both provisions concerning dangerous goods and provisions concerning transport equipment and transport operations.
- To establish Training Centers within WB HEIs. The most important results of the project will be the modernization of the existing curricula in the part related to the transport of dangerous goods and the handling of DG at all WB partner institutions. Among other things, the curriculum should increase students' awareness of the dangers that can occur when dangerous goods are transported and handled improperly. Direct beneficiaries of the project include 116 trained teaching staff, 120 enrolled students, 240 trained TDG professionals and the wider community (TDG stakeholders, public institutions, scientific community etc.) Type and number of outputs include 8 new/modernized study programs, 45 newly implemented TDG related courses, 8 new labs.

1.1 Objectives

The wider objective of the DGTRANS project is to improve the quality of higher education in the field of the transport of dangerous goods, strengthen its relevance for the labor market and society, enhancing the level of competences and skills of experts for transport of dangerous goods in WBC (Montenegro, Kosovo*, Albania and Bosnia and Herzegovina) by developing new competence-based and improved existing undergraduate/master curricula in line with EU trends.

Further, the project will also result in the development of trainings for transport of dangerous goods professionals based on results of survey for transport of dangerous goods stakeholders, organized local workshops with transport of dangerous goods stakeholders and recommendations of program countries and third countries associated to program.

Finally, the benefits for all WBC include implementation of the most appropriate scientific methods and the best practices in relation to the risk analysis procedures during the transport of dangerous goods.

- To analyse and improve current risk analysis management procedures and risk assessments on transport routes and new routing solutions into WBC.
- To improve existing and develop new transport of dangerous goods curricula for undergraduate and master studies.
- To improve existing and develop new transport of dangerous goods curricula for undergraduate and master studies.

1.2 Aims

1) To improve existing and develop new TDG curricula for undergraduate and master studies in accordance with Bologna requirements and national accreditation standards through implementing new/modernized courses. These courses should cover provisions concerning dangerous goods, transport equipment and transport operations, as well as the risk assessment tools,

vehicles monitoring systems, and route-planning systems based on network analyses performance.

2) The aim of the improved study programs is to include the different disciplines such as transport, environmental sciences, politics, supply chain management, security management and the risk management needed for a safer transport of dangerous goods, where research institutions, members of the DG supply chain, service providers, public administrations and end-users will work together.
3) To analyse and improve current risk analysis management procedures and risk assessments on transport routes and new routing solutions into WBC. Herein, we are finding and applying the most appropriate scientific methods and the best practice about what issues should be included in risk analysis procedures to improve the safety during the transport of dangerous goods and how can management procedures be improved to avoid mistakes or inefficiencies during the sharing of information within a company and between different companies involved in the supply chain.
4) Topics of the Green weeks: practical presentations of the pilot plant of the solar charger for electric micro-mobility vehicles, introduction to the technical characteristics of the equipment, short training on battery charging, short training for using of electric micro mobility vehicles, driving training and safety measures practice, organization of promotional rides within the free space of the premises of the WB HEIs, introduction with the EM mobility devices (bicycles, scooters, batteries, chargers, driving simulators, lab car models etc.); introductions with EM association activities and further networking with attendees of the event.
5) To develop and implement the training program for the TDG professionals in line with ADR and up-to-date scientific knowledge on issues related to the transport of dangerous goods. According to ADR each TDG subject, involved in activities which include the consigning the transport of dangerous goods by road or the related packing, loading, filling or unloading, shall appoint one or more TDF professionals, responsible for prevention of the risks inherent in such activities with regard to persons, property and the environment.

1.3 Objectives of the Work Package 2: Introduction with key issues for TDG in WBC and PC

Objectives of the WP2 are:

- Identification of key issues of safe and secure TDG in PC needed to be managed in WB countries.
- Identification of key issues of TDG in WB and assessment of all risk management aspects for safe and secure TDG
- Assessment of all risk key issues related to TDG will be done.
- Analysis of existing curricula in WB HEIs and curricula best practices in PC in the field of TDG
- Identification of required resources for modernization of laboratory environment of WB HEIs
- Organization of the three-day workshop on existing curriculum and innovative practices in the EU related to TDG.

This integrate report present Analysis of Key Issues related to transport of dangerous goods in PC.

In this report we summarized analysis prepared by PC partners:

- UM UNIVERZA V MARIBORU SI (Slovenia)
- OE OBUDAI EGYETEM HU (Hungary)
- LUT POLITECHNIKA LUBELSKA PL (Poland)
- UNI UNIVERZITET U NISU RS (Serbia)
- TUC POLYTECHNEIO KRITIS EL (Greece)

2. Introduction

2.1 Preparation of the report

To the preparation of the present report (Analysis of Key Issues related to transport of dangerous goods in PC) lead partner of WP 2 (University of Maribor) prepared template for each PC partner.

At the beginning the short description of the project DGTRANS was given (objectives, aims, etc.).

In addition, template was structured in 3 chapters:

- Tools, methods, standards and programs in (country name) TDG chain
- Concrete examples in (country name) for TDG chain management
- Overview of the volume of TDG accidents, potential harmful influence on the environment and mitigating measures in (country name)

For each chapter we prepared detailed instructions for each partner, for example:

- *Please describe tools, methods, standards and programs in TDG chain in your country.*
    - *For your help – in your report you could consider to include / discuss, for example, following topics – of course, in connection with state-of-the-art in your country:*
    - *International regulations in transportation of dangerous goods by roads:*
    - *The European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)*
    - *Directive 95/50/EC on uniform procedures for checks on the transport of dangerous goods by road*
    - *Directive 98/91/EC relating to motor vehicles and their trailers intended for the transport of dangerous goods by road*

- *Directive 2008/68/EC on inland transport of dangerous goods*
- *Directive 2010/35/EU - transportable pressure equipment*
- *National regulations in transportation of dangerous goods:*
- *Law on the transportation of dangerous goods*
- *Law on the road traffic safety*
- *Law on the roads*
- *Secondary regulations on the transportation of dangerous goods (e.g. rulebooks, decrees, rules, orders)*
- *If you have also some other information from this topic from some other EU countries (different than PC) it will be very useful to include in your report.*

- *Please present concrete examples for TDG chain management in your country.*
- *Please provide overview of the volume of TDG accidents, potential harmful influence on the environment and mitigating measures in your country.*

2.2 Structure of the report

This report is structured in two main parts:

- Common findings which are similar in all PC countries,
- Country specific findings, which are unique for specific PC country.

3. Analysis of Key Issues for TDG in PC: Common findings for PC

Analysis of key issues for TDG in PC showed, that we could point out some common findings, which are very similar (or even the same) in all analyzed PC countries.

The main reason is that almost all PC (4 out of 5) in this project are also the member of the EU.

3.1 Legal bases of the transportation and inspection of dangerous goods in EU

Dangerous goods are all kinds of substances, materials and objects, the transport of which is either prohibited or permitted only under the conditions laid down by law, in particular the European Agreement concerning the International Carriage of Dangerous Goods by Road.

Dangerous goods are transported by all modes of transport, i.e. road, rail, sea, air and inland waterways, with road and rail being the most common. Each mode of transport is regulated by a different international agreement. About half of all goods are classified as dangerous goods.

We analyze following (mainly EU) regulations related to the transport of dangerous goods:

1. *International Carriage of Dangerous Goods by Road (ADR)*

The first and the most important regulation is The European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) consists of 1300 pages detailing regulations and exceptions for each substance that must be followed by each individual truck driver.

2. *Directive 95/50/EC on uniform procedures for checks on the transport of dangerous goods by road*

This Directive shall apply to checks carried out by Member States on the transport of dangerous goods by road in vehicles travelling in their territory or entering it from a third country. It shall not apply to the transport of dangerous goods by vehicles belonging to or under the responsibility of the armed forces. This Directive shall not, however, affect the Member States' right, with due regard to Community law, to carry out checks on the national and international transport of dangerous goods within their territories performed by vehicles not covered by this Directive.

3. *Directive 98/91/EC relating to motor vehicles and their trailers intended for the transport of dangerous goods by road*

This Directive shall apply to vehicles of categories N and O, as defined in Article 2 and Annex II to Directive 70/156/EEC, intended for the transport of dangerous goods by road within or between Member States. The scope, definition, classification and requirements relating to such vehicles and the administrative provisions for EC type approval thereof are set out in Annexes I and II respectively to this Directive.

4. *Directive 2008/68/EC on inland transport of dangerous goods*

This Directive shall apply to the transport of dangerous goods by road, by rail or by inland waterway within or between Member States, including the activities of loading and unloading, the transfer to or from another mode of transport and the stops necessitated by the circumstances of the transport.

5. *Directive 2010/35/EU - transportable pressure equipment*

(1) This Directive sets out detailed rules concerning transportable pressure equipment to enhance safety and ensure free movement of such equipment within the Union.

(2) This Directive shall apply to:

(a) new transportable pressure equipment as defined in Article 2(1), which does not bear the conformity markings provided for in Directives 84/525/EEC,

84/526/EEC, 84/527/EEC or 1999/36/EC, for the purpose of making it available on the market.

(b) transportable pressure equipment as defined in Article 2(1), bearing the conformity markings provided for in this Directive or in Directives 84/525/EEC, 84/526/EEC, 84/527/EEC or 1999/36/EC, for the purposes of its periodic inspections, intermediate inspections, exceptional checks and use;

(c) transportable pressure equipment as defined in Article 2(1), which does not bear the conformity markings provided for in Directive 1999/36/EC, for the purposes of reassessment of conformity.

(3) This Directive shall not apply to transportable pressure equipment which was placed on the market before the date of implementation of Directive 1999/36/EC and which has not been subject to a reassessment of conformity.

(4) This Directive shall not apply to transportable pressure equipment used exclusively for the transport of dangerous goods between Member States and third countries, carried out in accordance with Article 4 of Directive 2008/68/EC.

4. Analysis of Key Issues for TDG in PC: Specific findings for each PC

In this chapter specific findings for each PC country are presented.

4.1 Slovenia

4.1.1 Legal bases of the transportation and inspection of dangerous goods in Slovenia

Dangerous goods in Slovenia can be transported on public roads, by rail or by airplanes. There are various transportation regulations applying to the various transportation modes (based on Dangerous Goods Transport Act, DGTA, OJ RS 56/15 [1].

The Slovenian legislation is based on the adaptation of the regulations on the checks laid down in international agreements, in line with EU requirements. The authority's power to check is included in the laws specific to each mode of transport and their implementing regulations. Dangerous Goods Transport Act (prepared and managed by Ministry of Infrastructure of Government of Republic of Slovenia) regulates the conditions for the transport of dangerous goods for individual types of transport, the duties of persons participating in the transport, the conditions for packaging and vehicles, the appointment of a safety consultant, the training of persons participating in the transport, the powers of state authorities and the supervision of the enforcement of the law. The purpose of the Act is to ensure the safe transport of dangerous goods.

For the transport of dangerous goods in road traffic, the following are used:

- the European agreement on the international transport of dangerous goods by road (ADR), (Official Gazette of the SFRY - MP, No. 59/72) and the act on the notification of succession (Official Gazette of the RS - MP, No. 9/92), of which the annexes are an integral part A and B,

- the protocol supplementing the third paragraph of Article 14 of the European Agreement on the International Carriage of Dangerous Goods by Road (ADR), (Official Gazette of the SFRY - MP, no. 8/77) and the act on notification of succession (Official Gazette of the RS - MP, no. 9/92) and
- protocol supplementing Article 1 (a), Article 14 (1) and Article 14 (3) (b) of the European Agreement on the International Carriage of Dangerous Goods by Road (ADR), (Official Gazette of the Republic of Slovenia - MP, No. 7/97) .

For the transport of dangerous goods in railway transport, the following applies:

- the Convention on International Railway Transport (COTIF), (Official Gazette of the SFRY - MP, No. 8/84) and the Act on Confirmation of Succession (Official List of the RS - MP, No. 9/92), an integral part of which are the rules on international railway transport of dangerous goods (RID) and
- protocol on the amendment of the Convention on International Railway Transport (COTIF) (Official Gazette of the RS – MP, No. 2/04).

For the transport of dangerous goods in maritime transport, the following are used:

- the international convention on the safety of containers (CSC) (Official Gazette of the SFRY – MP, No. 3/87) and the act on notification of succession (Official Gazette of the RS – MP, No. 15/92),
- the international convention on the protection of human life at sea (SOLAS), 1974 (Official Gazette of the SFRY – MP, No. 2/81) and the act on notification of succession (Official Gazette of the RS – MP, No. 15/92) and
- the international convention on the prevention of marine pollution from ships (MARPOL), 1973 (Official Gazette of the SFRY – MP, No. 2/85) and the act on the notification of succession (Official Gazette of the RS – MP, No. 15/92), together with the applicable protocols and amendments to these conventions and mandatory codes.

For the transport of dangerous goods in air transport, the following are used:

- convention on international civil aviation (Official Gazette of the FLRJ – MP, no. 3/54, 5/54, 9/61, 5/62, and Official Gazette of the SFRY – MP, no. 11/63, 49/71, 62/ 73.

The following are also used for the transport of nuclear materials:

- the convention on physical protection of nuclear material (Official Gazette of the SFRY - MP, No. 9/85) and the act on notification of succession (Official Gazette of the RS - MP, No. 9/92) and
- joint convention on the safety of handling spent fuel and the safety of handling radioactive waste (Official Gazette of the RS - MP, No. 3/99).

In road transport, a member state of the European Union is considered a party to the ADR from Annexes A and B to the European Agreement on the International Carriage of Dangerous Goods by Road. The last version is referred to the year 2023.

Among the more important by-laws that supplement the Dangerous Goods Transport Act are:

- Rules approving the packaging for the transport of dangerous substances, OJ RS 37/02 [2];
- Rules on the duties of a security consultant for the transport of dangerous goods, OJ RS 88/00 [3]
- Decree on the designation of companies for the professional training of persons who handle and transport dangerous substances and on the issuance of certificates, OJ RS 18/92 [4]
- Rulebook on the professional training of drivers of motor vehicles transporting dangerous substances and persons participating in the transport of these substances, OJ RS 71/97 [5]
- Regulations on the certificate of professional qualification of a security consultant, OJ RS 26/17 [6]

- Rulebook on uniform procedures for monitoring the road transport of dangerous goods, OJ RS108/05 [7]

The DGTA [1] provides, among other things:

- that only admissible packaging that corresponds to the quantity and characteristics of the dangerous goods, that is tested and approved and that has the appropriate markings, may be used for transport [2],
- that only vehicles that are manufactured and equipped in accordance with the regulations (ADR), are inspected and have a certificate (if required) and are appropriately marked may be used,
- that all measures must be taken during transport to prevent accidents or to reduce the consequences; in the event of an accident, it is necessary to call the police or the information center, - duties of the sender, packer, fillers, tank users, loaders, carriers, recipients in the transport of dangerous goods and additional requirements,
- provisions regarding the permit for the transport of explosive, radioactive and nuclear substances,
- provisions regarding personnel who participate in or carry out transport with special emphasis on the definition of the safety consultant, his tasks and obligations, and the need for the appropriate professional qualification of the driver and other personnel who participate in the transport of dangerous goods (three levels of training: basic, specialist, supplementary) [3], [4], [5], [6],
- provisions regarding safety measures: the driver must comply with ADR, requirements regarding loading/unloading places, compliance with provisions regarding vehicles,
- provisions regarding control on public roads and/or preventive control at the sender, carrier, or receiver [7].

When transporting dangerous goods, in addition to the special provisions regarding the transport of dangerous goods, the following must also be taken into account:

- Road Transport Act, OJ RS 18/23 [8]
- Act on Explosives and Pyrotechnic Products, OJ RS 19/15 [9]

- Environmental Protection Act, OJ RS 18/23 [10]
- Protection Against Natural and Other Disasters Act, OJ RS 177/22 [11]

The table 1 contains importance Slovenian national regulations related to transportation of dangerous goods.

Table 1: Slovenian national regulations related to transport of dangerous goods. [Source: Slovenian Legislation Information System][1]

Legislation	**Short content**
Dangerous Goods Transport Act, OJ RS 56/15	Dangerous Goods Transport Act regulates the conditions for the transport of dangerous goods for individual types of transport, the duties of persons participating in the transport, the conditions for packaging and vehicles, the appointment of a safety consultant, the training of persons participating in the transport, the powers of state authorities and the supervision of the enforcement of the law.
Rules approving the packaging for the transport of dangerous substances, OJ RS 37/02	These regulations determine the procedures for the approval of packaging for the transport of dangerous goods, in accordance with the regulations from Article 3 of the Act on the Transport of Dangerous Goods
Rules on the duties of a security consultant for the transport of dangerous goods, OJ RS 88/00	
Decree on the designation of companies for the professional training of persons who handle and transport dangerous substances and on the issuance of certificates, OJ RS 18/92	Professional training of persons who handle and transport dangerous substances is provided by many companies in RS.
Rulebook on the professional training of drivers of motor vehicles transporting dangerous substances and persons participating in the transport of these substances, OJ RS 71/97	This rulebook prescribes the professional training program for drivers of motor vehicles that transport dangerous substances and persons involved in the preparation for transport, loading, handling and unloading of dangerous substances (hereinafter referred to as: persons involved in the transport of dangerous substances), the procedure and the method of taking the exam and records of the exams. All candidates shall be over 21 year old. Three types of courses.

Regulations on the certificate of professional qualification of a security consultant, OJ RS 26/17	These regulations determine the content, form, validity and method of issuing a certificate of professional qualification of a security consultant for the transport of dangerous goods
Rulebook on uniform procedures for monitoring the road transport of dangerous goods, OJ RS 108/05	This rulebook is in accordance with the Commission Directive 2004/112/EC on the adaptation of Council Directive 95/50/EC on uniform procedures for checks on the road transport of dangerous goods to technical progress determines the content and format of the report on the control of the transport of dangerous goods - Annex I, the list of violations and related measures of the competent authority - Annex II and the content and format of the standard form for the report on violations and penalties, which must be sent to the commission - Annex III. Annexes I, II and III are an integral part of this regulation and are published together with it.
Road Transport Act, OJ RS 18/23	This Act determines the conditions and manner of carrying out the transportation of passengers and goods in domestic and international road transport, as well as the authorities responsible for the implementation and supervision of the implementation of this Act.
Act on Explosives and Pyrotechnic Products, OJ RS 19/15	This Act regulates the conditions that must be met by self-employed individuals, or self-employed individuals, who independently carry out an activity and legal entities and natural persons in the field of production and trade of explosives or pyrotechnic products, import, export and transit of explosives, pyrotechnic products or ammunition, purchase of ammunition parts for natural persons and control over the implementation of the law with the aim of protecting the life and health of people, property and ensuring the protection of the environment and public order.

Environmental Protection Act, OJ RS 18/23	This Act regulates the protection of the environment from pollution as a fundamental condition for sustainable development and, in this context, defines the fundamental principles of environmental protection, environmental protection measures, monitoring of the state of the environment and information about the environment, economic and financial instruments of environmental protection, public services of environmental protection and other issues related to environmental protection.
Protection Against Natural and Other Disasters Act, OJ RS 177/22	This Act regulates the protection of people, animals, property, cultural heritage and the environment against natural and other disasters (hereinafter: protection against natural and other disasters). The goal of protection against natural and other disasters is to reduce the number of accidents and to prevent or reduce victims and other consequences of these accidents. The state, municipalities and other self-governing local communities (hereinafter: local communities) organize protection against natural and other disasters as a unified and comprehensive system in the country. The protection system from the previous paragraph includes programming, planning, organization, implementation, control, financing of measures and activities for protection against natural and other disasters.

4.1.2 Concrete examples in Slovenia for transport of dangerous goods chain management

Since no public source in the Republic of Slovenia (neither the Ministry of Infrastructure nor the Statistical Office) has data on the amount of dangerous goods transported, on the transport work carried out with dangerous goods, nor on more detailed data on the participation of individual classes of dangerous goods, for presentation purposes they are used data obtained from the home pages of the Eurostat.

From the table in Figure 1, it can be seen that the transport work performed (tkm) in the transport of dangerous goods increased from 890 million tkm in 2017 to 1405 million tkm in 2021. The average annual traffic work performed in the period 2017-2021 increased by 12.1%, and in the last year a growth of 12.6% was recorded. Compared to other PCs participating in the project, the average annual growth in Slovenia is the highest, while the other countries mentioned and marked in the table record either a decline or a small increase in the traffic work performed in the analyzed period 2017 - 2021.

Figure 2 shows the shares of national and international transport of dangerous substances in 2021 in each country under consideration. the share of internal transport compared to the total transport work carried out in each country depends on the country's geostrategic location and its importance in terms of road transport. It can be seen from Figure 2 that, next to Luxembourg, Slovenia has the smallest share of national transport (estimated at 15%). Almost 85% of the total work performed in the transport of dangerous goods in the Republic of Slovenia is international transport (transit). An approximately similar ratio between internal and international transport is found in Hungary and Poland (from 50% to 60% of internal transport), while a distinctly small share of international transport (estimated at 2%) is recorded in Greece. The latter can be explained by Greece's position in the south of the European Union. The only country where transport work is recorded only in the form of internal transport is Italy.

Road freight transport of dangerous goods, 2017-2021
(million tkm)

	2017	2018	2019	2020	2021	Average annual growth rate 2017-2021	Growth rate 2020-2021
						%	
EU	75 321	71 527	73 726	71 300	72 628	-0.9	1.9
Belgium	3 838	3 003	3 591	3 221	2 991	-6.0	-7.1
Bulgaria	591	400	240	907	869	10.1	-4.2
Czechia	1 895	1 516	1 611	2 081	2 153	3.2	3.5
Denmark	621	734	728	832	874	8.9	5.0
Germany	12 934	12 835	12 793	11 758	11 771	-2.3	0.1
Estonia	208	215	211	126	154	-7.2	22.2
Ireland	146	102	112	77	80	-14.0	3.9
Greece	1 451	1 178	1 127	825	949	-10.1	15.0
Spain	12 735	13 210	12 710	11 609	12 502	-0.5	7.7
France	9 737	9 059	8 287	9 089	8 747	-2.6	-3.8
Croatia	582	713	820	707	751	6.6	6.2
Italy	7 918	8 439	9 293	9 215	7 986	0.2	-13.3
Cyprus	193	146	79	87	80	-19.8	-8.0
Latvia	282	296	272	311	354	5.8	13.8
Lithuania	593	582	629	445	591	-0.1	32.8
Luxembourg	426	491	495	386	305	-8.0	-21.0
Hungary	1 273	1 204	1 017	1 150	1 186	-1.8	3.1
Malta (')	:	:	:	:	:	-	-
Netherlands	1 296	1 467	1 496	1 375	1 371	1.4	-0.3
Austria	1 033	968	995	912	955	-1.9	4.7
Poland	8 785	7 386	9 441	8 255	9 247	1.3	12.0
Portugal	1 035	665	750	649	731	-8.3	12.6
Romania	2 490	1 944	1 936	1 711	2 260	-2.4	32.1
Slovenia	890	1 062	1 068	1 248	1 405	12.1	12.6
Slovakia	496	384	300	462	451	-2.3	-2.4
Finland	1 888	1 945	2 294	2 189	2 045	2.0	-6.6
Sweden	1 983	1 585	1 431	1 676	1 818	-2.1	8.5
Norway	1 286	1 305	1 115	936	1 607	5.7	71.7
Switzerland	569	763	813	488	749	7.1	53.5
Montenegro	7	4	6	7	1	-38.5	-85.7

(-) Not applicable
(:) Not available
(') Data not available (see chapter 'data sources')
Source: Eurostat (online data code: road_go_ta_dg)

eurostat

Figure 1: Road freight transport of dangerous goods in million tkm in EU and other European countries 2017 – 2021 [EUROSTAT]

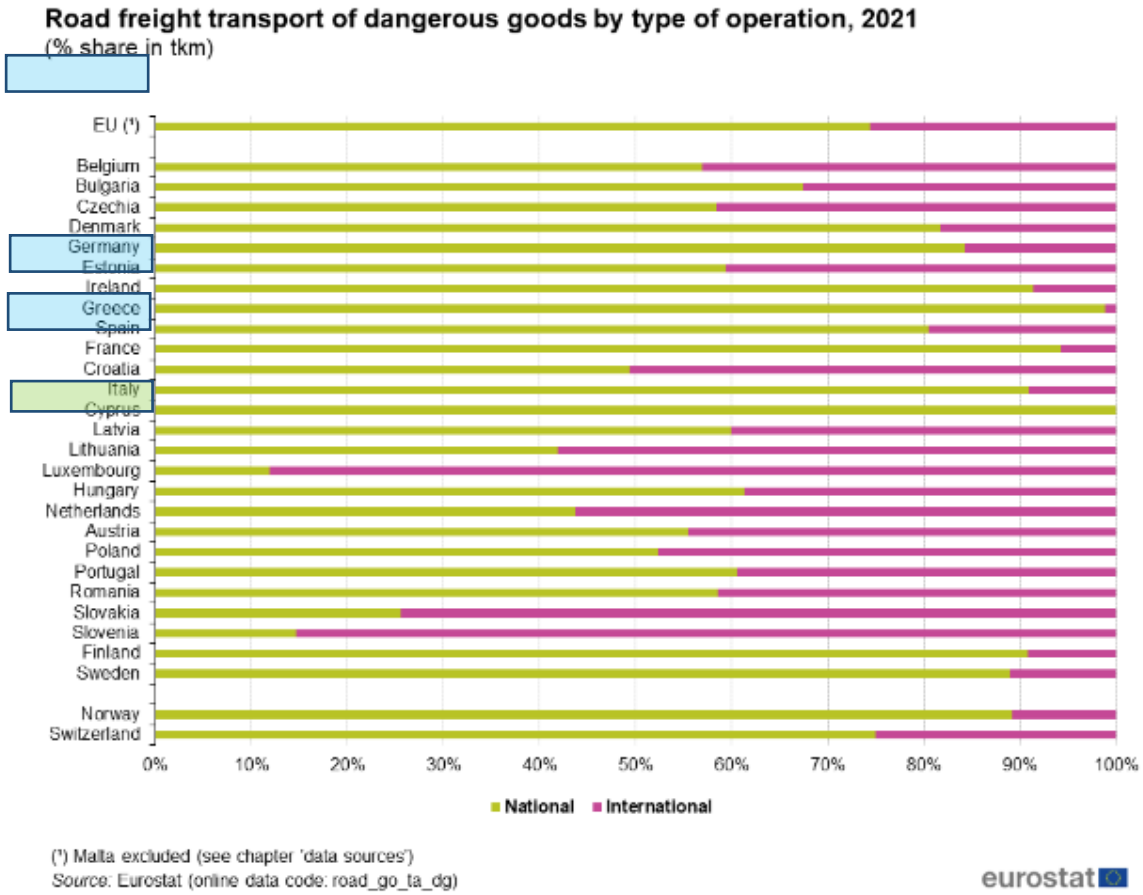


Figure 2: Road freight transport of dangerous goods in % share in tkm by type of operation in EU and other European countries, 2021 [EUROSTAT]

Figure 3 presents the structure of road freight traffic with dangerous goods by type of dangerous goods (classes 1 to 9) for EU countries in 2021. The figure shows that more than 50% of dangerous goods transported in the EU in 2021 are liquid flammable substances (Class 3), about 15% are different types of gases (Class 2), 12% are corrosive substances (Class 8), the rest are oxidizing substances and other dangerous substances. The classification by country is not given, but we can estimate that a roughly similar structure applies to all EU members.

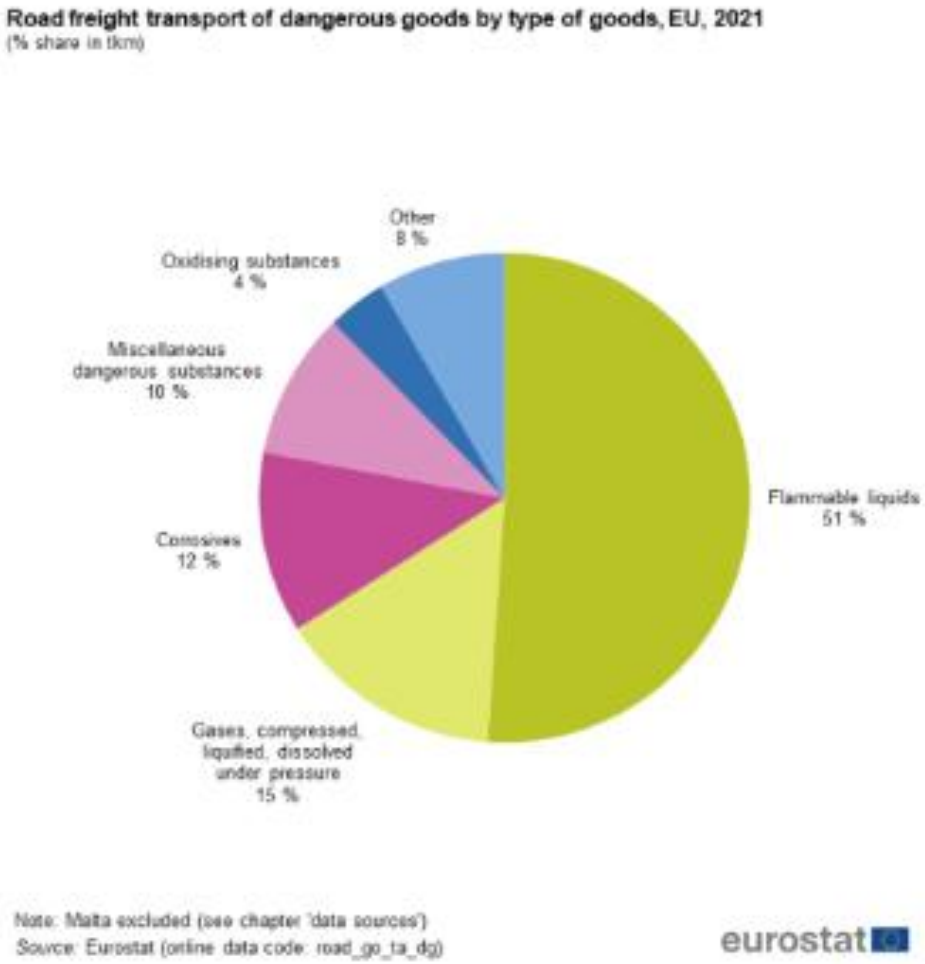


Figure 3: Road freight transport of dangerous goods in by type of goods in EU, 2021 [EUROSTAT]

4.1.3 Overview of the volume of transport of dangerous goods accidents, potential harmful influence on the environment and mitigating measures in Slovenia

The Act on the Transport of Dangerous Goods stipulates that everyone involved in the organization and implementation of the transport of dangerous goods (especially the driver) must take all safety measures to prevent an accident from occurring or to minimize the consequences of a traffic accident if it does occur. comes. The law stipulates that in the event of hazardous goods being scattered or spilled, the place of spillage must be secured, collected, or removed, and that the police or information center (police, fire brigade, rescuers) must be notified. If the loose or spilled dangerous goods cannot be picked up, it is necessary to call an organization authorized to deal with accidents involving dangerous goods at the carrier's expense. The Minister for the

Environment and the Minister for Protection against Natural and Other Disasters play a major role in these activities.

Fortunately, there have been no noteworthy traffic accidents with dangerous substances on Slovenian roads in the last period of time, while in industrial plants we record some events/accidents that had a significant impact on the environment and people living in the immediate vicinity. Such accidents are not the subject of this report.

4.1.4 Statistics about road inspections

From the Dangerous Goods Transport Act, it is clear that the control over the implementation of the Act both on public transport areas, as well as preventively at the sender, carrier or recipient, is assigned to the Infrastructure Inspectorate, which is a body within the Ministry of Infrastructure. In the inspectorate, they carry out the tasks of inspection control over the implementation of regulations in the fields of railway transport, road transport, transport infrastructure for the mentioned types of transport, cableway devices and safety on ski slopes, electric power, thermal energy and mining.

From the Act on the Transport of Dangerous Goods, it is clear that the control over the implementation of the Act both on public transport areas, as well as preventively at the sender, carrier or recipient, is assigned to the Infrastructure Inspectorate, which is a body within the Ministry of Infrastructure. In the inspectorate, they carry out the tasks of inspection control over the implementation of regulations in the fields of railway transport, road transport, transport infrastructure for the mentioned types of transport, cableway devices and safety on ski slopes, electric power, thermal energy and mining.

The Road Traffic Inspectorate, within the Infrastructure Inspectorate, is in charge of monitoring in the field of road traffic, focusing mainly on the monitoring of regulations governing the transport of passengers and goods in road transport, social legislation, vehicles, drivers and the transport of dangerous goods. With the controls that road traffic inspectors carry out over transport providers, driving time, mobile workers' breaks, as well as the use of recording equipment over the procedures and providers of driver and candidate driver training and over the procedures and providers

of ensuring compliance and technical flawlessness of vehicles, we realize three complementary goals: to improve road safety, to ensure adequate social protection for mobile workers in road transport and to ensure fair competition between companies.

Pursuant to the Dangerous Goods Transport Act, the Road Transport Inspectorate is obliged to report annually on the inspections carried out and the results of these inspections. We obtained two inspection reports from the Ministry of Infrastructure, namely for the years 2016 and 2021. The results of the inspection can be seen in the figures 4 in 5.

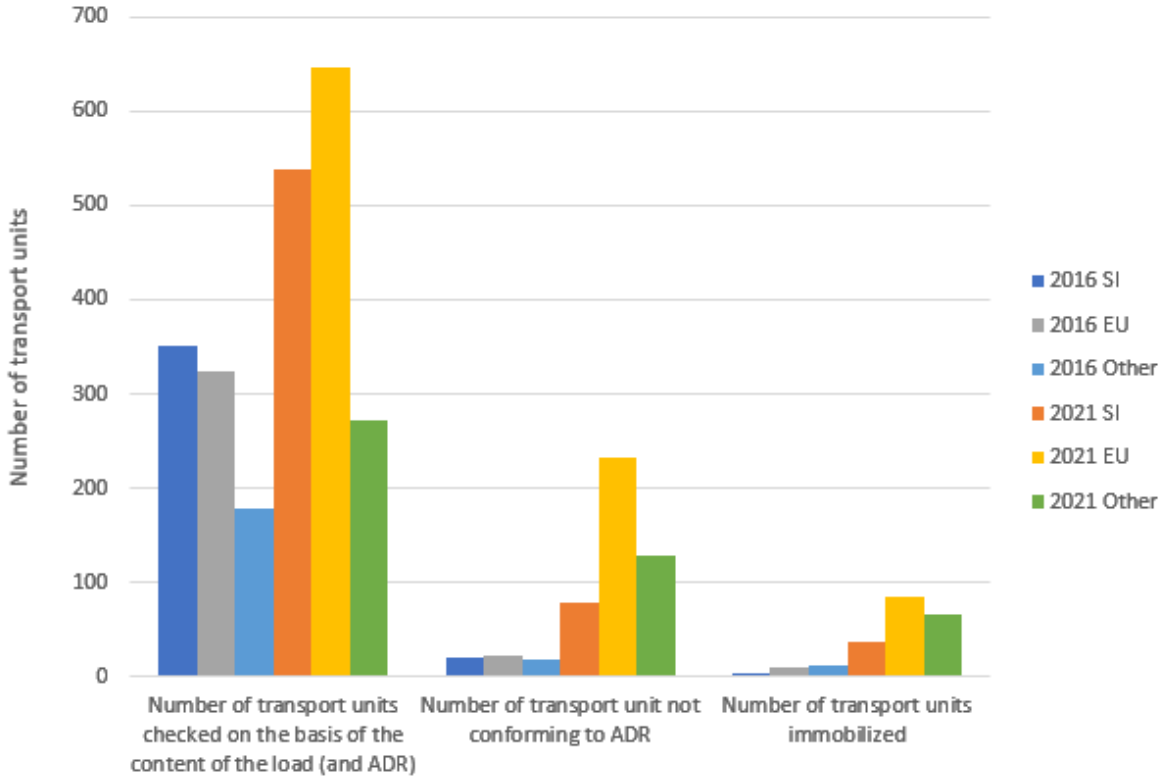


Figure 4: Number of transport units checked on the basis of the content of the load, number of transport units not conforming ADS and number of transport units immobilized in the year 2016 and 2021 by the driver from different origin countries (SI, EU and other) [report of Slovenian Inspection for road transport]

In the five-year period from 2016 to 2021, the number of inspections increased by 70%, the largest part of inspected vehicles in 2021 is represented by vehicles registered in other EU member states 44%, followed by vehicles registered in Slovenia 37%. Out of a total of 1457 inspections, deviations from ADR requirements were detected in 440

cases (in 30% of all inspections). In 2021, the largest number of deviations was detected in vehicles registered in EU member states (almost 53%), followed by vehicles registered in other countries (almost 30%). The number of detected deviations increased seven (7) times from 2016 to 2021.

In the following, all deviations from compliance with ADR requirements are classified according to risk categories, which in accordance with ADR are classified into three levels: risk category I, risk category II and risk category III. Risk category is consistent with the definition of packing group in ADR, where packing group I represents substances that pose a high danger, packing group II substances that pose a medium danger and packing group III substances that pose a low danger. The types of hazards depend on the substance being transported (classes 1 to 9).

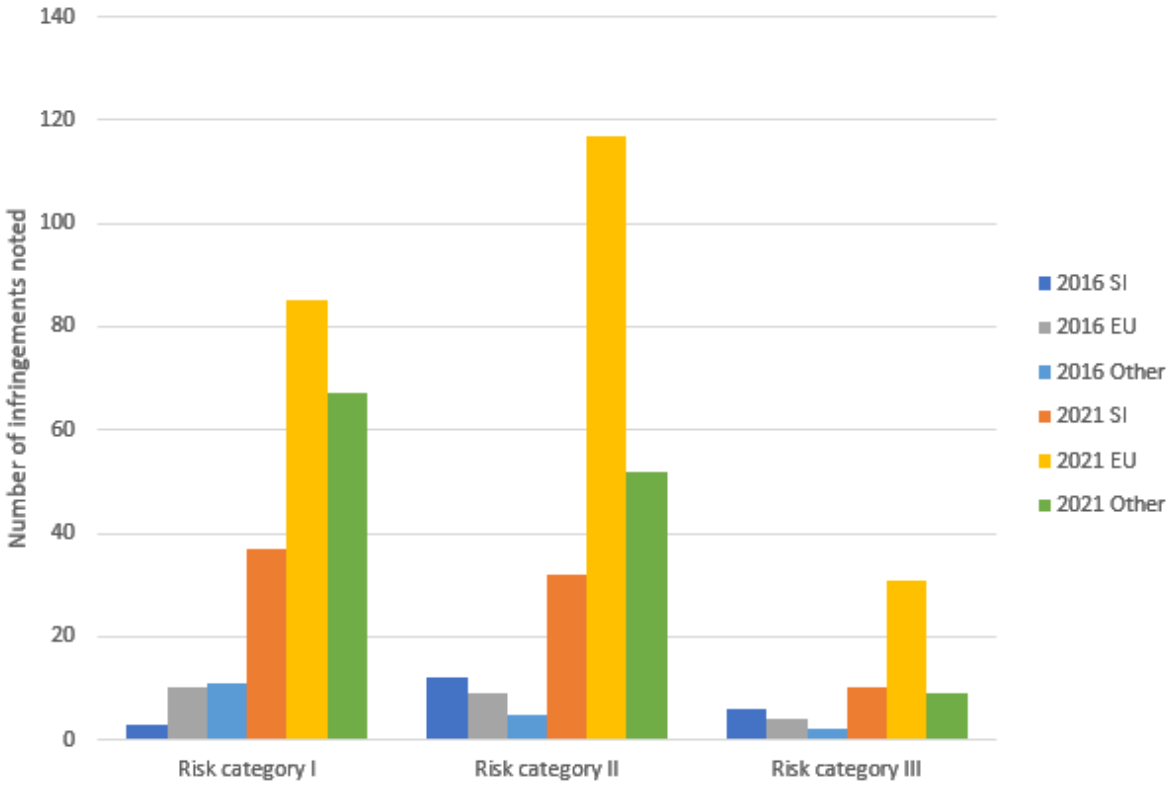


Figure 5: Number of infringements noted according to risk category in the year 2016 and 2021 by the driver from different origin countries (SI, EU and other) [report of Slovenian Inspection for road transport]

From the point of view of demonstrated potential dangers, for which deviations from ADR were found, the most dangerous are vehicles registered in the EU (a total of 233 deviations found in 2021, of which 85 PG I (36%) and 117 (50%) PG II - high and

medium level of danger). The following are vehicles registered in other countries, for which in 2021 it was found in controls that a total of 128 vehicles deviated from ADR requirements, of which more than 50% were driving very dangerous substances (PG I) and more than 40% medium hazardous substances (PG II).

4.2 Hungary

4.2.1 Legal bases of the transportation and inspection of dangerous goods in Hungary

Dangerous goods can be transported on public roads, by rail, over waterways or by air- plane in Hungary. There are various transportation regulations applying to the various transportation methods: ADN, ADR (European Agreement Concerning the International Carriage of Dangerous Goods by Road), IMSBC Code (International Maritime Solid Bulk Cargoes Code), ICAO TI (International Civil Aviation Organization Technical Instructions for the Safe Trans- port of Dangerous Goods by Air)/IATA DGR (International Air Transport Association Dangerous Goods Regulations), IMDG Code (International Maritime Dangerous Goods Code) and RID (Regulations Concerning the International Carriage of Dangerous Goods by Rail). The tasks of the disaster management authority related to the transportation of dangerous goods are completed in line with the Hungarian and international legal regulations. [14]

The Hungarian legislation is based on the adaptation of the regulations on the checks laid down in international agreements, in line with EU requirements. The authority's power to check is included in the laws specific to each mode of transport and their implementing regulations.

In Hungary, Annexes A and B to the Agreement on the International Carriage of Dangerous Goods by Road and on the Domestic Use of Dangerous Goods in Hungary, 2 July 2021, 387/2021. (VI. 30.) and ITM Decree 39/2021 (VII. 30.) on the domestic application of Annexes A and B to the Agreement on the International Carriage of Dangerous Goods by Road (ADR) shall apply from 31 July 2021.

The European Union requires Member States to apply a uniform structure to the rules on the transport of dangerous goods by road, rail, and inland waterway in Directive 2008/68/EC. Today the Act I of 1988 on Road Transport establishes the right of the disaster protection authority to independently inspect and fine. [14]

Next table contains importance national regulations in transportation of dangerous goods.

Table 2: National regulations in transportation of dangerous goods [Source: National Directorate General for Disaster Management][15]

Act CXXVIII. of 2011.	on disaster protection and the amendment of certain related laws; This law must be applied to disaster-risk activities carried out in Hungary, in order to prevent an extensive damage event, as well as in the event of its occurrence, and also when protection against the harmful effects of the disaster is necessary in Hungary (including protection against serious accidents related to hazardous substances).
Act I of 1988	Road transport
Gov. Decree No. 312/2011.	During the procedures of the professional disaster prevention body, on the rules of the uniform procedure for the inspection of the transport of dangerous goods by rail and inland waterways and the imposition of fines, as well as the amount of fines that can be imposed for individual irregularities, as well as the general rules of the official duties related to the imposition of fines.
Gov. Decree No. 1/2002. (I. 11.)	Government decree on the uniform procedure for the inspection of the transport of dangerous goods on the roads
NFM Decree No. 5/2014 (IV.30)	On the appointment and qualification of the dangerous goods transportation safety consultant;
Gov. Decree No. 156/2009. (VII.29.)	On the amount of fines that can be imposed in the event of a violation of certain provisions related to road transport of goods, passenger transport and road traffic, as well as the official tasks related to fines.
NFM Decree No. 61/2013. (X.17.)	On the domestic application of Annexes "A" and "B" of the European Agreement on the International Carriage of Dangerous Goods by Road (ADR)
NFM Decree No. 7/2011. (III. 8.)	On the road transport of agricultural chemicals and fuels with an agricultural tractor or trailer pulled by a slow vehicle;
NFM Decree No. 62/2013. (X.17.)	On the domestic application of the Regulation on the International Carriage of Dangerous Goods by Rail (RID);
Gov. Decree No. 225/2015. (VIII. 7.)	On detailed rules for certain activities related to hazardous waste.
NFM Decree No. 57/2011. (XI. 22.)	On water transport regulations
51/2013. (IX. 6.) NFM rendelet	On the transport and packaging of radioactive materials
Gov. Decree No 313/2014. (XII. 12.)	On the disaster prevention authority control related to the air transport of dangerous goods and the rules for imposing fines.
NFM Decree No. 28/2017. (VII. 5.)	On the modification of the domestic application of the Regulation on the International Carriage of Dangerous Goods by Rail (RID) (NFM Decree No. 62/2013. (X.17.))

Gov. Decree No 177/2017. (VII. 5.)	On the publication of the Regulations attached to the European Agreement on the International Carriage of Dangerous Goods by Inland Waterway (ADN), as well as on some issues of its domestic application.
NFM Decree No. 26/2017. (VII. 5.)	On the domestic application of the Regulations attached to the European Agreement on the International Carriage of Dangerous Goods by Inland Waterway (ADN).

4.2.2 Concrete examples in Hungary for TDG chain management

The Hungarian Disaster Management system is based on three main pillars, fire protection, civil protection, and industrial safety. Industrial safety deals with manmade disasters, major accidents and other events endangering human health and life, the environment, and critical assets. From the point of view of the Disaster Management Act, industrial safety deals with four further pillars; critical system components covered by the regulations about critical systems and installations, dangerous establishments or dangerous activities, the transportation of dangerous goods, and prevention of nuclear incidents.[16]

Hungary's geographical location is very favorable and has an important role in the transportation to and from the eastern and southern countries. As a result of this, transit shipments are also significant in addition to the domestic transportation, therefore transport infrastructure has a very important role in our country.

Transportation of dangerous goods is happening mostly on road but is getting more and more popular on railways, inland waterways and by air as well. [17]

Notification of the forwarding of dangerous goods in Hungary Installations used for the transportation of dangerous goods can be divided into five groups in line with the transportation methods, as follows [18]:

- Installations used for the road transportation of dangerous goods.
- Installations used for railway transportation.
- Installations used for the transportation over inland waterways.
- Installations used for the preparation of air transport.
- Installations used for transportation by pipeline.

Notification of the forwarding of dangerous goods

National Directorate General for Disaster Management homepage contains information about the notification of dangerous goods groups (water, road, train).

Figure 6: National Directorate General for Disaster Management homepage

Notification of transport of dangerous goods (ADN) by inland waterways in progress in Hungary (example)

Gov. Decree No. 312/2011. stipulates that companies carrying out water transport must report the transport of dangerous goods to the National Directorate General for Disaster Management. The company can submit the report electronically to the emergency department of the competent county (capital city) disaster management directorate. Documents are available on the National Directorate General for Disaster Management homepage and the e-mail contact as well. [13]

4.2.3 Overview of the volume of TDG accidents, potential harmful influence on the environment and mitigating measures in Hungary

Statistics about road inspections and accidents

The following table shows quantitative changes in the inspections of dangerous goods transport by road compared to 2002, 2006, 2009 and 2011, which can be considered base years.

Table 3: Road inspections (2002-2014)

Figures of road inspections, source: NDGDM MoI, 2015

Inspections of Dangerous Goods Transport	2002	2006	2009	2011	2012	2013	2014
ADR road transport inspections							
Number of inspections	501	1002	1313	996	1669	1625	3888
Number of inspected vehicles	n/a	n/a	10970	13964	35000	35428	31780
Number of ADR vehicles	1168	2383	3665	2175	4242	4229	5321
Number of defective vehicles	581	362	370	165	317	405	384
Relative number of errors	0.71	0.3	0.23	0.18	0.15	0.13	0.11
Number of site inspections	65	166	322	588	612	654	1114
Number of penalty decisions	not authorised	not authorised	353	233	237	499	645
Number of second-instance decisions	not authorised	not authorised	137	70	100	144	163
Total amount of penalties (million HUF)	not authorised	not authorised	212.45	98	148.55	188.650	215.240
Number of court proceedings	not authorised	not authorised	17	6	13	23	44
Number of inspected accidents	n/a	8	13	27	36	17	32
The inspecting authority (in the first instance)	Regional body	Regional body	Regional body	Regional body	Regional body	Regional body	Local body

Based on the table 3, it can be stated that the figures related to authority inspections steadily increased. The year of 2011 represents the average performance of inspections under the effect of the first disaster management act. After the second disaster management act came into force, a substantial growth can be seen in the figures, which is most probably due to the authority activity's drop in the public administration level. Local organs replaced regional ones as authorities of the first instance in the integrated organization. Another reason is the country-wide series of inspections called "Disaster", which embraces all means of transportation. [17]

The figure below displays figures related to the incidents between 2012 and 2015 and their inspections. [17]

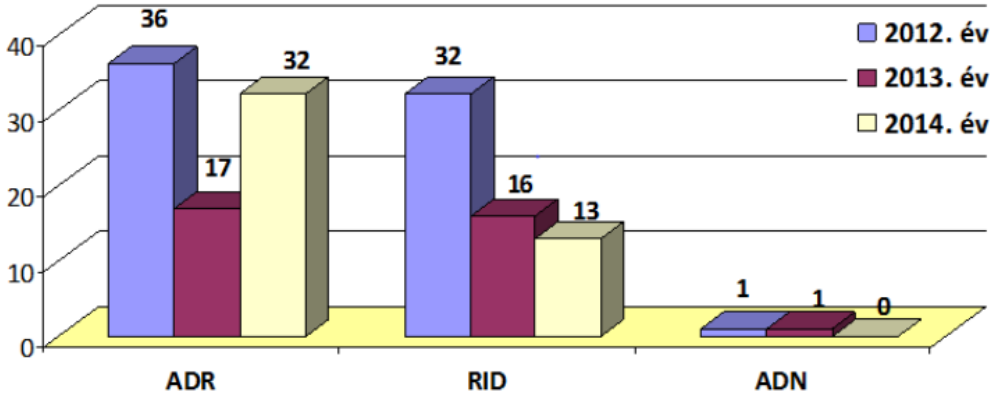


Figure 7: Number of inspected accidents [Source NDGDM Mol, 2015]

Table 4: Number of inspections and inspected accidents [Source NDGDM Mol, 2015]

	Number of ADR vehicles	Number of inspections	Number of inspected accidents
2012	4242	1669	36
2013	4229	1625	17
2014	5321	3888	32

According to a Deputy Fire Chief the constant presence of the authorities is also essential on public roads, since during the COVID epidemic, and after that, when the number of inspections was greatly reduced and then could be restarted, the experience was that the trend that had been increasing until then turned again in a negative direction. [17]

Statistics about inland waterway inspections and accidents

Similarly, the volume of inspections grew in the field of dangerous goods transport by inland waterway.

It is true for both means of transport that disaster management authority was steadily strengthening its activities, which is reflected in better coordination and effectiveness of supervision. [17]

Table 5: Inland waterway inspections and accidents (source: NDGDM MoI, 2015)

	Number of ADN vehicles	Number of inspections	Number of inspected accidents
2012	365	315	1
2013	435	498	1
2014	985	725	0

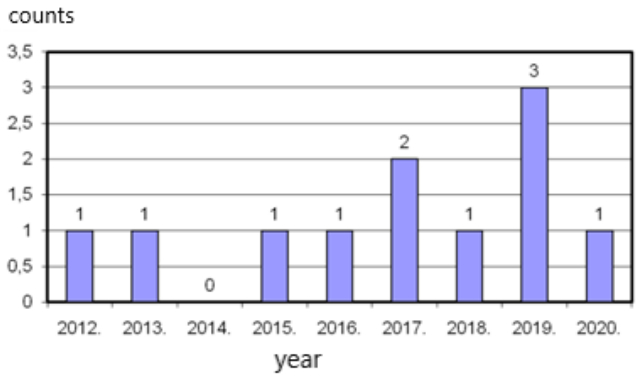


Figure 8: Number of accidents related to the inland transport by waterway of hazardous materials (2012-2020) Source: BM OKF IBF 2021

Examples for accidents

Accident near Kunfehértó in 2021

A tanker transporting dangerous goods collided head-on with a car. One person died. The truck drove into a ditch, its tank ruptured, and hundreds of liters of diesel poured onto the road. The disaster management carried out the remedial action.

Figure 9: Accident near Kunfehértó [19]

Accident near Mór (2020)

The tanker truck transporting liquid bitumen overturned, and the mobile laboratory of the disaster management had to be called to the scene.

Figure 10: Accident near Mór [20]

Carrying out more frequent and effective inspections in order to prevent accidents.

Examples of train accidents in Hungary

On 12.05.2012, between Máriabesnyő and Bag, six tank cars of a freight train derailed and overturned. The railway track, the overhead contact line system and the vehicles suffered serious material damage (approx. 200 million HUF). The accident was caused by the fault of the track and the inattention of the driver failing to observe the speed restrictions and exceeding the speed limit. Other irregularities also played a part in the accident. Besides the six tank cars, a tank car filled with sulphury acid was also added to the train, but luckily, it did not derail. [22]

Figure 11: Accident at Máriabesenyő

Inspections and fine

The law sets out the procedure for imposing a fine in accordance with the right of review. The bodies responsible for inspection are the transport authority, the police, the customs authority, and the Disaster Management authority. These authorities are therefore also entitled to monitor compliance with the rules on the transport of dangerous goods in the event of an accident, i.e., to determine whether the accident is linked to a breach of a transport rule and, if so, exactly which rule. However, experience shows that the investigation of such a complex accident is in all cases carried out by the Disaster Management, which is required by internal rules to carry out the investigation. Disaster Management Mobile Laboratories have the appropriate personal protective equipment, measuring instruments, consequence analysis software and procedures to use them, as well as the knowledge to prepare for possible population protection measures to investigate such a complex incident.

Government Decree 1/2002 (I. 11.) on the uniform control procedure for the transport of dangerous goods by road, which prescribes the application of a uniform control procedure in Hungary within the European Union. To ensure the effectiveness of prevention in Hungary, the national industrial safety inspectorate of the National Directorate General for Disaster Management manages the tasks of the disaster protection authorities in connection with the investigation of accidents. The infringements are fined in a basis of Government Decree No 156/2009 (29.VII.) on the number of fines for infringements of certain provisions relating to the carriage of goods

and passengers by road and road transport, and on the duties of the administrative authorities in relation to the imposition of fines.

According to the road transport law mentioned above, the transport authority, police, Disaster Management, and customs authorities are entitled to check and impose fines regarding the transport of dangerous goods, the carrier, the road vehicle and its crew, the dispatcher of the goods, the temporary storage, the packager, the loader, the recipient and the appointment and qualification of the safety advisor. The decree on the uniform procedures for checks on the transport of dangerous goods by road, coming into effect on 1 March 2002, is considered a basic implementing regulation. The local and territorial (county level) authority of National Directorate General for Disaster Management is entitled to conduct checks. The local and territorial authority of Disaster Management may conduct independent checks on the area of another Disaster Management authority, with the prior consent of the central organ of the Disaster Management authority. The checklist for inspections is specified in the annex to the Government Decree No 156/2009 (29.VII.) on the number of fines for infringements of certain provisions relating to the carriage of goods and passengers by road and road transport, and on the duties of the administrative authorities in relation to the imposition of fines. The authority may take samples of goods for laboratory examination. In the case of infringement, the authority imposes sanctions and immobilizes the vehicle, in line with a separate decree of fine.

The infringements shall be assigned to the following risk category for the purpose of determining the amount of the fine, where category 1 is the most serious. Risk category 1 means infringements of the regulations on the transport of dangerous goods which involves a high risk of death, serious personal injury, or significant damage to the environment. Risk category 2 means infringements of regulations on the transport of dangerous goods which involves a risk of personal injury or damage to the environment. Risk category 3 means infringements of the regulations on the transport of dangerous goods (ADR) with a low risk of personal injury or damage to the environment.

Some examples for most serious infringements are here:

- Carriage of dangerous goods excluded from transport under the ADR.
- Leakage and scattering of dangerous goods.

- Transport by an unauthorized mode of transport or by an unsuitable means of transport or a means of transport in an unsuitable technical condition
- Bulk transport in a container that is structurally unsuitable.
- Transport with an expired approval
- Use of packaging without approval
- Use packaging that does not comply with the packaging instructions for dangerous goods.
- Failure to comply with special packaging requirements.
- Failure to comply with the rules for stowage and securing of cargo.
- Failure to comply with the rules on stacking.
- Non-compliance with the permitted degree of filling
- Failure to comply with the quantity limit per transport unit.
- Transport of dangerous goods without any indication or information. [16]

4.3 Poland

4.3.1 Legal bases of the transportation and inspection of dangerous goods in Poland

In terms of Polish domestic law, attention should primarily be drawn to the Act of 19 August 2011 on the carriage of dangerous goods. In terms of road traffic, also the Law on Road Traffic. The most important Polish institution controlling compliance with the law on the transport of dangerous goods is the Road Transport Inspectorate.

Due to the scale of road transport, the ADR Convention remains one of the most important documents regulating road transport. Currently, 49 countries remain parties to the ADR, including Poland.

European Agreement concerning the international carriage of dangerous goods by road – ADR - the Agreement concerning the International Carriage of Dangerous Goods by Road (ADR), drawn up in Geneva on 30 September 1957, was ratified by Poland in 1975.

The ADR Agreement is a comprehensive piece of legislation covering several areas relating to the transport of dangerous goods. It consists of the Agreement proper, defining the legal relations between the participating parties, and Annexes A and B, which contain provisions regulating to a large extent the conditions of transport of dangerous goods by road.

The law relating to ADR, i.e., the rules for the transport of dangerous goods, is amended every two years. The main change is the deletion of the expression 'European' from the name of the agreement. This means that ADR regulations should also be applied by non-EU countries, such as China and African countries, which are involved in the transport of goods within Europe.

The provisions of the ADR binding on the signatory member states are divided into Volume I and Volume II and comprise a total of nine chapters or parts regulating the international carriage of dangerous goods:

- Part 1 - General provisions
- Part 2 - Classification: Classes of dangerous goods (ADR classes)
- Part 3 - List of dangerous goods, specific provisions and exemptions for dangerous goods packed in limited quantities.
- Part 4 - Provisions on the use of packaging and tanks
- Part 5 - Shipment procedures
- Part 6 - Requirements for the construction and testing of packaging, large bulk containers, tanks, and bulk containers.
- Part 7 - Provisions concerning conditions of carriage, loading, unloading, and handling.
- Part 8 - Requirements for vehicle crew, equipment, conduct and documentation.
- Part 9 - Requirements for construction and approval of vehicles

These regulations mainly describe how the goods transported are to be classified as dangerous goods and what safety measures are involved. In addition, the documentation of the transport of dangerous goods, the safety obligations of those involved in the transport and the relevant instructions of those specifically involved are also described. These include the shipper, the consignor, the carrier and also the consignee of a load of dangerous goods. Emergency handling in case of damage is also an important element.

Drivers of dangerous goods transports must hold a dangerous goods licence, an ADR certificate. To obtain an ADR certificate, it is required to undergo training and then pass a theoretical examination. In addition, the ADR certificate must be renewed every five years with refresher training and an examination.

A person who holds a valid ADR certificate is entitled to drive a vehicle transporting dangerous goods by road for which ADR requires its driver to complete an ADR course.

The ADR certificate shall be issued to a person who:

1) is at least 21 years old, except for drivers of vehicles belonging to the Armed Forces of the Republic of Poland.

2) meets the requirements specified in the provisions of the road traffic law on road transport for drivers carrying out road transport.

3) has completed an appropriate ADR course:

(a) initial, if he/she applies for an ADR certificate for the first time

(a) initial, if he applies for an ADR certificate for the first time

(b) a further training course, if he applies for a renewal of his ADR certificate.

4) has successfully passed an examination at the end of an initial or an in-service ADR course

(4) passed the initial or further training ADR course.

However, according to the ADR, all persons involved in the transport and handling of dangerous goods must also prove that they have adequate expertise in the handling of dangerous goods and dangerous goods regulations. Logistics companies involved in the transport of dangerous goods must appoint a dangerous goods safety adviser.

The appointment of an advisor, according to the Transport of Dangerous Goods Act and the ADR European Agreement, is mandatory for companies whose activities involve the transport of dangerous goods. According to the cited regulations, the concept of transport also includes the activities of packing, filling, loading, and unloading of dangerous goods. A transport participant who cooperates with an advisor may expect the advisor to prepare an annual report on the activities involving the transport of dangerous goods. In addition, in the event of a serious accident or accident occurring during the loading, transport or unloading of dangerous goods, the adviser will be required to prepare an incident report. But the adviser's responsibilities do not end there. He or she should monitor compliance with carriage requirements and advise the company of the activity he or she has introduced accordingly. If appropriate practices are required to be implemented as a result, the adviser should assist in their development.

He or she may also be involved in the introduction of correct emergency procedures for accidents and incidents, safe handling instructions or control procedures. The adviser can also verify the existence of a security plan and advise on the purchase of

means of transport or the selection of subcontractors. In companies where employees perform loading or unloading, in forwarding or shipping companies, or in the case of drivers who are not ADR-certified and who only carry dangerous goods under so-called exemptions, the adviser can provide them with appropriate training. This is because employees should be trained in the requirements of the carriage, according to their responsibilities and duties, in accordance with the provisions of section 1.3 of the European ADR Agreement.

Vehicles intended to carry dangerous goods also require ADR approval. Approvals are granted depending on which dangerous goods the vehicles are authorized to carry. The following classes of vehicles are available for the transport of dangerous goods:

- vehicle other than FL, EX/III or MEMU vehicle, intended for the transport of dangerous goods in fixed tanks, mobile tanks - AT vehicle.
- a unit or vehicle designed for the production and loading of EMW (Emulsion Explosives - MEMU vehicle)

The vehicle's ADR registration must be renewed annually during the technical inspection. As in the case of the general inspection of motor vehicles, the special inspection under ADR is also carried out by an officially recognized inspection body and only this body is authorized to renew the ADR registration.

The task of the Road Transport Inspection is to perform the activities set out in: article 100 of the Act of 19 August 2011 on the carriage of dangerous goods (i.e. Journal of Laws 2018, item 169). These tasks consist in the control of compliance with the regulations on the transport of dangerous goods, and in particular the control is subject to:

1) the compliance of the performed transport of dangerous goods with the requirements set out in ADR, RID or ADN respectively and in the Act.

2) the technical condition of vessels, packaging, transport equipment used for the transport of dangerous goods.

3) the technical condition of the means of transport used for transport, its marking and equipment.

4) the training of persons carrying out the carriage of dangerous goods and activities related to such carriage, as well as the appointment of a competent safety advisor for the carriage of dangerous goods.

5) the documents required for the transport of dangerous goods, in particular the ADR certificate.

The tasks also include control of documents related to the performance of road transport, control of transport documents, control of road traffic within the framework of the powers granted by the Road Traffic Law, control of drivers' working time, as well as control of compliance with the terms and conditions of transport of animals and waste.

The performance of all these tasks entails certain "procedural" powers, which are used by inspectors when carrying out inspections. Inspectors are therefore given certain rights, including but not limited to:

1) the right to enter the vehicle.

(2) the right to inspect documents.

(2a) Right to inspect the driver card and the company card.

(3) the right to inspect the measuring and control equipment installed or present in the vehicle or the digital tachograph.

(3a) right to inspect the equipment used on the vehicle,

4) the right to control the weight, axle loads and dimensions of the vehicle by means of a measuring device.

5) the right to demand from the road transport operator and his/her employees to provide written or oral explanations, to produce documents and other information carriers, and to make available any data related to the subject of the check.

(6) The right to enter the premises of the entity performing road transport, including the premises or premises where it carries out its activities or stores documents and other information carriers required by law.

Inspectors of the Road Transport Inspection have the right to impose and collect fines. If an inspector stops a foreign hauler and, as a result of an inspection, finds an

infringement of the applicable regulations, a fine will be imposed, subject to immediate enforcement. Otherwise, his vehicle will be diverted to a car park until payment is made.

In addition to their powers to impose fines by way of administrative decisions, Road Transport Inspectors have the power to formulate requests for the initiation of proceedings:

- administrative withdrawal of traffic rights,
- criminal or penal-fiscal proceedings,
- in infringement cases,
- before the authorities of the State Labor Inspectorate,
- provided for in international agreements about foreign entrepreneurs.

In Poland, in the field of transport, the transport of certain dangerous goods is subject to an obligation to notify the Regional Police Commander and the Regional Commander of the State Fire Service.

The goods must be reported to:

1. the sender of dangerous goods - if transport begins in the Republic of Poland and is carried out by a carrier which is a foreign entrepreneur,

2. the carrier - if transport begins in the Republic of Poland and is performed by a carrier other than those specified in point 1,

3. the competent post of the Border Guard - if transport begins abroad.

The notification shall be submitted no less than 5 days prior to the commencement of transport - in cases referred to in points 1 and 2, and prior to granting permission for the vehicle with dangerous goods to enter the territory of the Republic of Poland - in the case referred to in point 3.

The list of dangerous goods whose transport is subject to mandatory notification, the scope of information subject to notification and the form of notification shall be specified by an ordinance of the minister in charge of transport in agreement with the minister in charge of internal affairs, taking into account the specific risks related to the transport of certain dangerous goods.

The driver of a vehicle transporting dangerous goods, in addition to the documents required by separate regulations and binding international agreements, shall be obliged to carry and present, upon request of the authorities or persons entitled to carry out inspections.

1. the transport document containing the data specified in the ADR agreement,

2. written instructions in the event of an accident relating to all the dangerous goods being transported, conforming to the scope, form and language laid down in the ADR Agreement,

3. an ADR certificate.

The documents referred to in points 2 and 3 are not required where dangerous goods are transported in quantities for which the ADR agreement does not require the vehicle to be appropriately marked.

Control of the carriage of dangerous goods by road and the requirements related to such carriage shall be performed by:

- inspectors of the Road Transport Inspectorate - on roads, car parks and on the premises of the entrepreneur in possession of dangerous goods,
- officers of the State Fire Service - on the premises of an entrepreneur possessing dangerous goods,
- Police officers - on roads and car parks,
- Border Guard officers - on roads and car parks,
- inspectors of the State Labor Inspectorate - on the premises of an entrepreneur possessing dangerous goods,
- customs officers
- soldiers of the Military Gendarmerie and military law enforcement bodies - on the vehicles of the Armed Forces,
- authorized employees of the State Atomic Energy Agency - in car parks and on the premises of an entrepreneur possessing dangerous goods,
- authorized personnel of the State Atomic Energy Agency - in the car parks and on the premises of the entrepreneur possessing the dangerous goods,

- authorized employees of the Environmental Protection Inspection - in the car parks and within the premises of the entrepreneur possessing the dangerous goods,
- authorized employees of road administration - in places specified in their powers.

The persons carrying out the control shall cooperate, to the extent necessary with representatives of the State Atomic Agency - in matters of conditions of transport of radioactive goods by road and of the Transport Technical Supervision - in matters of technical conditions of packaging intended for transport of dangerous goods by road, in matters of technical conditions of tanks, gas packaging and large bulk containers intended for transport of dangerous goods by road, and in matters of issuing certificates of approval of vehicles for transport of certain dangerous goods.

Persons carrying out inspections under it may only carry out strictly defined activities, and within these they are entitled to check:

- the classification of the dangerous good,
- the use of packaging, tanks or vehicles,
- the labelling of packages and their contents,
- compliance with prohibitions on the packaging of certain goods together,
- compliance with prohibitions on loading certain goods together,
- the manner in which the goods are arranged and secured on the vehicle,
- the technical condition of the packaging and tanks used for the transport,
- the technical condition of the vehicle used for the transport, its marking and equipment,
- the method of carriage,
- the qualifications of the driver,
- the qualifications of other persons carrying out activities connected with the carriage of dangerous goods by road,
- the documents required for such carriage.

In addition, the persons carrying out the check are obliged to complete a checklist during each check.

In the event of discovering irregularities in connection with the transport of dangerous goods affecting the safety of such transport, the person carrying out the control shall have the right to prevent the vehicle from crossing the border, if the vehicle is within the territorial range of the border crossing point, as well as to cause, at the expense of the owner or holder of the vehicle, the vehicle together with its load to be removed and deposited in a parking place making it possible to leave it safely.

A vehicle that has been removed may be returned to the authorized person after the irregularity has been remedied and a fee has been paid to cover the costs associated with its removal, parking and security measures. To the extent not regulated, the principles and conditions of vehicle removal specified in the road traffic regulations shall apply respectively.

The ADR Agreement regulates the obligations of the shipper and the carrier.

According to its content: "The consignor of dangerous goods is obliged to deliver for carriage only such consignments that meet the requirements of the ADR. He shall in particular:

(a) ensure that the dangerous goods are classified and authorized for carriage in accordance with the ADR;

(b) provide the carrier with information and data in an easily legible form and, where necessary, with the required transport documents and accompanying documents (permits, authorizations, notifications, certificates)

(c) use only packaging, DPPLs and tank-containers (tank-vehicles, demountable tanks, battery-vehicles, MEGCs, mobile tanks and tank-containers) that are approved and suitable for the carriage of the materials concerned and bear the marks required by ADR;

(d) comply with the requirements concerning modes of shipment and shipping restrictions.

(e) ensure that even empty uncleaned and non-gassed tanks (tank-vehicles, demountable tank-vehicles, battery-vehicles, MEGCs, portable tank-vehicles and tank-containers), as well as empty uncleaned vehicles and bulk containers, are marked and

provided with the required large warning labels and that empty uncleaned tanks are as closed and sealed as when loaded.

Where the consignor uses the services of other parties involved in the transport operation (packer, shipper, filler, etc.), he shall take appropriate measures to ensure that the consignment complies with the requirements of the ADR. However, in the case of the requirements under paras. (a), (b), (c) and (e), the consignor may rely on the information and data made available to him by the other participants in the carriage.

Where the shipper is acting on behalf of a third party, that third party should inform the shipper in writing that the carriage involves dangerous goods and should make available to the shipper all the information and documents needed to fulfil his obligations.

Conversely, it is the carrier's primary duty to ensure that:

(a) the dangerous goods to be carried are authorized for carriage in accordance with ADR;

(b) all the information required by the ADR concerning the dangerous goods intended to be carried has been provided by the shipper before the start of the carriage,

(c) the vehicles and load are free from evident defects and that there are no leaks or leakages, shortcomings in the equipment, etc.

(d) the deadline for the next test has not passed for tank vehicles, battery vehicles, demountable tanks, mobile tanks, tank containers and MEGCs.

(e) the vehicles are not overloaded.

(f) the required warning stickers, signs and orange-colored plates are displayed on the vehicles;

(g) the transport unit carries the equipment required in the ADR for the transport unit, the vehicle crew and the specified warning stickers.

Transport of Dangerous Goods - Obligations of the main participants in the carriage under the CMR Convention

The obligations of the shipper entrusting the carrier with dangerous goods are set out in Article 22 of the CMR Convention. He should describe precisely to the carrier the

danger presented by the goods entrusted to him and indicate the precautions to be taken (so-called information obligation). Where should this type of information be placed? It is assumed that the CMR consignment note is the appropriate place to include it.

If this information is not included in the consignment note, it is up to the sender or the consignee to prove by any other means that the carrier was aware of the danger presented by the carriage of the said goods.

The consignor shall be liable for all costs and damage arising out of their being entrusted for carriage or from their carriage. A shipper who fails to comply with its obligations is exposed not only to the loss of the cargo but also to the payment of damages. This is a liability of an absolute nature.

In contrast, the Convention does not detail the rules for the carrier's liability for damage arising from the carriage of dangerous goods. In Article 23, it only indicates a general obligation to pay compensation for the total or partial loss of the goods.

Requirements for vehicles for the transport of dangerous goods

Vehicles intended for the transport of dangerous goods must comply with the provisions contained in:

- ADR agreement,
- The Law on the Transport of Dangerous Goods,
- Road Traffic Law

Motor vehicles or vehicle combinations may be used for the transport of hazardous materials, except for a motorbike or a vehicle combination consisting of a motorbike and a trailer. A vehicle combination may have only one semi-trailer or trailer.

In Poland, it is allowed to transport diesel fuel, oxidizing materials used as fertilizers or poisonous materials used as plant protection agents, by a combination of vehicles consisting of an agricultural tractor and a trailer, if these goods are transported in packages and in small quantities, for which the ADR agreement does not provide for the obligation of marking the vehicle.

According to the ADR agreement, all motor vehicles with a permissible total weight exceeding 12 tones and registered for the first time as of 01.01.1998 should have a speed limiter adjusted in such a way that - considering the tolerance - the vehicle cannot exceed the speed of 90 km/h. In Poland, according to the provisions of the Highway Code, every lorry with a maximum permissible weight exceeding 3.5 tones and a motor tractor for which the maximum permissible weight of the vehicle combination exceeding 3.5 tones is specified, should be equipped with an approved speed limiter, installed by the manufacturer or a unit authorized by him, limiting the maximum speed of the lorry and the motor tractor to 90 km/h.

Motor vehicles and trailers intended for use as transport units for the carriage of dangerous goods should have braking systems whose design and performance meet the relevant requirements of ECE Regulation No. 13.

In the case of fire extinguishers:

- each transport unit carrying dangerous goods should be equipped with at least one fire extinguisher (for fire groups A, B, C) containing not less than 2 kg of fire extinguishing powder (or another extinguishing agent but of equivalent quantity) for extinguishing a fire in the engine or cabin of the vehicle; furthermore
- each transport unit with a maximum permissible mass of up to and including 3,5 t shall be equipped with one or more fire extinguishers (for group A, B, C fires) with a total content of 4 kg of fire extinguishing powder (or other extinguishing agent but an equivalent quantity)
- each transport unit with a maximum permissible mass of more than 3.5 t but not more than 7.5 t shall be provided with one or more fire extinguishers (for fire groups A, B, C) with a total of 8 kg of fire extinguishing powder (or other extinguishing agent but equivalent), the content of one extinguisher shall not be less than 6 kg.
- each transport unit with a permissible gross vehicle mass of more than 7,5 t shall be provided with one or more fire extinguishers (for fire groups A, B, C) with a total of 12 kg of fire extinguishing powder (or other equivalent extinguishing agent but not less than 6 kg per extinguisher.

The following documents should be on board the vehicle when transporting hazardous materials:

- transport document,
- written instructions for the driver,
- driver's certificate of training (if required),
- driver's certificate of competence,
- certificate of approval of the vehicle for the transport of certain dangerous goods (for EX/II, EX/III, FL, OX, AT vehicles),
- authorization to carry certain goods.

In the case of a container, if the carriage by road takes place immediately before the carriage by sea, a container packing certificate is required.

Written instructions for the driver are the so-called driver's accident instructions for each material transported. These instructions contain the physical and chemical properties of the material and how to proceed in the event of an accident. These instructions should include:

- the name of the material or group of goods, the UN class and number, a description of the load, whereby the description should be brief, limited to e.g. physical state, colour and odor - to facilitate recognition of the release of the material,
- the nature of the hazard of the material carried (predominant hazard, subsidiary hazard, behavior of the material under the influence of fire or heating, whether the material carried reacts dangerously with water),
- countermeasures to be taken by the driver,
- the personal protective equipment the driver should wear,
- basic actions to be taken in the event of an accident, e.g:
- switch off the engine,
- do not use naked flames, do not smoke,
- mark the scene of the accident and warn other road users and bystanders,
- inform people in the vicinity of the danger,
- inform the police and fire brigade.

- additional actions to be carried out in case of small quantities of material released,
- special actions to be carried out with certain materials (if required),
- the equipment necessary to perform the additional or special action (if required).
- information for the driver in case of fire (the driver should not, however, extinguish the fire of the load),
- information to the driver necessary in the event of contact with the material transported.

These instructions are prepared and provided to the carrier (driver) by the consignor of the material. The information contained in the instructions should be provided to the hauler at the time the transport is ordered, so that the hauler adapts the additional equipment of the vehicles to the requirements of the instructions. The instructions themselves should be delivered to the driver at the time of loading the material at the latest. The driver should keep the instructions in a conspicuous place in the cab of the vehicle.

4.3.2 Concrete examples in Poland for TDG chain management

Hazardous materials can be transported in three ways in road transport:

- Carriage by consignment in pieces - Each piece of goods should be marked with a warning sticker and UN number and, in the case of explosive goods, a sticker with the name of the material contained in the package. If the goods present several different hazards then toxicity, corrosivity and flammability shall be indicated on separate stickers. Carriage in pieces can be by crates, containers, on platforms or vehicles with specially adapted bodies.
- Carriage in bulk without packaging - This is carried out using box or container vehicles (dedicated to low-risk solid goods).
- Tank carriage - Each tank car has a so-called tank code, i.e., the requirements it has to meet for the carriage of a specific load, e.g. type of vehicle, filling level of the tank, appropriate marking.

According to the regulations, a vehicle carrying a hazardous material should, as far as possible, travel on roads with good surfaces and low traffic density, avoiding roads near active leisure and sports centers and avoiding built-up areas of cities, in particular inner-city streets.

When organizing the transport of hazardous materials, journeys should also be planned to avoid the need for parking wherever possible, particularly in urban areas.

When organizing the transport of hazardous materials, it is important to bear in mind that these transports cannot be carried out on all roads. Certain types of material (e.g. class 7 radioactive) are subject to notification to the relevant provincial police chief and the State Fire Service. Certain types of material also require authorization from the local police station or constable and the chief of the State Border Guard Service for loading and unloading. In the case of domestic transport, this notification must be made at least 5 days before the date of commencement of transport. The obligation to notify is incumbent on the carrier (if it is a national company) or on the shipper (if it contracts the service to a foreign entity). On the other hand, if the carriage starts abroad, the notification shall be made by the competent control post of the Border Guard before issuing a permit to enter the territory of Poland. The effect of this notification is not only the issuance of a permit to transport, but also the determination of the transport route.

Knowledge of regulations and good organization of transport ensure safety in the transport of dangerous goods. First of all, it is necessary to classify the transported material into one of the separated classes of dangerous goods. In this way, the correct handling of the goods during their movement can be determined and the appropriate means of transport used. The obligation to adequately prepare and equip the vehicle rests with the transporter, while the shipper should each time check whether the substituted means of transport actually meets the requirements for the class of hazardous material being transported. When organising the transport of hazardous materials, particular attention should also be paid to loading work and the selection of appropriate loading technology. Of course, those directly involved in the transport of hazardous materials (i.e. the drivers) have a considerable influence on the transport of hazardous goods. Their knowledge of the type of material being transported, the conditions of transport and how to handle the load in question largely determines the

safety of the transport. In this respect, it is essential that the provisions on the training of these persons and their compliance with the conditions set out in the legislation are strictly adhered to.

The standard for guaranteeing the safe transport of dangerous goods by road is the European ADR agreement.

4.3.3 Overview of the volume of TDG accidents, potential harmful influence on the environment and mitigating measures in Poland

Handling of major accident or incident during the transport of dangerous goods

If a serious accident or incident within the meaning of ADR, RID or ADN has occurred in relation to the transport of dangerous goods, the participant in the transport shall, within 14 days of the occurrence of the incident, transmit the report referred to in Article 40(2):

1) to the President of the Railway Transport Office - in case of transport of dangerous goods by rail;

2) the provincial road transport inspector competent for the place where the incident occurred - in case of transport of dangerous goods by road;

3) to the director of the inland waterway office competent for the place where the incident occurred - in the case of transport of dangerous goods by inland waterway;

4) to the Head of the Inspectorate of Support for the Armed Forces - in the case of transport of dangerous goods by means of transport belonging to the armed forces or by means of transport for which the armed forces are responsible.

Information on a serious accident or breakdown in the transport of dangerous goods shall be forwarded to the minister in charge of transport, immediately after the post-accident report is received by these authorities.

Conditions for the safe transport of dangerous goods by road

Dangerous cargo is any goods that can have a destructive effect or pose a danger to persons, property and the environment. Hazardous cargo exists in three states of matter: solid, liquid and gaseous. The transport of dangerous goods is prohibited by law. The transport of such an item is only permitted under separate conditions defined by law. In road transport, these are the provisions of the European agreement known as ADR, which precisely regulate the conditions for the safe transport of dangerous goods by road. The Convention was drawn up in Geneva in 1957 and Poland ratified it in 1975. The ADR agreement is in force in 46 countries. This agreement is regularly updated to ensure safety and reduce the risk of operations in the transport of dangerous goods by road.

According to these guidelines, the transport of dangerous goods is subject to specific orders and bans - in terms of the material's admissibility for transport, its packaging, classification, and labelling, as well as requirements relating to the means of transport and the execution of the transport. With this classification, hazardous goods are assigned methods for selecting the correct mode of transport, appropriate packaging and handling procedures to guarantee safety. All hazardous materials produced worldwide are divided into 13 hazard classes. Each item has an individual UN identification number. Once the goods are classified in the appropriate group and given a number, the selection of the right means of transport and appropriate packaging of the goods follows.

In Poland, the transport of hazardous materials is additionally regulated by the Act on Transport Law, the Act on Transport of Dangerous Goods, the Act on Road Traffic Law. All these regulations are primarily aimed at ensuring that the danger from hazardous materials is reduced to an acceptable level.

Responsibilities of participants in the transport process

As mentioned earlier, it is the responsibility of those involved in the process of transporting hazardous materials to ensure the safety of this transport. The shipper (who is responsible for preparing the consignment), the carrier (who is responsible for preparing the vehicle) and the driver (who is responsible for the way the vehicle is driven and for complying with the regulations and instructions) have a special role in this case. All persons involved in the transport, loading and unloading of dangerous goods must be ADR-qualified and have received appropriate training beforehand, and businesses must also appoint a dangerous goods safety adviser.

The shipper is obliged to package and label the consignment correctly and to load it properly. Packaging should be in good condition, suitable for the load being transported and properly closed. Packaging is selected according to the degree of danger posed by the load. For example, high risk materials are placed in Packing Group I, medium risk materials in Packing Group II and low risk materials in Packing Group III. Markings should be durable and legible, and resistant to external influences. In addition to labelling, warning stickers are also used to indicate, for example, the type of material being transported. It is also up to the shipper to choose how to transport the hazardous cargo.

The carrier contracted to transport should verify the choice of means of transport and provide a vehicle that meets the requirements according to the number assigned to the load. The hauler is obliged to provide the right means of transport and to use the right equipment and markings in it. The preparation of the vehicle refers to the bodywork and chassis; in particular the type of material (resistance to mechanical exposure, temperature, pressure and its quantity), the design of the bodywork, engine and exhaust system and their placement in the vehicle, the electrical installation, voltage, equipment with control devices, alarms, fire extinguishers, first aid kit, driver's personal protective equipment and warning signs, wedges to immobilize the vehicle.

The marking of the vehicle shall consist of conspicuity plates

Must be of the appropriate color and size (orange rectangular plates placed on the front and rear of the car or vehicle combination, vertically and perpendicularly to the vehicle axis). In the event of an accident, the emergency services are warned of the potential danger through the appropriate marking of vehicles and packages.

The driver transporting the dangerous load must have the appropriate qualifications; he must have training, be familiar with the rules of the road, the ADR Convention, the relevant laws and regulations, know how to give first aid, have the ability to deal with accidents (use of fire-fighting equipment) and respect the prohibitions on combining certain types of material in the same vehicle. It is also important to drive the vehicle properly, to observe the required rest breaks, to prepare the load for transport (placing and securing it on the vehicle) and to not exceed the permitted load capacity. The person driving the means of transport must be aware of his/her material and moral responsibility for any damage that may occur during transport.

Along with the load, documentation must be carried in the cabin with the name and address of the shipper and consignee, the UN numbers of all loads carried, the sticker numbers, the packing group, the type and quantity of goods and additional information characterizing the transport. The driver should also have written instructions from the shipper in the languages of all transit countries. The basic document used for this type of carriage is the consignment note. The consignment note should contain important information about the load being carried. Depending on the type of cargo and the agreements made, additional documents - permits, certificates, texts of special agreements - are attached to the consignment note.

Hazards inherent in the transport of dangerous goods

The transport of dangerous goods may pose a risk to both humans and the environment. Risks may arise from, for example: technical defects in the vehicle, failure to observe safety rules. The consequences of failures or errors can be explosion, fire,

radiation, and other toxic hazards. This is definitely what endangers the health and life of people, animals and also the contamination of the environment. Among the only of the many effects on the human body, we can include: sensitizing effects, changes in the central and peripheral nervous system, as well as in the kidneys. There are also toxic effects: on the skin and eyes. Every year as many as several hundred accidents involving dangerous goods are registered, and in this respect, we can definitely distinguish tankers transporting fuels. How do dangerous goods endanger the environment? Undoubtedly, substances penetrate the soil and water causing significant degradation.

The most common causes of accidents

- hazards due to the properties of the goods in question,
- leaks and poor packaging,
- leaking tanks,
- poor vehicle condition,
- lack of securing,
- disregard for regulations,
- loss of control of the vehicle,
- poor road condition,
- poor weather conditions.

The consequences of not knowing about the transport of dangerous goods

- Extensive personal injury to the driver and also to road users,
- death
- loss of jobs due to lack of skills and knowledge,
- degradation of the surrounding environment,
- causing traffic disruption,
- considerable material damage.

The consequences are, of course, many more, only the basic ones have been presented. Consequently, every employer must require a high level of knowledge of hazardous materials from the driver to avoid all the negative consequences.

Behavior during a dangerous goods accident/accident

Whenever an accident involving a vehicle or vehicles transporting dangerous goods occurs, the following must be done assess the situation of the incident, alert the emergency services, inform the operator and also the designated dangerous goods advisor, if necessary, stop the vehicles on the road in question and designate a protective zone. On the other hand, if a serious accident has occurred, according to the ADR agreement in force, a report must be submitted to the competent authority for the place of the incident - the provincial road transport inspector - within 14 days of the day of the incident.

In order to improve the safety of the transport of dangerous goods, it is necessary to:

- improve the technical condition of public roads by bringing them up to EU standards,
- build and modernize transport infrastructure,
- improve the organization of road traffic,
- improve the technical condition of public roads by bringing them up to EU standards,
- build transport infrastructure, -improve the organization of road traffic,
- establish an effective driver training system, in terms of acquiring driving licenses, improving professional skills,
- improve the organization of road traffic,
- establish an effective system of training for drivers, in terms of acquiring driving licenses, improving professional skills,
- improve the system of admitting vehicles to road traffic in order to eliminate vehicles in a poor technical condition from traffic,
- implement an integrated transport safety system, eliminating institutional fragmentation of actions and competences for improving safety, monitoring the transport of high-risk goods,
- restrict the passage of vehicles on roads through urban areas (cities),
- introduce an obligation to report the transport of dangerous goods to the State Fire Service and provincial police chiefs.

It should be added that for the transport of selected groups of dangerous goods a special escort, often armed, must be used in addition to the pilotage. There are cases of criminals attempting to capture certain dangerous goods. IT is being applied to the transport of dangerous goods. Modern telematics solutions not only monitor the speed and position of the vehicle, but can also report events that the driver might have missed or noticed too late. In the event of a valve malfunction, telematics solutions enable distributors to react immediately and stop the vehicle.

An overview of the number of road accidents involving transporters of hazardous material

Table 6: Type of incident

Type of incident	**number**
Side impact collision	13442
Pedestrian impact	2405
Rear-end collision	1863
Accident with a passenger	982
Other	687
Front-end vehicle collision	577
Running into an immobilised vehicle	440
Running into a pole, sign	71
Vehicle rollover	26
Run over an animal	15
Run over protective barrier	13
Run over pothole, bump, hump	9
Running over a railway barrier	2

Table 7: Time of event/annual variation

Year	**Incidents**	**Dead**	**Seriously injured**	**Slightly injured**
2018	1481	16	102	307
2019	1406	17	90	232
2020	946	13	45	133
2021	1065	9	65	129

Table 8: Vehicles/participants' vehicles

vehicle type	vehicles
Tram, trolleybus	20970
Passenger car	15078
Lorry, Gross Vehicle Weight over 3.5 T	1030
Bicycle	360
Lorry up to 3.5 T GVW	357
Undetermined vehicle	316
Public transport bus	304
Other bus	133
Other	57
Moped	56
Motorbike	41
Free-wheel vehicle	25
Other motorbike	19
Agricultural tractor	12
Emergency vehicle	10
Motorbike up to 125 cc (up to 11 kw/0.1 KW/kg)	5
Light quadricycles	1

Table 9: Causes of incidents/causes of driver

Cause of incident	incidents
Failure to give way	8715
Incorrect: avoiding	1235
Failure to keep a safe distance between vehicles	1094
Wrong: Turning	1050
Failure to maintain speed according to traffic conditions	1023
Entering with a red light	938
Wrong: Changing lanes	636
Wrong: reversing	310
Wrong: Turning around	305
Other reasons	271
Wrong: Overtaking	250

Failure to respect other signs	246
Abrupt braking	189
Wrong: evasive action	167
Failing to give way to a pedestrian	105
Wrong: Riding through a pedestrian crossing	102
Wrong: stopping, waiting	61
Not overtaking a pedestrian at a zebra crossing	55
Failing to respect traffic lights	33
Failure to yield to a pedestrian in other circumstances	22
Tiredness, falling asleep	16
Driving on the wrong side of the road	15
Improper: crossing a bicycle crossing	6
Avoiding a vehicle in front of a pedestrian crossing	4
Wrong way: crossing a zebra crossing	4
Failure to give way to a pedestrian when turning into a cross road	1
Overtaking a vehicle in front of a pedestrian crossing	1

Table 10: Causes of pedestrians

Cause of incident	**incidents**
Careless entry onto the carriageway: in front of a moving vehicle	825
Entering the roadway at a red light	650
Crossing the road at an unauthorised place	340
Other causes	113
Standing on the roadway, lying down	51
Stopping, reversing	48
Entering the roadway recklessly: from behind a vehicle, from an obstacle	47
Walking on the wrong side of the road	4

Table 11: Other causes of incidents

other_causes	**incidents**
Other	739
Undetermined	614
Passenger fault	290
Non-fault technical failure of the vehicle	58
Inadequate roadway condition	35
Objects, animals on the road	21

Sudden driver's faintness	14
Technical failure of the vehicle	13
Unsafe roadworks	9
Faulty traffic organisation	6
Impairment, death of the driver	5
Vehicle fire	2
Malfunctioning traffic lights	2

4.4 Serbia

4.4.1 Legal bases of the transportation and inspection of dangerous goods in Serbia

The key document that regulates the transport of dangerous goods at the international level is the **ADR.** This document was adopted on September 30, 1957 by UNECE (United Nations Economic Commission for Europe) and has been applied in **Serbia (Yugoslavia)** since January 29, 1968 [23]. It is renewed every two years and is harmonized with the **Globally Harmonized System of Classification and Labelling of Chemicals** (**GHS**). The GHS is a system for standardizing and harmonizing the classification and labeling of chemicals. It is a logical and comprehensive approach to [24]:

- defining health, physical and environmental hazards of chemicals.
- creating classification processes that use available data on chemicals for comparison with the defined hazard criteria, and
- communicating hazard information, as well as protective measures, on labels and Safety Data Sheets (SDS).

The GHS Document, also known as 'The Purple Book', provides guidelines on how to implement a hazard classification and communication framework, but it should be noted that the GHS does not constitute a regulation or standard in and of itself.

The Republic of Serbia is a signatory to most international conventions, directives, and agreements in the field of transportation, handling, and storage of dangerous substances. The most important signed multilateral agreements regarding the Carriage of Dangerous Goods by Road are given below [25]:

- ADR 2017 Vol I and II
- ADR 2019 Vol I and II
- ADR 2021 Vol I and II

- Multilateral Agreement M326 under section 1.5.1 of ADR concerning the periodic inspection and test of pressure receptacles for the carriage of gases of Class 2 (from 2020)
- Multilateral Agreement M327 under section 1.5.1 of ADR concerning periodic or intermediate inspections of portable tanks and UN multiple-element gas containers (MEGCs) in accordance with 6.7.2.19.2, 6.7.3.15.2, 6.7.4.14.2 and 6.7.5.12.2 of ADR (from 2020)

Implementation of these international conventions, directives, and agreements as well as national legislation regarding the transport of dangerous goods is under the jurisdiction of the Serbian Ministry of Construction, Transport and Infrastructure by the **Sector for air transport and transport of dangerous goods**.

A large volume of national regulatory measures pertaining to the transport of dangerous exists. The most important document is **The law on the transport of dangerous goods** ("Official Gazette of RS", no. 104 of December 23, 2016, 83 of October 29, 2018, 95 of December 8, 2018 - etc. law, 10 of February 15, 2019). This law regulates the conditions for carrying out internal and international transport of dangerous goods in the road, rail, and inland water transport on the territory of the Republic of Serbia, requirements concerning packaging, mobile equipment under pressure, i.e. tank, i.e. means of transport intended for the transport of dangerous goods, conditions for the appointment of bodies that examine and control packaging, mobile equipment under pressure, i.e. a tank, or a vehicle for the transport of dangerous goods, conditions for authorizing bodies that examine and control ships for the transport of dangerous goods, competences of state bodies and organizations in the transport of dangerous goods, conditions, and obligations to be fulfilled by participants in the transport of dangerous goods, supervision, as well as other issues related to the transport of dangerous goods.

According to this law transport of dangerous goods on the territory of the Republic of Serbia is carried out in accordance with the provisions of the following confirmed international agreements:

1) European Agreement on the International Carriage of Dangerous Goods by Road (ADR) of September 30, 1957 ("Official Gazette of the SFRY - International Agreements",

no. 59/72 and 8/77, "Official Gazette of the RS - International Agreements", no. 2/10 and 14/13), with subsequent amendments and additions.

2) Convention on International Carriage by Rail (COTIF) of May 9, 1980, Appendix C - Rulebook on International Carriage of Dangerous Goods by Rail (RID) ("Official Gazette of the SFRY - International Treaties", No. 8/84, "Official Gazette of the FRY - International Agreements", No. 3/93, "Official Gazette of the RS", No. 102/07 and "Official Gazette of the RS - International Agreements", No. 1/10, 2/13 and 17/15), with subsequent amendments and additions.

3) European agreement on the international transport of dangerous goods on inland waterways (ADN) dated May 26, 2000 ("Official Gazette of RS - International Agreements", No. 3/10, 1/14, and 7/15), with subsequent changes and additions.

Confirmed international agreements apply to the transport of dangerous goods in international transport, in the part that is carried out on the territory of the Republic of Serbia, as well as to the transport of dangerous goods that is carried out on the territory of the Republic of Serbia.

Dangerous goods can be accepted for transport, provided that their transport is permitted in accordance with ADR/RID/ADN, this law, and by-laws adopted based on this law.

This law does not apply to the transport of dangerous goods carried out through transport belonging to the Ministry responsible for defense affairs, the Ministry responsible for internal affairs, the Serbian Army, as well as the military forces of other countries and organizations that use the transport infrastructure of the Republic of Serbia according to a special agreement.

Additional laws and by-laws that apply in Serbia regarding the transport of dangerous goods by road are as follows:

- The Law about chemicals "Official Gazette of RS", No. 36 of May 15, 2009, 88 of November 23, 2010, 92 of December 7, 2011, 93 of September 28, 2012, 25 of March 13, 2015.

- Rulebook on the method of transporting dangerous goods in road traffic "Official Gazette of the RS", number 125 of November 14, 2014.
- Rulebook on the method of transporting dangerous goods through protected zones "Official Gazette of RS", number 75 of August 31, 2015.
- Rulebook on the method and conditions for determining routes for transporting dangerous goods in road traffic and the method of locating and tracking vehicles "Official Gazette of the RS", number 59 of August 23, 2019.
- Rulebook on the manner of inspection and marking of vehicle containers for the transport of certain dangerous goods in road traffic "Official Gazette of RS", number 95 of November 20, 2015.
- Rulebook on special elements, i.e. risk assessment criteria, frequency of inspection supervision based on risk assessment, and special elements of the inspection supervision plan in the field of dangerous goods transport "Official Gazette of RS", number 55 of July 16, 2018.
- Rulebook on the program and method of passing the examination for professional competence to perform the duties of a driver of a vehicle for the transport of dangerous goods, the composition of the commission, and the amount of the examination costs "Official Gazette of the RS", number 125 of November 14, 2014.
- Rulebook on the conditions for issuing a special permit for the transport of certain dangerous cargo "Official Gazette of the RS", number 12 of February 12, 2016.
- Decree on criteria for the classification of violations of regulations according to the category of risk of consequences in the transport of dangerous goods "Official Gazette of the RS", number 82 of September 8, 2017

4.4.2 Concrete examples in Serbia for TDG chain management

TDG chain management in Serbia is strictly regulated by the Law on the transport of dangerous goods and appropriate by-laws.

The permit for the transport of dangerous goods on the territory of the Republic of Serbia is issued at the request of the sender or recipient, that is, the transport organizer, and must contain:

- data on the manufacturer, sender, carrier, and receiver.
- UN number of dangerous goods, as well as data and certificates prescribed in ADR.
- data on the type, quantity, chemical, and physical composition of dangerous goods, as well as the type of packaging, ie mobile equipment under pressure or tanks for the transport of dangerous goods;
- indicating the route of movement (itinerary);
- indicating the place of loading and unloading.
- start time and expected end time of transport.
- data on the means of transport, as well as on the driver for the transport of dangerous goods in road traffic.
- time and place scheduled for rest.
- approval of the competent authority of the neighboring country based on which import or transit is approved.
- the name of the entry and exit border crossing.

On the territory of the Republic of Serbia, only packaging, and mobile equipment under pressure, i.e. a tank, can be used for the transport of dangerous goods: which is appropriate in terms of technical characteristics for the given quantity and given characteristics of the dangerous goods that are placed in the packaging, mobile equipment under pressure, or tank, that is, which meets other safety requirements according to the ADR regulations; for which a conformity assessment has been carried out following the requirements of ADR and for which a certificate of conformity has been made available confirming that it is transporting appropriate dangerous goods; which is marked and labeled in accordance with ADR, the law on the transport of dangerous goods and the regulations adopted based on this law and for which there is a valid document on periodic control following ADR.

Packaging, mobile equipment under pressure, i.e. a tank that was not manufactured in the Republic of Serbia, and for which a decision on recognition has

been obtained, i.e. a document issued by a conformity assessment body appointed in the Republic of Serbia, can be used.

A foreign certificate of conformity for packaging, i.e. movable equipment under pressure, i.e. a tank for the transport of dangerous goods issued by a foreign conformity assessment body can be recognized if the packaging, i.e. mobile equipment under pressure, i.e. a tank has been tested and approved according to foreign regulations whose requirements provide the same level of protection for the safety of people, the environment and property as determined by ADR requirements.

Dangerous goods in road traffic are transported in appropriate packaging and secured under the EN 12195-1:2012 standard. If this is not possible, securing that cargo is done following the EN ISO 12100-2 standard.

TDG chain actors

TDG chain consists of the following actors: sender, transport organizer, packer, filler, loader, carrier, receiver, unloader, and driver. Their obligations, according to the Law on the transport of dangerous goods are regulated as follows:

Obligations of the sender

The consignor in road traffic is obliged to fulfill the obligations prescribed in subsection 1.4.2.1 of the ADR.

Obligations of transport organizers

When acting in the name and on behalf of the sender, the transport organizer is obliged to ensure that the requirements from Art. 18. and 24. from the law on the transport of dangerous goods.

Obligations of the packer

A packer in road traffic is obliged to fulfill the obligations prescribed in subsection 1.4.3.2 of ADR.

Obligations of the filler

The filler in road traffic is obliged to fulfill the obligations prescribed in subsection 1.4.3.3 of the ADR. In addition, the filler is obliged to hand over to the carrier for transport only dangerous goods that are allowed for transport following The law on the transport of dangerous goods.

Obligations of the loader

The loader in road traffic is obliged to fulfill the obligations prescribed in subsection 1.4.3.1 of the ADR.

Obligations of the carrier

The carrier in road traffic is obliged to fulfill the obligations prescribed in subsection 1.4.2.2 of the ADR.

Obligations of the receiver

The recipient in road traffic is obliged to fulfill the obligations prescribed in subsection 1.4.2.3 of the ADR.

Obligations of the unloader

The unloader in road traffic is obliged to fulfill the obligations prescribed in subsection 1.4.3.7 of the ADR.

Obligations of the driver in road traffic

The driver in road traffic is obliged not to accept for transport a piece that is obviously damaged or incomplete, especially if the dangerous goods are expiring or there is a risk of expiring, as well as to respect other restrictions defined by ADR. Drivers in road traffic are obliged to act in accordance with sections 7.5.1, 7.5.5, 7.5.7, 7.5.8 and 7.5.11 ADR, as well as subsections 7.5.1.1, 7.5.1.2, 7.5. 1.3 paragraph 2, 7.5.1.4 and 7.5.1.5 ADR.

All participants in the transport of dangerous goods in road traffic are obliged to, in accordance with their obligations:

1) act per the provisions on safety from chapter 1.10 ADR, as well as to ensure that the areas within the temporary storage terminal, temporary storage places, and vehicle depots, which are used for temporary storage during the transportation of dangerous goods from the subsection 1.10.1.3 ADR, adequately secured, well-lit and, where possible, inaccessible to the public;

2) ensure that safety training of employees is carried out by subsection 1.10.2.3 of the ADR, as well as regular refresher courses to familiarize themselves with changes in the ADR and domestic regulations at least once every two years, that is, to keep and keep records of the safety training conducted by subsection 1.10.2.4 ADR.

A shipper, packer, filler, loader, carrier, unloader, and receiver participating in the transport of hazardous goods with a high potential hazard or radioactive material with a high potential hazard must adopt and implement safety plans per subsection 1.10.3.2.1 of the ADR, which must contain at least elements from subsection 1.10.3.2.2. ADR.

The risk of consequences in the transport of dangerous goods due to non-application of ADR, the law on the transport of dangerous goods, and by-laws adopted based on this law, is classified into three categories:

1) category I danger is a danger to human life or environmental pollution with consequences whose elimination is long-term and expensive.

2) category II danger is the danger of serious bodily injury to a person or significant environmental pollution and environmental pollution in a larger area;

3) danger of category III is the danger of causing slight physical injury to a person or slight pollution of the environment.

The government prescribes criteria for the classification of violations of ADR, the law on the transport of dangerous goods, and by-laws adopted based on this law, according to the category of risk of consequences in the transport of dangerous goods.

Transport participants are obliged, considering the type of foreseeable dangers, to take all prescribed measures to prevent an extraordinary event, that is, to minimize the consequences of an extraordinary event to the greatest extent possible.

In case of danger, that is, in the case of an extraordinary event, the driver in road traffic is obliged to immediately inform the authority responsible for emergencies and the police, as well as to communicate all the information needed to take appropriate measures.

4.4.3 Overview of the volume of TDG accidents, potential harmful influence on the environment, and mitigating measures in Serbia

Dangerous goods transport on the territory of the Republic of Serbia is primarily a threat to the corridors around the roads on which dangerous goods are transported. Due to the current condition, characteristics of the land, morphology, transport needs, and other conditions, the road network is such that in the immediate vicinity there are power, telecommunications, water infrastructure, health facilities, arable land, industrial facilities, protected zones, etc.

According to official data from the Statistical Office of the Republic of Serbia (https://www.stat.gov.rs/) transported amount of dangerous goods in tons per year in road transport is shown in Figure below. The covered period is from 2009 to 2015.

Figure 12: Transported amount of dangerous goods in Serbia in tons per year in road transport

Unfortunately, data regarding the number of TDG accidents are not publicly available.

Transport participants are obliged, considering the type of foreseeable dangers, to take all prescribed measures to prevent an emergency event, that is, to minimize the consequences of an emergency event to the greatest extent possible. In the event of danger, i.e. in the event of an emergency event, road traffic drivers are obliged to immediately notify the authority responsible for emergencies and the police, as well as to communicate all the information needed to take appropriate measures. The carrier, the sender, the recipient, and the transport organizer are obliged to cooperate, as well as with the competent state authorities to exchange data on the need to take appropriate safety and preventive measures, as well as to apply procedures in the event of an emergency.

In the event of spillage or any other form of release of dangerous goods or imminent risk of spillage, or any other form of release of dangerous goods, after notification, the carrier is obliged to provide, pick up, remove, or dispose of the dangerous following the law regulating waste management or to make it harmless in

another way, i.e., to take all measures to prevent the further spread of pollution. If the carrier is not able to secure, pick up, remove, or dispose of dangerous goods, it is obliged to hire, at its own expense, a legal entity that has the appropriate license, or authorization to act in the event of an emergency under a special regulation.

In the event of an emergency during the transport of Class 7 ADR dangerous goods, in addition to the measures prescribed by this law, measures are also taken following the action plan in the event of an accident prescribed by the law regulating protection against ionizing radiation and nuclear safety. Dangerous goods, i.e., contaminated objects, in case of scattering, spilling or some other form of release of dangerous goods, must be disposed of by the special regulations governing the handling of that type of dangerous goods.

In the event of an emergency event for which there is an obligation to report by ADR, the safety advisor of the transporter, i.e., the transport organizer, is obliged to submit the prescribed report to the ministry in accordance with the law. It is forbidden to carry out rehabilitation of the transport vessel, including welding, performing thermal insulation, modification of the pipe installation on the measuring and transfer equipment, changing the valve group, and other similar works on vehicles for the transport of dangerous goods, which may cause consequences for property, people, and the environment, without the approval of the designated body.

The minister responsible for internal affairs, with the consent of the minister, prescribes the manner, conditions, and measures for safe intervention in case of spillage, spillage, spillage, or any other form of release of dangerous goods.

The Serbian Ministry of Construction, Transport, and Infrastructure, through the Department for the Transport of Dangerous Goods, is in the process of developing the Strategy for the Development of the Transport of Dangerous Goods, which deals with topics related to raising the capacity of participants in the transport of dangerous goods, the quality of basic assets and infrastructure. It is also planned to create an information system that will unite all subjects in the transport of dangerous goods, equipment registers, route network, and operational monitoring.

4.5 Greece

4.5.1 Legal bases of the transportation and inspection of dangerous goods in Greece

National regulations in transportation of dangerous goods:

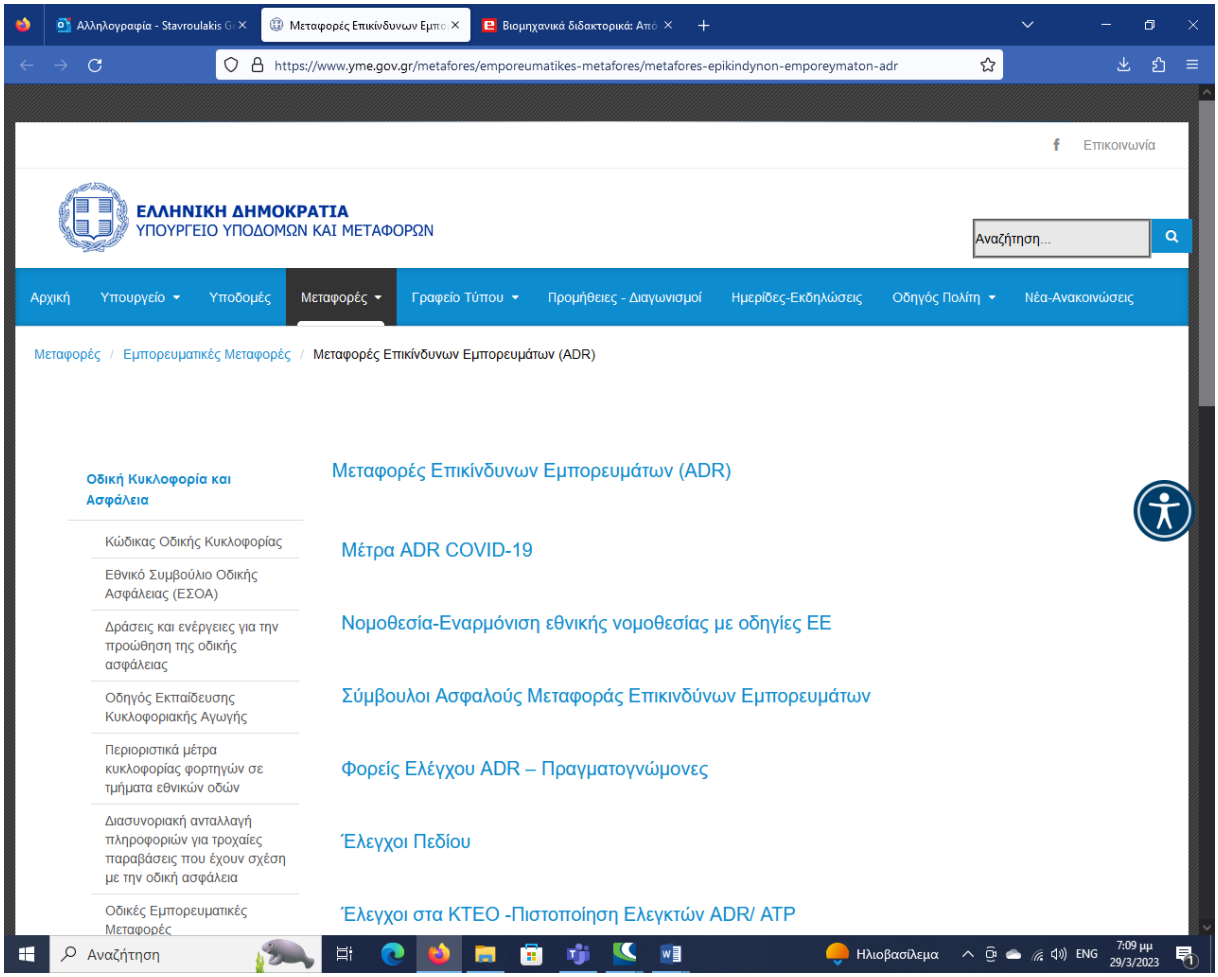
- Law on the transportation of dangerous goods
- Law on the road traffic safety
- Law on the roads
- Secondary regulations on the transportation of dangerous goods (e.g. rulebooks, decrees, rules, orders).

In particular the Laws of Greek Republic are:

- Initial adoption of ADR ν.1741/1987.
- Subsequent adoption of revised document 50941/40/1990,
- Adoption of 1995 revision 71538/2868/1997
- Adoption of 1993 protocol Φ.101/40062/4881/2007
  - Conforming with directive 94/55 (π.δ. 104/1999),
  - Conforming with directive 96/86 (Φ.2/21099/1700/2000),
  - Conforming with directive 1997/47 (21736/2092/99/2001),
  - Conforming with directive 2000/61 (ADR 1999 κυα 73368/3230/2000/2001/2002)
  - Conforming with directive 2001/7 (ADR 2001 κυα 47368/2522/2004)
  - Conforming with directive 2003/28 (ADR 2003), and 2004/111 (ADR 2005)
- And 2006/89 (ADR 2007 κυα 19403/1388/2008)
  - Conforming with directive 2008/68 (ADR 2009 κυα 35043/2524/2010)
  - Conforming with directive 61/2010 (ADR 2011 κυα 52167/4683/2012)
  - Conforming with directive 2012/45 (ADR 2013 κυα 40955/4862/2013)
  - Conforming with directive 2014/103 (ADR 2015 κυα 20655/2897/2015)
  - Conforming with directive 2016/2309 (ADR 2017 κυα 22039/2825/2017)
  - Conforming with directive 2018/1846 (ADR 2019 κυα 48222/2474/2019)

- Conforming with directive 2020/1833 (ADR 2021 κυα Γ5/145078/2021)

The Greek Ministry of Infrastructures and Transportation has a complete webpage in Greek giving information related to ADR (source of previous information).



Official information about the competent authority for ADR in Greece can be found from the web page
https://unece.org/fileadmin/DAM/trans/danger/publi/adr/1.8/Greece_2020-12.pdf

GREECE

Main competent authority	Ministry of Infrastructures, Transport and Networks General Division of Road Safety Division of Road Traffic and Safety Department of Road Safety Transport of Dangerous Goods and Perishable Foodstuffs Anastaseos 2 & I. Tsigante, P.C. 101 91, Papagou Tel: +30 210 6508126 +30 210 6508174 +30 210 6508514 +30 210 6508513 Fax: +30 210 6508518 Email: e.evangelatou@yme.gov.gr h.pasios@yme.gov.gr a.letros@yme.gov.gr j.achladianakis@yme.gov.gr
Other competent authorities	Notification by Greece in accordance with 1.8.4 of ADR (English)
Notification according to 1.9.4	
Notification according to 1.9.5 (Tunnel restrictions)	
Other notifications	

4.5.2 Concrete examples in Greece for TDG chain management

TDG requires the usage of ADR procedures and certification as described in previous directives.

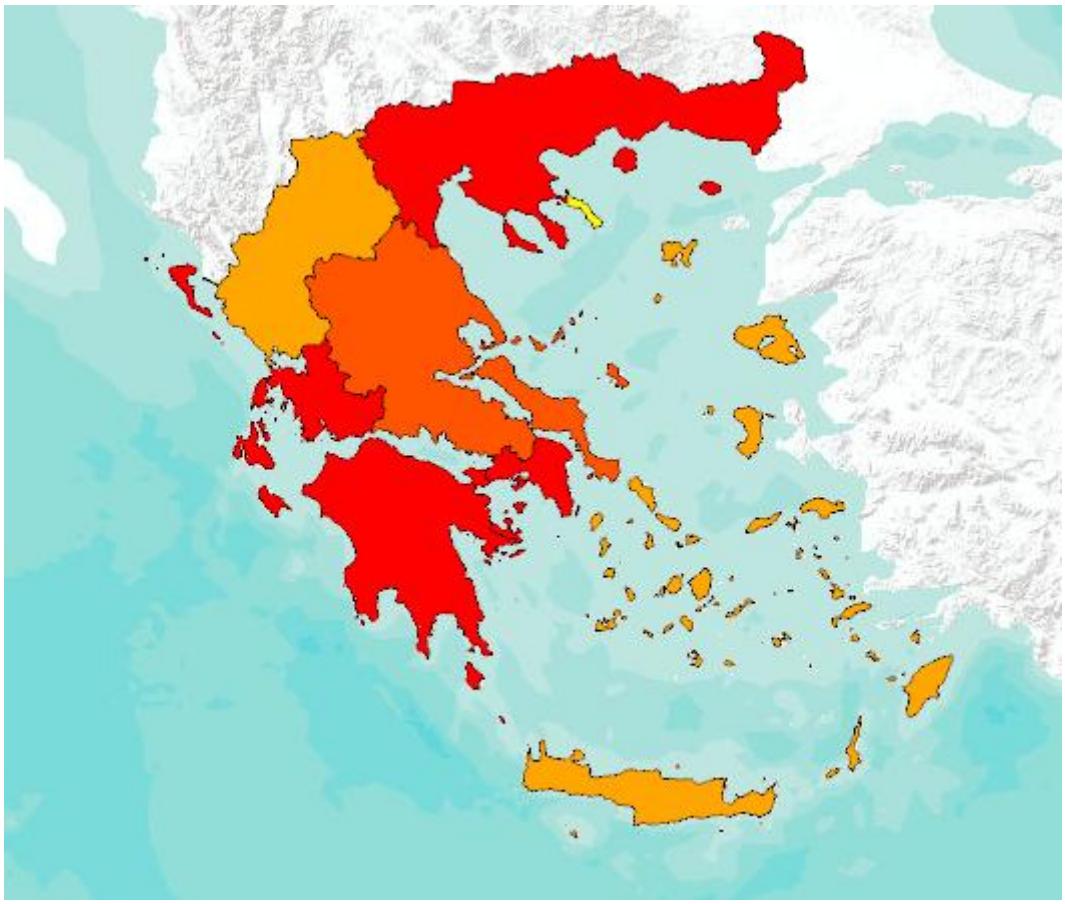
In particular Public and Private Laboratories and Centers are certified for the examination of vehicles, safety procedures and drivers/personnel, depending of the size of each involved company. Inspectors are also certified and have to renew their certification on a periodic basis.

Most of the steps are applied locally. In particular 'TUV-type' centers apply ADR certification of vehicles and other equipment. One of the authors of this document is active in a local center and will provide material during the course of the project.

4.5.3 Overview of the volume of TDG accidents, potential harmful influence on the environment and mitigating measures in Greece

Road accidents are reported with the number of deaths/injuries. Specific information related to the TDG or violation of corresponding rules are not publicly available.

A plot of road accidents during the first three months o year 2023 follows:



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[6] Regulations on the certificate of professional qualification of a security consultant, OJ RS 26/17 http://pisrs.si/Pis.web/pregledPredpisa?id=PRAV12887

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D2.1 Reports on analyses key issues related to TDG in WBC

"Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be."

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Content

1) About the project

Dangerous goods (DG) are materials that, due to their characteristics, can constitute a risk to people, animals, or the environment. The involvement of DG in an accident could lead to fires, explosions, and the release of toxic gases, producing serious consequences to human health and the environment. To diminish risks, the transport of dangerous goods (TDG) in Europe is subjected to different regulations with the constant raising need for educated and skilled personnel. The main aims and specific objectives of the project are:

- To identify key risks of the transport of dangerous goods (TDG) by road in WB partner countries according to different regulations.
- To improve existing and develop new curricula for undergraduate and master studies in accordance with Bologna requirements and national accreditation standards implementing new subjects studying the transport of dangerous goods by road. These subjects should cover both provisions concerning dangerous goods and provisions concerning transport equipment and transport operations.
- To establish Training Centers within WB HEIs. The most important results of the project will be the modernization of the existing curricula in the part related to the transport of dangerous goods and the handling of DG at all WB partner institutions. Among other things, the curriculum should increase students' awareness of the dangers that can occur when dangerous goods are transported and handled improperly. Direct beneficiaries of the project include 116 trained teaching staff, 120 enrolled students, 240 trained TDG professionals and the wider community (TDG stakeholders, public institutions, scientific community etc.) Type and number of outputs include 8 new/modernized study programs, 45 newly implemented TDG related courses, 8 new labs.

1.1 Objectives

The wider objective of the DGTRANS project is to improve the quality of higher education in the field of the transport of dangerous goods, strengthen its relevance for the labor market and society, enhancing the level of competences and skills of experts for transport of dangerous goods in WBC (Montenegro, Kosovo*, Albania and Bosnia and Herzegovina) by developing new competence-based and improved existing undergraduate/master curricula in line with EU trends.

Further, the project will also result in the development of trainings for transport of dangerous goods professionals based on results of survey for transport of dangerous goods stakeholders, organized local workshops with transport of dangerous goods stakeholders and recommendations of program countries and third countries associated to program.

Finally, the benefits for all WBC include implementation of the most appropriate scientific methods and the best practices in relation to the risk analysis procedures during the transport of dangerous goods.

- To analyse and improve current risk analysis management procedures and risk assessments on transport routes and new routing solutions into WBC.
- To improve existing and develop new transport of dangerous goods curricula for undergraduate and master studies.
- To improve existing and develop new transport of dangerous goods curricula for undergraduate and master studies.

1.2 Aims

1) To improve existing and develop new TDG curricula for undergraduate and master studies in accordance with Bologna requirements and national accreditation standards through implementing new/modernized courses. These courses should cover provisions concerning dangerous goods, transport equipment and transport operations, as well as the risk assessment tools,

vehicles monitoring systems, and route-planning systems based on network analyses performance.

2) The aim of the improved study programs is to include the different disciplines such as transport, environmental sciences, politics, supply chain management, security management and the risk management needed for a safer transport of dangerous goods, where research institutions, members of the DG supply chain, service providers, public administrations and end-users will work together.
3) To analyse and improve current risk analysis management procedures and risk assessments on transport routes and new routing solutions into WBC. Herein, we are finding and applying the most appropriate scientific methods and the best practice about what issues should be included in risk analysis procedures to improve the safety during the transport of dangerous goods and how can management procedures be improved to avoid mistakes or inefficiencies during the sharing of information within a company and between different companies involved in the supply chain.
4) Topics of the Green weeks: practical presentations of the pilot plant of the solar charger for electric micro-mobility vehicles, introduction to the technical characteristics of the equipment, short training on battery charging, short training for using of electric micro mobility vehicles, driving training and safety measures practice, organization of promotional rides within the free space of the premises of the WB HEIs, introduction with the EM mobility devices (bicycles, scooters, batteries, chargers, driving simulators, lab car models etc.); introductions with EM association activities and further networking with attendees of the event.
5) To develop and implement the training program for the TDG professionals in line with ADR and up-to-date scientific knowledge on issues related to the transport of dangerous goods. According to ADR each TDG subject, involved in activities which include the consigning the transport of dangerous goods by road or the related packing, loading, filling or unloading, shall appoint one or more TDF professionals, responsible for prevention of the risks inherent in such activities with regard to persons, property and the environment.

1.3 Objectives of the Work Package 2: Introduction with key issues for TDG in WBC and PC

Objectives of the WP2 are:

- Identification of key issues of safe and secure TDG in PC needed to be managed in WB countries.
- Identification of key issues of TDG in WB and assessment of all risk management aspects for safe and secure TDG
- Assessment of all risk key issues related to TDG will be done.
- Analysis of existing curricula in WB HEIs and curricula best practices in PC in the field of TDG
- Identification of required resources for modernization of laboratory environment of WB HEIs
- Organization of the three-day workshop on existing curriculum and innovative practices in the EU related to TDG.

This integrate report present Analysis of Key Issues related to transport of dangerous goods in WB.

In this report we summarized analysis prepared by WB partners:

- UPKM UNIVERSITY OF MITROVICA XK
- UNSA UNIVERZITET U SARAJEVU BA
- UES UNIVERZITET U ISTOCNOM SARAJEVU BA
- UOM JAVNA USTANOVA UNIVERZITET CRNE GORE PODGORICA ME
- AUB UNIVERZITET ADRIATIK BAR ME
- UPT UNIVERSITETI POLITEKNIK I TIRANES AL
- UPOLIS UNIVERSITETI POLIS SHPK AL

2) Introduction

2.1 Preparation of the report

To the preparation of the present report (Analysis of Key Issues related to transport of dangerous goods in WB) lead partner of WP 2 (University of Maribor) prepared template for each WB partner.

At the beginning the short description of the project DGTRANS was given (objectives, aims, etc.).

In addition, template was structured in 3 chapters:

- Tools, methods, standards and programs in (country name) TDG chain
- Concrete examples in (country name) for TDG chain management
- Overview of the volume of TDG accidents, potential harmful influence on the environment and mitigating measures in (country name)

2.2 Structure of the report

This report is structured in two main parts:

- Common findings which are similar in all WB countries,
- Country specific findings, which are unique for specific WB country.

3) Analysis of Key Issues for TDG in WB: Common findings for WB

Analysis of key issues for TDG in WB showed, that we could point out some common findings, which are very similar (or even the same) in all analyzed WB countries.

The main reason is that also WB countries need to respect international regulation in terms of TDG.

3.1 Legal bases of the transportation and inspection of dangerous goods

Transport of Dangerous Goods (TDG) is a critical issue that concerns public safety and environmental protection. The Western Balkan countries, including Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia, and Serbia, are situated at the crossroads of Europe, making them a critical transit route for the transportation of dangerous goods. Despite the importance of TDG transport in these countries, several key issues must be addressed to ensure the safe and secure transport of hazardous goods.

One of the primary issues is the need for more harmonization and standardization of regulations for TDG transport. Each Western Balkan country has its rules and procedures for TDG transport, creating confusion and inconsistencies for shippers and carriers. This lack of harmonization also challenges the cross-border transport of dangerous goods.

Another area for improvement is the need for adequate infrastructure for TDG transport. This includes a demand for dedicated transport routes and parking areas for dangerous goods vehicles and inadequate facilities for the safe handling and storage of dangerous goods. The lack of proper infrastructure can result in accidents and spills, posing a risk to public safety and the environment.

There is also a need for more awareness and training among stakeholders involved in TDG transport. This includes drivers, shippers, consignees, and regulators. Many stakeholders are unaware of the risks associated with TDG transport or the proper

handling and transportation procedures for dangerous goods. This lack of awareness can lead to accidents and spills, resulting in serious consequences.

Finally, the issue of corruption and the need for enforcement of regulations also pose a challenge for TDG transport in the Western Balkan countries. Corrosion can lead to non-compliance with regulations and inadequate safety measures, increasing the risks associated with TDG transport. The lack of enforcement of regulations can also result in non-compliance and insufficient safety measures, posing a risk to public safety and the environment.

In summary, the key issues for TDG transport in the Western Balkan countries include the need for harmonization and standardization of regulations, inadequate infrastructure, lack of awareness and training, and corruption and enforcement of regulations. Addressing these issues is crucial for ensuring the region's safe and secure transport of dangerous goods.

3.1.1 Legislative background of transport of dangerous goods

Transportation of dangerous goods represents a high-risk activity due to the characteristics of the transported goods and/or the risk of traffic accidents. In the transport chain, mistakes that occur during the handling or transportation of hazardous materials may cause combustion, explosion or leakage, which represents a major danger to people, property or the environment. Therefore, operators responsible for transporting and handling dangerous goods must obey to certain rules regarding implementation of preventive measures. These activities are defined by numerous legal acts, which were prescribed and implemented by the relevant decision makers at the international and national level.

In order to create safe conditions for the transport of dangerous goods, in 1954 the United Nations (UN) formed a team of experts that prescribed unique principles for marking and classifying goods, regulations that must be met by vehicles and vehicle equipment, procedures, documentation, etc. They prepared the initial version of the Recommendations on the Transport of Dangerous Goods which were directed to governments and to the international organizations concerned with safety in the transport of dangerous goods. As a result of this recommendation, in 1957, agreements on the transportation of dangerous goods were drawn up, and the member countries, by signing them, undertook the obligation to implement them.

Organizations and legislation that regulate the transport of dangerous goods are under the auspices of the United Nations (UN). Depending on the mode of transport of dangerous goods, there are different organizations that implement UN recommendations, such as International Civil Aviation Organization – ICAO (air

transport), International Maritime Organization – IMO (maritime transport), Economic Commission for Europe – ECE (road transport) and Intergovernmental Organization for International Carriage by Rail – OTIF (railway transport). The International Atomic Energy Agency (i.e., IAEA) was established as a special organization dealing with the development of standards related to the transport of radioactive materials. In order to define the rules for the transport of dangerous goods at the international level, agreements have been developed for each mode of transport. Accordingly, agreements were established for air (Technical Instructions For The Safe Transport of Dangerous Goods by Air - ICAO-TI), maritime (International Maritime Dangerous Goods Code - IMDG-CODE), inland waterway (European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways - ADN), road (Agreement concerning the International Carriage of Dangerous Goods by Road - ADR) and rail (Regulation concerning the International Carriage of Dangerous Goods by Rail - RID), (see Figure 1)

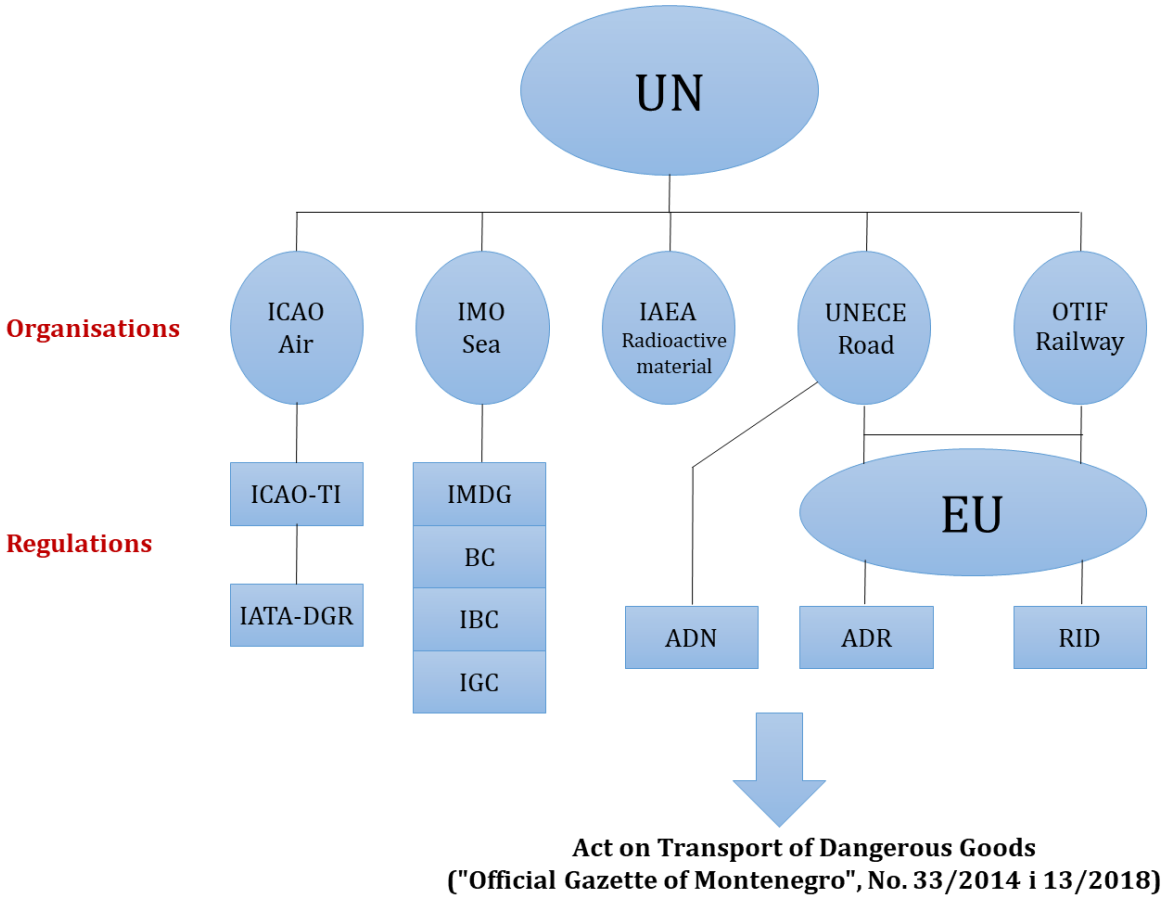

Figure 1: Types of organizations and regulations for the transport of dangerous goods by transport modes
Adapted from: Ministry of Transport and Communications (2006)

3.1.2 International regulations in transportation of dangerous goods by roads

The Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)

The Agreement concerning the International Carriage of Dangerous Goods by Road (ADR), (United Nations, 2023) was completed in Geneva on September 30, 1957 under the auspices of the United Nations Economic Commission for Europe, and entered into force on January 29, 1968. Over time the ADR was exposed to numerous changes and amendments, until January 1, 2023, when the last version of the document was adopted. This Agreement consists of two annexes: Annex A and Annex B, which are separated into nine parts. Annex A contains Parts 1 to 7 which define the conditions for the goods in question, in particular as regards their packaging and labelling. On the other hand, Annex B includes Parts 8 and 9 which describes the conditions related to the construction, equipment and operation of the vehicle carrying the goods in question. In Figure 2 is depicted the structure of the ADR.

Annex A: General provisions and provisions concerning dangerous articles and substances

- **Part 1:** General provisions;
- **Part 2:** Classification;
- **Part 3:** Dangerous goods list, special provisions and exemptions related to limited and excepted quantities;
- **Part 4:** Packing and tank provisions;
- **Part 5:** Consignment procedures;
- **Part 6:** Requirements for the construction and testing of packagings; intermediate bulk containers(IBCs), large packagings, tanks and bulk containers;
- **Part 7:** Provisions concerning the conditions of carriage, loading, unloading and handling.

Annex B: Provisions concerning transport equipment and transport operations

- **Part 8:** Requirements for vehicle crews, equipment, operation and documentation;
- **Part 9:** Requirements concerning the construction and approval of vehicles.

Figure 2. Structure of the ADR

The main objective of ADR is to identify the obligations of different participants in the transport chain, define requirements related to different participants, as well as classify dangerous substances into classes with a unified list of UN numbers. These numbers define the requirements that hazardous materials have to meet during handling and transport activities. According to the latest edition of ADR from 2021, 3548 hazardous substances were recognized, marked with UN numbers and classified into 13 classes. Every two years, the list of hazardous substances is revised and supplemented with new hazardous substances that are created in the manufacturing system. The Working Party on the Transport of Dangerous Goods (WP.15) of the Economic Commission for Europe's Committee on Inland Transport is authorized as the leader of these activities.

So far, the ADR agreement has been ratified by 52 countries, including WB countries. In practice, road inspections are carried out within national frameworks, and non-compliance with regulations can lead to sanctions against violators in accordance with domestic legislation. This means that sanctions are not explicitly prescribed in the ADR. ADR applies to transport operations that take place in the territories of at least two member countries. In order to provide free exchange and uniform legislation in the European Union, the provisions of ADR have been implemented through numerous EU directives.

Directive 95/50/EC on uniform procedures for checks on the transport of dangerous goods by road

Directive 95/50/EC refer to inspection of vehicles transporting dangerous goods on the roads in the territory of European Union countries. The Directive has been achieved the full implementation in all EU countries since January 1, 1997 and consists of three annexes. In Annex I is given a checklist which needs to be completed during an inspection and includes information regarding location and date of check, transportation participants, transport characteristics of good, on-board documents, circulation of vehicle and vehicle equipment. Annex II consists of a list and classification of infringements such as goods not authorized for transport, inappropriate vehicle or packaging, overfilling of tank, etc. Annex III comprise model standard form for the report to be sent by the member countries to the European Commission concerning infringements and penalties registered at the national level. Directive 95/50/EC is not applicable to the transport of dangerous goods under the responsibility of the armed forces. Inspection of the transport of dangerous goods have to include at least the items contained in Annex I. In addition, it has to be conducted in different locations and period of the day, as well as to consists of representative sample of the checkpoints along the road network. Authorities of the countries may disable shipments that do not obey rules.

They may require them to be in line with the law before continuing their transport or make them subject to other adequate sanctions in accordance with situation and safety prerequisites.

Directive 98/91/EC relating to motor vehicles and their trailers intended for the transport of dangerous goods by road

The roadworthiness of vehicles to a great extent affect the safety of transporting hazardous materials. Therefore, Directive 98/91/EC was adopted on 14 December 1998 in order to harmonize the technical requirements, standards and processes of homologation of vehicles intended for the transport of dangerous goods by road among member countries. The Directive refers to vehicles of categories 'N' (i.e., vehicles carrying goods) and 'O' (i.e., trailers) and consists of two annexes. Annex I includes scope, definition, classification and requirements. According to this Annex and Directive 94/55/EC vehicle transporting dangerous goods are classified into following groups: (1) *EX/II* for vehicles intended for the carriage of explosives as type II transport units; (2) *EX/III* for vehicles intended for the carriage of explosives as type III transport units; (3) *FL* for vehicles intended for the carriage of liquids with a flashpoint of not more than 61°C or flammable gases, in tank-containers of more than 3.000 litres capacity, fixed tanks or
demountable tanks and for battery vehicles of more than 1.000 litres capacity intended for the carriage of flammable gases; (4) *OX* for vehicles intended for the carriage of substances of class 5.1, marginal 2501, item 1(a), in tank-containers of more than 3.000 litres capacity, fixed tanks or demountable tanks; (5) *AT* for vehicles, other than those of types FL or OX, intended for the carriage of dangerous goods in tank-containers of more than 3.000 litres capacity, fixed tanks or demountable tanks and for battery vehicles of more than 1.000 litres capacity other than those of type FL. Annex II consists of administrative provisions for EC type approval. In other words, Annex II composed of application for EC type approval, granting of EC type approval, modification of the type and amendments to approvals, and conformity of production. A model of the information document and a model of the EC type-approval certificate are given in Appendices 1 and 2, respectively.

Directive 2008/68/EC on inland transport of dangerous goods

Taking into account that the transport of dangerous goods presents a substantial risk of accidents, it is necessary to undertake preventive measures to provide the best possible safety conditions. Directive 2008/68/EC is implemented on the transport of dangerous goods by road, by rail or by inland waterway within or between member states, including the activities of loading and unloading, the transfer to or from another mode of

transport and the stops necessitated by the circumstances of the transport. This Directive does not include transport of dangerous goods: (1) by vehicles, wagons or vessels belonging to or under the responsibility of the armed forces; (2) by seagoing vessels on maritime waterways forming part of inland waterways; (3) by ferries only crossing an inland waterway or harbour; (4) wholly performed within the perimeter of an enclosed area. Directive 2008/68/EC was adopted on 24 September 2008, and consists of three annexes. Annexes contains additional transitional provisions and national derogations related to transport by road, rail and inland waterway.

Directive 2010/35/EU - transportable pressure equipment

Directive 2010/35/EU was adopted on 16 June 2010 in order to enhance transport safety for transportable pressure equipment, whilst ensuring the free movement of transportable pressure equipment in a single transport market. Therefore, it was necessary to lay down detailed rules concerning the obligations of the various operators and the requirements to be fulfilled by the equipment concerned. This Directive is implemented on (1) new transportable pressure equipment as defined in Article 2(1), which does not bear the conformity markings provided for in Directives 84/525/EEC, 84/526/EEC, 84/527/EEC or 1999/36/EC, for the purpose of making it available on the market; (2) transportable pressure equipment as defined in Article 2(1), bearing the conformity markings provided for in this Directive or in Directives 84/525/EEC, 84/526/EEC, 84/527/EEC or 1999/36/EC, for the purposes of its periodic inspections, intermediate inspections, exceptional checks and use; (c) transportable pressure equipment as defined in Article 2(1), which does not bear the conformity markings provided for in Directive 1999/36/EC, for the purposes of reassessment of conformity. Directive 2010/35/EU does not apply to transportable pressure equipment which was placed on the market before the date of implementation of Directive 1999/36/EC and which has not been subject to a reassessment of conformity. In addition, this Directive does not apply to transportable pressure equipment used exclusively for the transport of dangerous goods between EU member countries and third countries, carried out in accordance with Article 4 of Directive 2008/68/EC. Directive 2010/35/EU includes six chapters and three annexes. Chapter I refers to scope and deffinitions. Chapter II is related to obligations for different economic operators (manufacturers or their authorized representatives, importers, distributors, owners and operators). Chapter III describes conformity of transportable pressure equipment and its assessment. Chapter IV relates to notifying authorities and notified bodies. Chapter V deals with safeguard procedures, i.e., procedure for dealing with transportable pressure equipment presenting a risk at national and EU level, as well as compliant transportable pressure equipment which presents a risk to health and safety. Chapter VI provides final

provisions. Annex I contains a list of dangerous goods other than those in class 2. Annex II comprise transitional provisions, while Annex III defines procedure for the reassessment of conformity.

Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances

Major accidents often have serious consequences, as evidenced by accidents like Seveso, Bhopal, Schweizerhalle, Enschede, Toulouse and Buncefield. Moreover, the impact can extend beyond national borders. This underlines the need to ensure that appropriate precautionary action is taken to ensure a high level of protection throughout the Union for citizens, communities and the environment. There is therefore a need to ensure that the existing high level of protection remains at least the same or increases. Directive 2012/18/EU refers to rules for the prevention of major accidents which involve dangerous substances, and the limitation of their consequences for human health and the
environment, with a view to ensuring a high level of protection throughout the EU in a consistent and effective manner. This Directive contains 34 articles which comprehends subject matter, scope, definitions, assessment of major-accident hazards for a particular dangerous substance, general obligations of the operator, competent authority, notification, major-accident prevention policy, domino effects, safety report, modification of an installation, an establishment or a storage facility, emergency plans, land-use planning, information to the public, public consultation and participation in decision-making, information to be supplied by the operator and actions to be taken following a major accident, action to be taken by the competent authority following a major accident, information to be supplied by the member countries following a major accident, prohibition of use, inspections, information system and exchanges, access to information and confidentiality, access to justice, guidance on safety distance and domino effects, amendment of annexes, exercise of the delegation, the committee procedure, penalties, reporting and review, amendment of Directive 96/82/EC, transposition, repeal, entry into force and addresses. In addition, Directive 2012/18/EU includes a list of seven annexes. Annex I refers to dangerous substances. Annex II defines minimum data and information to be considered in the safety report referred to in Article 10. Annex III contains information referred to in Article 8(5) and Article 10 on the safety management system and the organization of the establishment with a view to the prevention of major accidents. Annex IV consists of data and information to be included in the emergency plans referred to in Article 12. Annex V is related to items of information to the public as provided for in Article 14(1) and in point (a) of Article 14(2). Annex VI describes criteria for the notification of a major accident to the

Commission as provided for in Article 18(1). Finally, Annex VII presents correlation table. On the other hand, this Directive do not apply in the following situations: (1) military establishments, installations or storage facilities; (2) hazards created by ionizing radiation originating from substances; (3) the transport of dangerous substances and directly related intermediate temporary storage by road, rail, internal waterways, sea or air, outside the establishments covered by this Directive, including loading and unloading and transport to and from another means of transport at docks, wharves or marshalling yards; (4) the transport of dangerous substances in pipelines, including pumping stations, outside establishments covered by this Directive; (5) the exploitation, namely the exploration, extraction and processing, of minerals in mines and quarries, including by means of boreholes; (6) the offshore exploration and exploitation of minerals, including hydrocarbons; (7) the storage of gas at underground offshore sites including both dedicated storage sites and sites where exploration and exploitation of minerals, including hydrocarbons are also carried out; (8) waste land-fill sites, including underground waste storage.

4) Analysis of Key Issues for TDG in WB: Specific findings for each WB

In this chapter specific findings for each WB country are presented.

4.1 Montenegro

National regulations in transportation of dangerous goods in Montenegro are mainly harmonize with EU legislation.

4.1.1 Law on the transport of dangerous goods

Law on the transport of dangerous goods was adopted on 25 July 2014 and amended on 14 February 2018. This Law defines the provisions aimed at controlling and regulating the transport of dangerous materials and substances, on road, rail, sea and air traffic, on the territory of Montenegro, as regards both internal and international movement of dangerous materials (classified in the article 3). The transport of dangerous materials includes operations and activities such as consultations and expertise, packaging, labelling, loading, unloading, transshipment and temporary storage. This Law consists of eight chapters. Chapter I refers to general provisions, i.e., subject, exemption, the classes of dangerous goods and definitions. Chapter II includes preventive safety measures, i.e., places, equipment, prohibitions, time conditions and separate places for loading and unloading dangerous goods. Chapter III presents general safety measures in terms of obligations of participants in the transportation of dangerous goods (consignor, carrier, consignee, loader, packer, filler, tank-container/portable tank operator, unloader), transport document and ralated information, instructions in writings according to ADR, measures in case of loss of dangerous goods or accidents, constraints in the transportation of dangerous goods, packaging of dangerous goods, and requirements concerning the obligations and training of safety adviser and the vehicle crew. Chapter IV is related to approval for transport of hazardous materials, i.e., hazardous substance transport approval, approval for transport of explosive materials, poisons, radioactive materials, contents of the request document for transport of explosive materials, poisons, radioactive materials, approval validity period, approval for multiple transport and transportation notice. Chapter V consists of articles with regards to the transport of

hazardous materials by types of transport, that is transport of dangerous goods by road, rail, air and sea. Chapter VI describes supervision, i.e., law enforcement supervision, process of inspection, authority of the inspector, inspection in road traffic, temporary ban or interruption of transport, inspection of consignor, carrier or consignee, entry into the territory of Montenegro and annual reporting. Chapter VII refers to penalty provisions. Chapter VII is related to transitional and final provisions.

4.1.2 Law on the road traffic safety

Law on the road traffic safety was adopted on 28 June 2012 and amended on 29 December 2014, 03 March 2017 and 06 December 2019. This Law regulates road traffic rules, obligations of participants and other subjects in traffic, traffic restrictions, traffic signals, markings, signs and orders that must be followed by traffic participants, conditions that must be met by drivers and vehicles, special measures taken in traffic and other rules and measures that ensure road traffic safety. Law on road traffic safety contains seventeen chapters. Chapter I refers to general provisions such as subject and terminology. Chapter II defines roles and responsibilities of various subjects (i.e., traffic police, municipalities, road users, industry, family, schools, medical services, universities, media and non-governmental organizations) in order to enhance road safety. Chapter III consists of articles related to traffic rules, i.e., legal norms that prescribe behavior of the road users, such as general rules, entering a road, rules for using the road, speed limits, procedure when turning, right of way at certain road junctions, road junctions, U-turning, passing and overtaking vehicles, horn honking and lights flashing rules, stopping and parking rules, vehicle towing, use of vehicle lights and headlights on the road, headway between vehicles, rules for drivers of trams and other vehicles on rails, rules for drivers of motor cultivators, tractors and working machines with trailer, rules for drivers of bicycles, mopeds, motorcycles, tricycles and quadricycles, rules for pedestrians, railroad crossing rules, rules for highways and motorways, emergency vehicle rules, use of a yellow rotating or flashing lights, transportation of cargo on a vehicle, extraordinary transport and test driving. Chapter IV defines rules related to sports and other events or activities on the road. Chapter V includes rules with regards to special conditions and traffic constraints. Chapter VI contains rules regarding traffic signalization such as traffic signs, traffic lights, road markings, etc. Chapter VII refers to rules in terms of technical regulation of traffic like zones “30”, school zones, traffic calming measures, etc. Chapter VIII is related to legal duties after a collision and road crash. Chapter IX prescribes requirements and procedures necessary for applying for driving license. Chapter X comprises rules related to training for candidates for first driving licenses, such as theory lessons, practical

trainings, driving school requirements, driving instructor requirements, driving school vehicle requirements, driving test conditions, examination committee and register. Chapter XI includes rules with regards to technical requirements for vehicles, vehicle homologation process and vehicle testing procedures. Chapter XII refers to the roadworthiness tests for motor vehicles and their trailers. Chapter XIII is related to motor vehicle and trailer registration procedures. Chapter XIV describes special measures and authorities, including driver exclusion from traffic, alcohol/drugs/ psychoactive substances testing among road users, etc. Chapter XV, XVI and XVII are related to supervision, sanctions and final provisions, respectively.

4.1.3 Law on the roads

Law on the roads entered into force on 14 August 2020 including eleven chapters. This Law regulate the legal status of public and uncategorized roads, the manner of management, financing and construction of public roads, maintenance, protection, inspection and other issues of importance for roads. Chapter I contains basic provisions regarding subject matter, use of gender sensitive language and definitions. Chapter II was entitled as “public roads” and take into account legal status of roads, the right of way on a public road, public road elements, classification of public roads, records of public roads, changing the class of road sections, putting a public road out of use, and uncategorized roads. Chapter III comprehends public road management activities, mid-term and annual plan, traffic control on public roads, application of intelligent transport systems, jurisdiction of the administrative body and traffic and technical conditions. Chapter IV is related to road financing in terms of sources of funding, public road usage fees, exemption from toll and user fee, the manner of determining and paying the fee for the use of a public road and personal data protection. Chapter V includes rules with regards to construction of public roads, like technical regulations for the design and construction of public roads, consent for linking to public roads, responsibilities of the contractor, construction of national roads through urban areas, technical documentation for the development of municipal infrastructure, water supply or other facilities within the road land strip, financing the construction of bypass roads, bus bay, relocation of public roads, intersections of public roads and railway infrastructure, construction and maintenance of facilities and equipment that cross watercourses, notification of works on public roads, intersection of public roads and other infrastructure systems, construction of additional road elements and facilities for protection of public roads and traffic on public roads. Chapter VI includes rules regarding maintenance of public roads, types, routine and capital of public road maintenance, emergency maintenance, traffic regime during maintenance works, traffic signalization on national roads, maintaining

intersections of national and municipal roads, facility maintenance, national road at border crossings, temporary diversion of traffic to the municipal road, maintenance of common structures, acting on the basis of a plan for the elimination of natural disasters and damage due to untimely execution of works. Chapter VII defines road safety infrastructure management procedures such as assessment of the impact of national roads on traffic safety, road safety audit, ranking of national roads according to traffic safety and management of those roads and road safety inspection, road safety requirements for tunnels, as well as conditions for obtaining certificates for road safety auditors. Chapter VIII consists of rules concerning protection of public roads, such as traffic suspension, public road works, report on the condition and passability of public roads, technical assistance on roads, winter traffic regime, equipment of motor vehicles travelling on public roads, special transport, damage caused by special transport, special transport checks, vehicles transporting hazardous substances, installation, removal and addition of traffic signalization, dirt roads feeding to public roads, approval for connecting access roads, clear vision on public road intersections, access junction to public road, adapting access junctions to the needs of traffic on public roads, reducing the number of access junctions, prohibition of temporary or permanent occupation of public roads, protecting public roads from water, avalanches, noise, blinding effects and other harmful effects, prohibition to store building or other materials along public roads, prohibition of works that may damage or endanger public roads, removal of grease and objects from public roads, removal or marking of objects, substances or vehicles from public roads, marking and removal of broken-down vehicles, protective fence along public roads, an on construction in the road protection zone, limits of expropriation, prohibition of erecting fences, prohibition of erecting monuments, prohibition of works without consent, afforestation and riverbed regulation, protection of existing public roads against erosion and landslides, placing advertisements on public roads, construction of cable cars above public roads, vehicle parking spaces, traffic sign, blasting near public roads and measures to prevent damage to public roads and impeding safe traffic flow. Chapter IX includes rules related to supervision, i.e., supervision over the legality and expedience of operation, inspection, measures and actions of inspectors, and powers of inspectors. Chapter X prescribes penal provisions. Finally, Chapter XI refers to transitional and final provisions.

4.1.4 Secondary regulations on the transportation of dangerous goods (e.g. rulebooks, decrees, rules, orders)

Most of the countries of the Western Balkans have adopted above-mentioned EU directives through the adoption of secondary legislation. However, according to our

knowledge, Montenegro has not implemented these directives through the application of secondary regulations in the field of transportation of dangerous goods. This should be the focus of work in the near future.

4.2 Kosovo

National regulations in the transport of dangerous goods in Kosovo* are legally regulated in accordance with international regulations on the transport of dangerous goods. In the field of transport, there are many regulations, the most applicable of which are: Law on the transportation dangerous goods, Law on the road traffic safety, Law on the roads, as well as other legal and by-laws stand out.

4.2.1 Law on the transportation of dangerous goods

The 2004 law for the transport of dangerous goods, which was replaced by the 2013 law on road transport of dangerous goods, established the criteria and conditions that must be met by a substance or commodity to be considered dangerous. Through this Law is aimed to prevent the risk, and to increase supervision and safety of traffic during the transportation of dangerous goods which by their combustible, poisonous, explosive, vaporous, infectious, and radioactive features present danger for human and environment safety, regulates terms of dangerous goods transport in individual sector of transport, obligations of persons involved in Transport of Dangerous Goods, competencies and responsibilities of respective authorities on supervision regarding the implementation of this Law.

Dangerous Goods according to this Law are substances and objects which endanger public safety or public order, in particular public, life and health of humans as well as animals, plants and objects due to their nature, characteristics or conditions, during transportation, whose carriage is forbidden by ADR or are allowed to be transported under special terms.

As per this Administrative Instruction, dangerous goods are categorized into nine classes based on their inherent characteristics and unique qualities, in compliance with the European Agreement on the International Carriage of Dangerous Goods by Road (ADR):

- Class 1: Explosive substances and articles.
- Class 2: Gases.

- Class 3: The leaking flammable liquid.
- Class 4.1: Solid flammable substances, self-reactive substances, and solid desensitized explosives.
- Class 4.2: Substances that can be self-flammable.
- Class 4.3: Substances which when in contact with water create flammable gases.
- Class 5.1: Oxidizing substances.
- Class 5.2: Organic peroxides.
- Class 6.1: Toxic substances.
- Class 6.2: Infectious substances.
- Class 7: Radioactive material.
- Class 8: Corrosive substances.
- Class 9: Substances and other dangerous goods.

The Law is based on the directives of the European Community and the other International Mechanisms on safety and transport of dangerous goods such as (ADR, RID and COTIF). Directives said shall be defined by the Ministry and be implemented through special legislative acts.

Transport of dangerous goods from, to or through Kosovo*, performed by foreign entities or domestic entities, is performed in accordance with provisions of this Law and sub-legal acts coming out of it, as long these are not in contradiction to international agreements signed by persons with respective competency of Kosovo* in coordination with UNMIK.

The Ministry is authorized through special legal acts to issue regulations on Dangerous Goods Transport including:

a) permitting the Goods for transport.
b) packaging, joint packaging, joint loading.
c) the load labeling.
d) construction, nature, equipment, control and marking of vehicles and containers of transport.
e) the conduct during transportation.
f) the license of transport and documents of transport.
g) information – registration and reporting obligations.
h) vehicles performance.
i) qualifications.
j) the measure and the way of controlling the proceeding.

k) the protection manner of proceeding for the transport personnel.
l) the behavior and protection and the way of first aid of acting after an accident with dangerous goods.
m) participants obligations concerning the safety in Transport of Dangerous Goods,
n) transport personnel, including their medical monitoring and examination, the necessity for training, testing and further education as well as the determination of quality standards of the training personnel and of the instructors.
o) safety advisors in the company for Transport of Dangerous Goods, including training, testing and their further education as well as the determination of quality standards of the training personnel and of the instructors.
p) documentation and obligation to report on dangerous waste.
q) transport of dangerous goods by railway according to RID.
r) carriage of explosive, combustible, and dangerous materials in postal circulation.

4.2.2 Law on the road traffic safety

Kosovo* Government have passed the Law on road traffic provisions in 2016. The aim of this law is to determine the basic rules of conduct and behavior for partakers and other subjects in road traffic, the main required conditions for roads in view of traffic safety, system - signaling of traffic-road, the actions of authorized officers, procedures in case of traffic accidents, the instruction of new drivers and the administration of the driver exam, tow vehicles, equipment and tools each vehicle should have, the permissible vehicle size and weight and axletree burden, as well as the standards vehicles must fulfil in traffic.

This Law transposes partially Directive 2014/37/EU of 27 February 2014 amending Council Directive 91/671/EEC relating to compulsory use of safety belts and child restraint systems in the vehicle; Directive 2014/47/EU of the European Parliament and of the Council of 3 April 2014 on the technical roadside inspection of the of the roadworthiness of commercial vehicles circulating and repealing Directive 2000/30/EEC, Directive 91/671/EEC of 16 December 1991 on the approximation of the laws of the Member States relating to compulsory use of safety belts in vehicles of less than 3.5 tones.

According to this law, Ministry of Transport and Communications and the Municipal Assemblies regulate the traffic in their competences so that will determine:

a) Roads with priority passing,

b) Traffic with 1 respectively on 2 directions,

c) Technical system of traffic adjustment,

d) Limitation of speed movement,

e) Pedestrian traffic, bicycles, mopeds, dray, riding and the animal guidance,

f) Parking areas and the parking manner,

g) Zone of quiet traffic,

h) Blockage of buses, transporting vehicles, combined vehicles, and the working vehicles, on places in which are fated for parking of their type and the unblocking manner of these vehicles,

i) Placement and maintenance of the protecting encircle for pedestrians on dangerous places,

j) Pedestrian zones, safe directions for movement of school children, special technical measures for pedestrian and cyclist safety in locality of educational organ, health and other organs, sportive fields, kinder gardens, cinema and similar,

k) Removal, of old vehicles, damaged or unused or similar,

l) Areas in which is performed: driving tests, crossing, sportive driving and similar,

m) Movement conditions of supply vehicles at the calm traffic zones and the pedestrian zones.

4.2.3 Law on the roads

The law on the roads regulates the legal status of public roads; construction and maintenance of public roads; road and traffic protection measures, management, financing, and supervision of public roads. This law defines the basic concepts of public roads. Then, the division of public roads into main roads, regional roads, local roads, and residential roads was defined.

4.2.4. Secondary regulations on the transportation of dangerous goods (e.g. rulebooks, decrees, rules, orders)

Secondary regulations are additional rules that further govern the transportation of dangerous goods. These regulations may provide more specific details and requirements for the safe transport of dangerous goods. Secondary regulations in Kosovo* are:

REGULATION (MoD) – N0.07/2020 ON LAND TRANSPORT OF THE DANGEROUS GOODS IN THE KOSOVO SECURITY FORCE*

The purpose of this regulation is to control and ensure the safe transport of dangerous goods within the Kosovo* Security Force during mission fulfillment. It establishes measures to minimize risk, as well as the conditions, criteria, packaging, transportation vehicles, controls, duties, and responsibilities associated with the carriage of dangerous goods.

This regulation applies to all land transport of dangerous goods within the Kosovo* Security Force, as well as between local and international agencies and partner military forces.

ADMINISTRATIVE INSTRUCTION (MI NR. 05/2015 FOR AMENDING AND SUPPLEMENTATION THE ADMINISTRATIVE INSTRUCTION NO 12/2013 ON THE CRITERIAS AND PROCEDURES FOR ISSUANCE, SUSPENSION AND REVOCATION OF A LICENSE FOR LAND TRANSPORT OF DANGEROUS GOODS

The purpose of this Instruction is amending and supplementation of Administrative Instruction 12/2013 on the criteria and procedure for issuance, suspension, and revocation of license for land transport of dangerous goods. The provisions of this administrative instruction are mandatory for operators of land transport of dangerous goods.

ADMINISTRATIVE INSTRUCTION NO. 01/2015 ON THE PROGRAMME OR EDUCATION, IMPLEMENTATION, AND THE METHOD OF TRAINING AND ASSESSMENT OF THE SAFETY ADVISER

This Administrative Instruction aims to determine the program of education, implementation, the manner of training and evaluation of the safety adviser, form and validity of its qualification certificate, the conditions to be met by institutions that conduct training process, content and manner of conducting exams, the list of subjects, issues to be addressed and the composition of the commission appointed to conduct the examination as well as fees for training and exam of safety adviser.

Scope this Administrative Instruction is:

1. The provisions of this Administrative Instruction are mandatory for all natural and legal persons participating in the program of education,

enforcement, training mode and manner of evaluation of safety adviser in the transport of dangerous goods by road and rail.

2. The provisions of this Administrative Instruction are not mandatory for activities that relate to the transport of dangerous goods by security forces in the territory of the Kosovo* as well as activities which relate to small amounts of transport unit stated in the margins 10010 and 10011 in Annex B of Directive 94/55 / EC.

ADMINISTRATIVE INSTRUCTION NO. 12/2013 ON THE CRITERIA AND PROCEDURE FOR ISSUANCE, CANCELLATION AND REVOCATION OF LICENSE FOR LAND TRNASPORT OF DANGEROUS GOODS

The purpose of this administrative instruction is to determine the criteria and procedures for the issuance cancellation and revocation of licenses to operators of road transport of dangerous goods. This administrative instruction is intended to prevent danger, to increase supervision and ensure the transport of dangerous goods which are dangerous for people and the environment.

ADMINISTRATIVE INSTRUCTION NO. 06/2013 FOR TRAINING AND EXAMINATION AWARD FOR MANAGMENT AND MANIPULATORS OF THE DANGEROS GOODS

The purpose of this Administrative Instruction is determination of the initial program for organizing of the initial courses and special training of drivers of dangerous goods and manipulators of dangerous goods that have to do with packaging, loading and unloading of dangerous goods, the procedure of passing the exam, organize additional courses and conditions for granting authorization.

The basic program and special programs for the training (drivers) And manipulators for transportation of dangerous goods carried out based vocational training in the European Agreement on the Transport of Dangerous Goods ADR under Chapter 8.

4.3 Bosnia and Herzegovina

Bosnia and Herzegovina do not have a legislative framework in the field of transport of dangerous goods at the state level, although it was in the parliamentary procedure in 2009. At some lower levels of government in Bosnia and Herzegovina, there is an adopted legislative framework in the subject area.

In addition to the above, pursuant to the Law on Transport of Dangerous Goods of the SFRY ("Official Gazette of The SFRJ", No. 27/90), the Law on Trade in Explosive Substances, Flammable Liquids and Gases ("Official Gazette of SRB&H", No. 39/89), pursuant to Article 15a) of the Law on Defence of B&H ("Official Gazette of B&H", No. 88/2006), the Law on International and Inter-Entity Road Transport ("Official Gazette of B&H", No. 1/02 and 14/03), Law on the Basics of Road Traffic Safety in Bosnia and Herzegovina ("Official Gazette of B&H", No. 6/06, 75/06, 44/07, 84/09, 48/10, 18/13, 8/17, 89/17 and 9/18) and the European Agreement Concerning the International Carriage of Dangerous Goods by Road – ADR, The Minister of Defence of B&H adopted the Rulebook on the Manner of Transport of Dangerous Goods in the Ministry of Defence and the Armed Forces of Bosnia and Herzegovina ("Official Gazette of B&H", No. 21/14), which refers to the transport of dangerous goods carried out for their needs by the Armed Forces of Bosnia and Herzegovina.

Republic Srpska entity has a Law on Transport of Dangerous Materials ("Official and Gazette RS", number 15/16), which defines conditions for the transport dangerous materials in individual traffic branches, rights and obligations of persons participating in transportation, conditions for packaging and vehicles, issuing approval for transportation, conditions for appointment of security advisers, responsibility and conditions for allowing the person participates in transportation, the ministry's authority regarding the transportation in Republic Srpska, and the supervision of the law implementation.

The case law was arranged by transport dangerous materials in road and railway traffic, as well as on internal plov roads, and brought up legally attend:

- Rulebook on the professional training of safety consultants and the conditions that must be met by institutions that provide professional security advisors ("Official Gazette RS", No. 82/16);
- Regulation on professional training of drivers for the transport of dangerous goods and other persons involved in the transport of dangerous goods ("Official Gazette RS", number 115/16);
- Regulation on the manner of transport of dangerous goods by road ("Official Gazette RS", No 7/17);
- Regulation on the provisions of infringements in the transport of hazardous materials ("Official Gazette RS", No 7/17).

The Federation of Bosnia and Herzegovina's Federation has not adopted the Law on Transport of Dangerous Materials, but in 2016. The year is prepared by the case law,

but the same has not passed a parliamentary procedure yet. Also, the Brčko District of Bosnia and Herzegovina has not adopted the Law on Transport of Dangerous Materials.

The West-Herzegovina Canton passed the Law on Transport of Dangerous Materials ("Official Gazette ZHK", number 8/14) with sublegallyacts:

- The rules on conditions that must meet by the legal person that provides expert enabling and taking exam for security daily, and the look and content of the certificate of expert osposobljeness of adviser for security ("Official Gazette ZHK", number 24/15),
- The Rulebook on drafting and content of dangerous materials, led by the ZHK Ministry of Interior ("Official Gazette ZHK", number 24/15),
- The content rules and form of records conducted by a review of vehicles for the transport of dangerous materials ("Official Gazette ZHK", number 28/15),
- The rules on design and content confirm experts allowing employees to transport dangerous materials ("Official Gazette ZHK", number 12/14),
- The transport design and content rules are making dangerous materials and content on special security measures to take during the transport of dangerous materials ("Official Gazette ZHK", number 28/15).

According to mentioned, at Bosnia and Herzegovina and the Federation of Bosnia and Herzegovina to review vehicles used by dangerous materials are applied, the legal framework of the former state for transporting dangerous materials (The Law on Transport of Dangerous Materials "Official Gazette SFRJ", number 27/90), as well as the Right Lnik on the way transported dangerous material in road traffic ("Official Gazette SFRJ", 82/90).

4.3.1 Legislative background of transport of dangerous goods

The law on the basis of traffic security on roads in Bosnia and Herzegovina ("Official Gazette B&H", no. 6/06, 75/06, 44/07, 84/09, 48/10, 18/13, 8/17, 89/17 and 9/18), defines fundamental principles of interior relations and behavior participants in traffic and other traffic entities, fundamental conditions that must satisfy traffic roads traffic rules on roads, system of traffic signs and signs given to authorized persons, duties in case of traffic accidents, training of candidates for drivers, conditions for acquiring the right to drive motor vehicles, passing driving tests, requirements for vehicle devices and equipment, dimensions, total mass and axle load, basic conditions that must be met by traffic vehicles, work of a professional organization in Bosnia and Herzegovina, The other issues from traffic safety on roads that are unique for Bosnia and Herzegovina's territory.

Regarding the partial regulation of the transport of dangerous goods by road traffic, the following bylaws and the Decision arose from the said Law:

- Rulebook on dimensions, total mass and axle load of vehicles, on devices and equipment that vehicles must have and on basic conditions that must be met by devices and equipment in road traffic ("Official Gazette of B&H", No. 23/07, 54/07, 101/12, 26/19 and 83/20);
- Rulebook on Vehicle Approval ("Official Gazette of B&H", No. 83/20 and 08/22), as well as the Decision on minimum technical requirements for newly manufactured and used vehicles in vehicle type approval and individual vehicle approval, and for parts, devices, and equipment for type approval ("Official Gazette of B&H", No. 23/19);
- Rulebook on Vehicle Safety Tests ("Official Gazette of B&H", No. 33/19 and 29/20),
- Rulebook on vehicle certification and conditions that vehicle certification organizations must meet ("Official Gazette of B&H", No. 41/08, 89/11, 6/12 and 83/20),
- Decision on minimum technical requirements for newly manufactured and used vehicles in vehicle type-approval and individual vehicle approval, and for parts, devices, and equipment for type approval ("Official Gazette of B&H", No. 23/19).

4.3.2 International regulations in transportation of dangerous goods by roads.

The ADR Agreement was successively taken from the former state. However, although the state level is responsible for international and inter-entity road transport, the Law on the Transport of Dangerous Goods has not yet been adopted at the state level.

Most western Balkan countries (WBC) are contracting parties to international agreements and conventions regulating the international transport of dangerous goods, which they inherited from the former state and in the meantime published in their official gazettes in accordance with national legislation. International agreements and conventions governing the transport of dangerous goods in road, rail, water and air transport are reflected in:[1]

- The European Agreement concerning the International Carriage of Dangerous Goods by Road (EU) applies. European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR) with its components, annexes A and B and a notification act.
- The Convention concerning International Carriage by Rail (COTIF) is applicable to railway transport, as well as the Regulation on the International Carriage of Dangerous Goods by Rail (RID).

[1] In 2017, the WBC signed a treaty establishing the Transport Community.

- the Convention on International Civil Aviation, international standards and recommended practice of the International Civil Aviation Organisation (ICAO): Appendix 18 to the Convention on International Civil Aviation.
- When transporting dangerous goods by inland waterways, the European Agreement Concercing the International Carriage of Dangerous Goods by inland Waterways (ADN) applies.

In addition to international agreements regulating the international transport of dangerous goods, the legal framework of the WBC countries is based on the adopted laws and bylaws in the field at the national level. When it comes to Bosnia and Herzegovina, and since there is no law adopted at the state level, the subject area is resolved differently at the lower levels of government, with partial application of the legislation of the subject area inherited from the former state ("Official Gazette of the SFRJ", No. 27/90).

The European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)

By taking over the succession of the ADR agreement from the former state, it is used in various new authorities in B&H (entity, cantonal). The RS entity has adopted the Law on Transport of Dangerous Goods, which regulates the transport of dangerous goods by road, while the Government of the FB&H has prepared a proposal for the Law on Transport of Dangerous Goods, but the adoption procedure has not been completed, while some cantons have adopted regulations regarding the regulation of the field of transport of dangerous goods.

The European Treaty concerning the International Carriage of Dangerous Goods by Road (ADR) was signed in Geneva on 30 September 1957 under the auspices of the United Nations Economic Commission for Europe and entered into force on 29 January 1968. The Agreement underwent amendments to the Protocol amending Article 14 adopted in New York on August 21, 1975, which entered into force on April 19, 1985.

The title of the Agreement has changed by the ADR Amendment Protocol adopted by the Foreign Contractor Conference. Maja 2019. The year, and entered into force 1. January 2021. godine. Since this day, the European Agreement on International Road Transport Dangerous Materials (ADR) has been becoming an agreement on the international road transport of dangerous materials (ADR).

In accordance with Section 2. Dangerous goods prohibited for carriage by Annex A shall not be accepted for international carriage, while the international carriage of other dangerous goods shall be permitted if the following are fulfilled in the following terms:

- the conditions laid down in Annex A for the goods concerned, in particular as regards their packaging and marking; and
- the conditions laid down in Annex B, in particular as regards the construction, equipment and operations of vehicles carrying the substances concerned.

However, pursuant to Article 4, each Contracting Party reserves the right to regulate or prohibit, for reasons other than safety during carriage, the entry of dangerous goods into its territory. The Contracting Parties also reserve the right to regulate, by bilateral or multilateral agreements, that certain hazardous substances the carriage of which is prohibited by Annex A shall be permitted to be transported internationally under certain conditions in their territories, or to allow dangerous substances whose international carriage is permitted by the provisions of Annex A to be transported in their territory under conditions less stringent than those set out in Annexes A and B. Annexes A and B are regularly subject to amendments and they have been updated since the entry into force of the ADR.

As stated above, wbc are contracting parties to international agreements and conventions regulating the international carriage of dangerous goods, which they inherited from the former state, which is also the case of Bosnia and Herzegovina. The purpose and meaning of the ADR Agreement and its annexes and additions is the harmonization, i.e. harmonization of various national regulations that defined the conditions for the carriage of dangerous goods.

The Law on International and Inter-Entity Road Transport ("Official Gazette B&H", No. 1/02 and 14/03), among other things, regulates the manner and conditions for the performance of transport of passengers and goods by vehicles in international and inter-entity road transport, the activities of oversized transport of goods, inspection supervision, customs control, and obligations to pay fees for the use of roads.

The Rulebook on the conditions for issuing licenses and qualification cards of drivers ("Official Gazette B&H", No. 77/14 and 65/18), regulates the conditions for issuing licenses and qualification cards of drivers, prescribes the conditions for issuing licenses and license statements for performing international road transport, access to road transport activities and performing this activity, content, and form of licenses of carriers, license statements and keeping records thereof, as well as the conditions for performing the duties of drivers in international road transport if they are driving

vehicles requiring a driving license of category C, CE, D or DE and/or the corresponding subcategory. The rulebook is partially aligned with regulations 1071, 1072 and 1073, after which Bosnia and Herzegovina implemented the ITF Quality Charter[2].

The aforementioned legal framework at the level of Bosnia and Herzegovina did not specifically prescribe the conditions for the performance of international and inter-entity road transport of dangerous goods, but the generic regulated cargo transport. With regard to trade in goods with the Member States of the European Union, as well as the countries of the region, the number of licensed carriers for international cargo transport[3], in order to ensure the future unhindered access of transport companies to these markets, it is necessary to harmonize national legislation in the field of road transport of dangerous goods.

Directive 95/50/EC on uniform procedures for checks on the transport of dangerous goods by road

Directive 95/50/EC on uniform procedures for the verification of the transport of dangerous goods by road applies to surveillance carried out by Member States in connection with the transport of dangerous goods by road by vehicles carrying out in their territory or entering their territory from a third country. The Directive does not apply to the transport of dangerous goods by vehicles belonging to or under the jurisdiction of the armed forces.

The provisions of the Directive shall not affect the right of Member States to exercise control over the internal and international transport of dangerous goods on their territory, vehicles to which this Directive does not apply. Since the supervision is to be carried out using a list of common elements, the annexes to the Directive in question prescribe the Minutes on the conduct of supervision of the transport of dangerous goods, the type of offences, as well as the form of the report submitted on committed offenses and penalties imposed. [4]

Given that at the level of Bosnia and Herzegovina, as well as at the level of authorities other than Republic Srpska, there is no adopted legal framework for the transport of dangerous goods, the directive in question has not been transposed into the

[2] https://www.itf-oecd.org/report-bosnia-and-herzegovina-current-state-implementation-quality-charter-0
[3] www.transportnedozvole.gov.ba
[4] 'supervision' means any inspection, control, inspection, verification or formality carried out by competent authorities to ensure the safety of the transport of dangerous goods.

legislation of Bosnia and Herzegovina. However, the Rulebook on violations of the provisions in the transport of dangerous goods ("Official Gazette OF RS", No. 7/17), which was adopted based on the Law on the Carriage of Dangerous Goods ("Official Gazette rs", No. 15/16), the directive in question was partially implemented.

Directive 98/91/EC relating to motor vehicles and their trailers intended for the transport of dangerous goods by road

Directive 98/91/EC on motor vehicles and their trailers intended for the carriage of dangerous goods by road applies to vehicles of categories 'N' and 'O' which are intended for the transport of dangerous goods by road in or between Member States.

The scope, definition, classification, and requirements relating to such vehicles, as well as the administrative provisions relating to their EC type-approval, are set out in Annexes I and II to the Directive.

In Bosnia and Herzegovina, the determination of category, subcategory and sub-sub-category of vehicles is carried out on the basis of the Law on the Basics of Road Traffic Safety in Bosnia and Herzegovina ("Official Gazette of B&H", No. 6/06, 75/06, 44/07, 84/09, 48/10, 18/13, 8/17, 89/17 and 9/18) and the Rulebook on Dimensions, Total Mass and Axle Load of Vehicles, on Devices and Equipment That Vehicles Must Have and on the Basic Conditions That Must Be Met by Road Traffic Devices and Equipment ("Official" Gazette BH", No. 23/07, 54/07, 101/12, 26/19 and 83/20). The Regulation stipulates the dimensions of the vehicle, the total mass of the vehicle, the axle loads of the vehicle and the basic conditions that must be met by devices and equipment on vehicles in road traffic and which must be installed and constructed on vehicles so that vehicles can safely participate in road traffic, as well as other technical conditions that must correspond to certain devices on vehicles that are of importance for traffic safety.

Vehicle approval in Bosnia and Herzegovina is carried out on the basis of the Law on the Basics of Road Traffic Safety in Bosnia and Herzegovina ("Official Gazette of B&H", No. 6/06, 75/06, 44/07, 84/09, 48/10, 18/13, 8/17, 89/17 and 9/18), the Rulebook on Vehicle Approval ("Official Gazette of B&H", No. 83/20 and 08/22), as well as the Decision on the lowest technical requirements for newly manufactured and used vehicles in vehicle type approval and individual vehicle approval, and for parts, appliances and protection of vehicles during type-approval ("Official Gazette of B&H", No. 23/19).

The Rulebook on vehicle approval regulates the procedure for the implementation of vehicle approval, parts, appliances and equipment of vehicles, exemptions from the implementation of the vehicle approval procedure, review of documentation in the procedure of approval, sampling, conditions and selection of the organization for the implementation of administrative, technical and specialist tests in the field of type-approval, supervision of operation, abolition of authorization for performing administrative and technical tasks and data protection.

The Decision on the minimum technical requirements for newly manufactured and used vehicles in vehicle type approval and individual vehicle approval, as well as for the divisions, devices, and equipment of vehicles in type approval ("Official Gazette B&H", No. 23/19) prescribes the lowest technical requirements for newly manufactured and used vehicles in the processes of vehicle type approval and approval of an individual vehicle, and for parts, device,s and equipment of vehicles in the type-approval process.

Annex III, which refers to technical requirements for newly manufactured vehicles, as well as Annex IV relating to technical requirements for used vehicles, the decision on the minimum technical requirements for newly manufactured and used vehicles in vehicle type-approval and individual vehicle approval, and for parts, devices, and equipment for type-approval ("Official Gazette of Bosnia and Herzegovina", No. 23/19), The directive is accepted.

The Rulebook on vehicle certification and the conditions that vehicle certification organizations must meet ("Official Gazette of B&H", No. 41/08, 89/11, 6/12 and 83/20), regulates the manner and procedure of certification of vehicles that are individually or serially produced, modified, repaired after serious traffic accidents, significantly improved, vehicles where circuits and devices essential for safe participation in traffic are changed, vehicles used for the transport of dangerous goods, vehicles for the transport of perishable goods, and the conditions to be met by vehicle certification organizations, as well as keeping records of issued certificates and certificates. Annex 1 of the Regulations regulates the categorization of changes and the level of necessary documentation by individual types of testing, including for testing vehicles for the transport of dangerous goods.

Directive 2008/68/EC on inland transport of dangerous goods

Directive 2008/68 /EC on the inland transport of dangerous goods applies to the carriage of dangerous goods by road, rail, or inland waterway within or between

Member States, including loading and unloading, crossing to or from other modes of transport, and stops required for transport circumstances.

Given that at the level of Bosnia and Herzegovina, as well as at the level of authorities other than Republic srpska, there is no adopted legal framework for the transport of dangerous goods, the directive in question has not been transposed into the legislation of Bosnia and Herzegovina. However, with the adopted Law on the Transport of Dangerous Goods ("Official Gazette of RS", no. 15/16), the directive in question was partially implemented.

Directive 2010/35/EC - transportable pressure equipment

Directive 2010/35/EC lays down detailed rules on movable pressure equipment in order to improve safety and ensure the free movement of such equipment.

Given that at the level of Bosnia and Herzegovina, as well as at the level of authorities other than Republic srpska, there is no adopted legal framework for the transport of dangerous goods, the directive in question has not been transposed into the legislation of Bosnia and Herzegovina. However, with the adopted Law on the Transport of Dangerous Goods ("Official Gazette of RS", no. 15/16), the directive in question was partially implemented.

4.3.3 National regulations in transportation of dangerous goods

At the state level, regulations have not been transposed into national legislation, but international agreements/ conventions inherited by B&H by succession from the former state are applied.

The application of regulations in the field of transport of dangerous goods is regulated differently at certain levels of government in Bosnia and Herzegovina. Namely, at the level of Bosnia and Herzegovina, the area in question is partly regulated by the Law on the Basics of Road Traffic Safety in Bosnia and Herzegovina ("Official Gazette of B&H", No. 6/06, 75/06, 44/07, 84/09, 48/10, 18/13, 8/17, 89/17 and 9/18), as well as bylaws arising from the said Law, such as:

- Rulebook on dimensions, total mass, and axle load of vehicles, on devices and equipment that vehicles must have and on basic conditions that must be met by devices and equipment in road traffic ("Official Gazette B&H", No. 23/07, 54/07, 101/12, 26/19 and 83/20),
- Rulebook on vehicle approval ("Official Gazette of B&H", No. 83/20 and 08/22), as well as the Decision on the minimum technical requirements for newly manufactured and used

vehicles in vehicle type-approval and approval of individual vehicles, and for parts, devices and vehicle protection during type approval ("Official Gazette of B&H", No. 23/19),
- Rulebook on vehicle certification and requirements that vehicle certification organizations must meet ("Official Gazette of B&H", No. 41/08, 89/11, 6/12 and 83/20) and
- Rulebook on vehicle roadworthiness tests ("Official Gazette of B&H", No. 33/19 and 29/20).

In addition, in the territory of the Entities of the Federation of Bosnia and Herzegovina and the Brčko District of B&H, the Law on Transport of Dangerous Goods ("Official Gazette of SFRY", No. 27/90) is still partially in application. The West Herzegovina Canton passed the Law on the Transport of Dangerous Goods ("Official Gazette ZHK", No. 8/14).

The Entity Republic of Srpska has adopted the Law on The Transport of Dangerous Goods ("Official Gazette of RS", No. 15/16), which applies to the regulation of the transport of dangerous goods by road and rail, as well as by inland waterways.

Law on the transportation of dangerous goods

As previously stated, Bosnia and Herzegovina have not adopted the Law on transport of dangerous goods at the state level, although it has been in parliamentary procedure since 2009. Also, the Federation of Bosnia and Herzegovina entity does not have a Law on Transport of Dangerous Goods, but it is the same in the parliamentary procedure since 2016, nor does the Brcko District of Bosnia and Herzegovina have adopted the law in question. The Republic Srpska entity has adopted the Law on Transport of Dangerous Goods ("Official Gazette of RS", No. 15/16), from which a number of bylaws have emerged, which regulate the areas concerned.

Bosnia and Herzegovina, as one of the signatories of the Agreement establishing the Transport Community, actively participates in the work of the governing bodies and technical committees of the Transport Community. Namely, among other technical committees, a Technical Committee for the Transport of Dangerous Goods has been established, in whose work Bosnia and Herzegovina has an active member. As a result of the work of the technical committee, a series of documents have emerged, from which the Guidelines for the transport of dangerous goods are heard in particular.[5], the WBC undertook certain obligations, with the aim of creating a harmonized legal framework with the area.

[5] https://www.transport-community.org/wp-content/uploads/2021/12/TDG-Guidelines-.pdf

Law on the road traffic safety

The Law on the Basics of Road Traffic Safety in Bosnia and Herzegovina ("Official Gazette B&H", No. 6/06, 75/06, 44/07, 84/09, 48/10, 18/13, 8/17, 89/17 and 9/18), establishes the basic principles of mutual relations and behavior of road users and other traffic entities, the basic conditions that must be met by roads in terms of road safety, keeping the Central Register of Drivers and Vehicles, road traffic rules, system of traffic signs and signs provided by authorized persons, duties in case of traffic accidents, training of candidates for driver, conditions for acquiring the right to drive motor vehicles, passing driving tests, conditions for vehicle devices and equipment, dimensions, total mass and axle load of vehicles, basic conditions that must be met by vehicles in traffic, work of professional organizations in Bosnia and Herzegovina, and other issues in the field of traffic safety on roads that are unique for the entire territory of Bosnia and Herzegovina.

The institutions of Bosnia and Herzegovina, entity and cantonalinstitutions and institutions of the Brcko District of Bosnia and Herzegovina and local self-government institutions and local government institutions in cities and municipalities shall ensure the implementation of laws and within their competence shall enact regulations and undertake other necessary measures for its consistent implementation. Control and regulation of traffic on roads in Bosnia and Herzegovina is carried out by authorizedpersons of the competent authority of internal affairs.

Part of the law relating to "Towing vehicles" regulates the way in which vehicles transporting dangerous goods can be towed, while part of the law "Distance between vehicles", regulates the necessary distance if two or more vehicles for the transport of dangerous goods are moving. Also, the law prescribes the performance of a preventive technical inspection of vehicles for the transport of dangerous goods, whose maximum permissible mass exceeds 7,500 kg. The technical inspection of vehicles in Bosnia and Herzegovina is regulated in detail by the Rulebook on Vehicle Roadworthiness Tests ("Official Gazette of B&H", No. 33/19 and 29/20).

Law on the roads

By 2022, Bosnia and Herzegovina have not yet adopted the Law on Roads. However, the lower levels of government in B&H have the subject law. For example, the

FB&H entity has adopted the Law on Roads of the Federation of Bosnia and Herzegovina, which [6]regulates the classification of public roads, road management and the legal position of managers, planning, construction, reconstruction, maintenance, contracting, and assignment of works, road protection and conditions for traffic on roads, concessions on public roads, financing of public roads, administrative supervision of the implementation of the Law, penalties and other issues of importance for the Federation of Bosnia and Herzegovina in the field of roads.

On the other hand, the RS entity has since 2013 the Law on Public Roads of the Republic of Srpska, which regulates the legal status of road managers, the manner of using public and uncategorized roads; management, financing, planning, construction, reconstruction, maintenance, and protection of roads; concessions on public roads; public-private partnership and supervision of the implementation of this Law. [7]

Also, at the level of individual cantons, we have adopted Laws. For example, Sarajevo Canton has the Law on Roads of Sarajevo Canton[8] which regulates the categorization of public roads, road management and legal position of the manager, planning, construction, reconstruction, rehabilitation, maintenance, contracting and transfer of works, road protection and conditions of traffic on roads, concessions on public roads, financing of public roads, administrative supervision of law enforcement, penalties and other issues within the competence of the Sarajevo Canton, the City of Sarajevo and municipalities within the Sarajevo Canton in the field of roads.

Herzegovina-Neretva Canton has a law for road transport in the area of Herzegovina-Neretva Canton adopted in 2013.[9] which regulates more closely the conditions, manner and specifics of the organization of the transport of passengers and cargo in the area of Herzegovina-Neretva Canton, namely: conditions, manner and procedure of organization and performance of regular and non-line passenger transport, conditions, manner and organization of taxi transport, transport for own needs, transport by horse-drawn vehicles and other vehicles on motor drive and other drive, method of issuing decisions for certain types of transport, the manner of organization and number of public transport vehicles that will be equipped with devices for facilitated entry or exit of persons with disabilities, inspection supervision and penal provisions.

[6]"Official Gazette of the FBiH", no. 12/2010, 16/2010. 66/2013.https://jpcfbih.ba/
[7] "Official Gazette of the Republic of Srpska", no. 89/2013 and 83/2019
[8] Službene novine KS, broj 1/22 (Izvor: https://propisi.ks.gov.ba/sites/propisi.ks.gov.ba/files/zakon_o_cestama.pdf)
[9] "Sl. novine HNK, br. 6/2013 i 4/2022 (Izvor: https://www.paragraf.ba/propisi/

Tuzla Canton has adopted the Law on Road Transport in the area of Tuzla Canton[10] which regulates more closely the conditions, manner, and specifics of the organization of the transport of passengers or cargo in the tuzla canton, namely: conditions, manne,r and procedure of organizing regular and non-line passenger transport, conditions, manner and organization of taxi transport, transport for own needs, transport by horse-drawn vehicles, motorcycles with trailers and other motor vehicles and other drives, method of issuing a decision for certain types of transport, the manner of organization and the number of public transport vehicles that will be equipped with devices for facilitated entry or exit of persons with disabilities, inspection supervision and penal provisions.

Secondary regulations on the transportation of dangerous goods (e.g. rulebooks, decrees, rules, orders)

From the Law on the Basics of Road Traffic Safety in Bosnia and Herzegovina, a few bylaws have emerged, which partially regulate the subject area, namely:

- Regulation on vehicle certification and the conditions that vehicle certification organizations must meet;
- Regulation on vehicle approval.

From the Law on the Basics of Road Traffic Safety in Bosnia and Herzegovina, a few bylaws have emerged, which partially regulate the subject area, namely:[11]

- Rulebook on dimensions, total mass, and axle load of vehicles, on devices and equipment that vehicles must have and on basic conditions that must be met by devices and equipment in road traffic ("Official Gazette B&H", No. 23/07, 54/07, 101/12, 26/19 and 83/20),
- Rulebook on vehicle approval ("Official Gazette of B&H", No. 83/20 and 08/22), as well as the Decision on the minimum technical requirements for newly manufactured and used vehicles in vehicle type-approval and approval of individual vehicles, and for parts, devices, and vehicle protection during type approval ("Official Gazette of B&H", No. 23/19),
- Rulebook on vehicle certification and requirements that vehicle certification organizations must meet ("Official Gazette of B&H", No. 41/08, 89/11, 6/12 and 83/20) and
- Rulebook on vehicle roadworthiness tests ("Official Gazette of B&H", No. 33/19 and 29/20).

[10] ''Sl. novine TK'' broj: 15/11, 02/14, 09/16 (Izvor: https://www.kuiptk.ba/
[11] "Official Gazette of BIH", no.06/06, 75/06, 44/07, 84/09, 48/10, 18/13, 8/17, 89/17 and 9/18 (Source: https://www.jpautoceste.ba/wp-content/uploads/2019/01/Zakon-o-osnovama-bezbjednosti-saobracaja-na-putevima-u-Bosni-i-Hercegovini.pdf)

Regulations that have a correlation with the transport of dangerous goods are also defined[12]:

- Rulebook on the Manner of Transport of Dangerous Goods in the Ministry of Defence and the Armed Forces of Bosnia and Herzegovina (Official Gazette B&H, No. 21/14)[13]
- Rulebook on vehicle roadworthiness tests ("Official Gazette of B&H", No. 33/19 and 29/20)
- Rulebook on registration of vehicles ("Official Gazette of B&H", No. 69/09 and 29/20).

At the level of the entity Republic Srpska, the following bylaws have been adopted from the Law on Transport of Dangerous Goods of the RS:

- Regulation on professional training of security advisors and conditions to be met by institutions providing professional training of security advisors ("Official Gazette of the Republic of Serbia", No. 82/16),
- Regulation on professional training of drivers of motor vehicles for the transport of dangerous goods and other persons involved in the transport of dangerous goods ("Official Gazette of the Republic of Serbia", No 115/16);
- Regulation on the mode of transport of dangerous goods by road ("Official Gazette of the Republic of Serbia", No 7/17),
- Rulebook on infringements of the provisions in the transport of dangerous goods ("Official Gazette of the Republic of Serbia", No. 7/17).

The West Herzegovina Canton adopted the Law on transport of dangerous goods ("Official Gazette ZHK", No. 8/14) and bylaws:

- Rulebook on the conditions to be met by a legal entity providing professional training and passing the examination of security guards, as well as the appearance and content of the certificate of professional qualification of a security consultant ("Official Gazette ZHK", no. 24/15),
- Rulebook on the preparation and content of records on important substances, which is conducted by the Ministry of Internal Affairs of the ZHK ("Official Gazette ZHK", No. 24/15),
- Regulation on the content and form of the minutes on the inspection of vehicles for the transport of dangerous goods ("Official Gazette ZHK", No. 28/15),
- Rulebook on the design and content of the certificate on the professional training of persons employed in the transport of dangerous goods ("Official Gazette ZHK", No. 12/14),
- Rulebook on the design and content of transport documents of dangerous goods and the content of instructions on special safety measures to be taken during the transport of dangerous goods ("Official Gazette ZHK", No. 28/15).

When transporting dangerous goods in postal traffic, three postal operators in Bosnia and Herzegovina apply the regulations of the Universal Postal Union.

[12] https://komorabih.ba/sektori-i-sluzbe/transport-i-komunikacije/propisi-iz-oblasti-sigurnosti-prometa-na-cestama-u-bih/#1547195212479-e8f27429-928f
[13] http://www.sluzbenilist.ba/page/akt/wAyDndgki08=

In Bosnia and Herzegovina, the transport of dangerous goods is regulated by the aforementioned Laws and Regulations containing elements according to Annex 1812 of the Convention on International Civil Aviation, safe and safe transport of dangerous goods by air, technical instructions for the safe transport of dangerous goods by air [14] , with a note for the handling of hazards for aviation accidents related to the carriage of dangerous goods (Doc 9481, AN/928) and elements of Annex 18 to the Chicago Convention and associated IATA DGR that are recognized as the only authentic legal material in the air transport of dangerous goods.

In the event of endangering the safety of the aircraft, accidents and serious accidents of aircraft related to dangerous goods, the captain of the aircraft and other participants related to the carriage of dangerous goods must act in accordance with ICAO doc. 9481 (Instructions for emergency management for aircraft accidents related to dangerous goods). Any threats to the safety of aircraft, accidents, and serious accidents of aircraft related to dangerous substances must be reported to the Civil Aviation Agency in a prescribed manner.

4.4 Albania

4.4.1 National regulations in transportation of dangerous goods

Law on the transportation of dangerous goods

The transportation of dangerous goods is regulated by various laws and regulations worldwide, including international treaties and national legislation.
The United Nations Model Regulations on the Transport of Dangerous Goods is the primary international agreement governing the transportation of dangerous goods. This model regulation provides guidelines and requirements for the safety of transporting dangerous goods by all types of transport, including road, rail, sea, and air [22], [23].
Many countries have adopted national legislation based on the UN Model Regulations, which sets out specific requirements and restrictions for transporting dangerous goods within their borders [24]. For example, in the United States, the Department of Transportation's Hazardous Materials Regulations (HMR) governs the transportation of hazardous materials. In Canada, the Transportation of Dangerous Goods Act and Regulations sets out the requirements for the safe transportation of dangerous goods.
These laws typically require that dangerous goods be appropriately classified, packaged, labeled, and marked. Appropriate safety measures are taken to prevent accidents and

[14] ICAO Doc. 9284 AN/905

minimize the risks to people and the environment. Carriers and shippers must also be trained and certified to handle and transport dangerous goods safely. [22].

Penalties for non-compliance with these laws can be severe, including fines, imprisonment, and revocation of permits or licenses. Therefore, it is essential for anyone involved in the transportation of dangerous goods to be familiar with the applicable regulations and take all necessary precautions to ensure the safety of people and the environment. Albania has adopted the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) as a national regulation for the transportation of dangerous goods dangerous goods [24]. The ADR provides a framework for the safe and efficient transportation of dangerous goods by road [5]. It sets out requirements for packaging, labeling, documentation, and the training of personnel involved in the transport of dangerous goods.

In Albania, the Ministry of Infrastructure and Energy oversees the implementation of ADR regulations [24]. The General Directorate of Road Transport is the regulatory body responsible for monitoring and enforcing compliance with the ADR requirements. Transporters of dangerous goods must have a special permit from the General Directorate of Road Transport. This permit is issued based on a risk assessment conducted by the transport company. It ensures safety measures are in place to prevent accidents and protect the environment. The ADR also requires the designation of a safety advisor to advise on transporting dangerous goods. The safety advisor must be trained and certified according to ADR requirements [22]. In case of an accident or incident involving dangerous goods, the transport company must report it to the competent authorities immediately. The authorities will then investigate and take appropriate measures to mitigate the consequences of the accident [19].

Overall, the ADR provides a comprehensive regulatory framework for the safe transportation of dangerous goods in Albania. Transporters of dangerous goods in Albania must comply with these regulations to ensure the safety of people, property, and the environment.[21]

Law on the road traffic safety

The Law on Road Traffic Safety in Albania is a comprehensive legislation that aims to promote safe driving practices and reduce the number of accidents and fatalities on the country's roads[24]. The law outlines the responsibilities of all road users, including drivers, pedestrians, and cyclists, and sets out the rules for using vehicles on public roads.

The Law on Road Traffic Safety in Albania is the primary legal framework governing the regulation of traffic on public roads and the protection of road users. The law was last amended in 2018 and is enforced by the Albanian State Police and other relevant authorities[24]. The law defines the rights and obligations of drivers, pedestrians, and

other road users and the penalties for violating traffic regulations. It also sets out the technical requirements for vehicles and the licensing of drivers. Some of the key provisions of the law include:

-Driver's license: In Albania, drivers must obtain a valid one before driving on public roads. The law establishes the requirements for obtaining and renewing a driver's license.

-Traffic rules: The law sets out the rules of the road, including speed limits, right-of-way, and parking regulations. Drivers must obey these rules to ensure the safety of all road users.

-Vehicle requirements: Vehicles must meet specific technical requirements, such as having functional brakes and lights, to be driven on public roads. The law also requires vehicles to have insurance coverage in case of accidents.

-Penalties: The law establishes penalties for traffic violations, such as fines and license suspension or revocation. In some cases, drivers may also face criminal charges if their actions result in injury or death.

-Overall, the Law on Road Traffic Safety in Albania aims to improve road safety and reduce the number of accidents on the country's roads. All road users must understand and follow these regulations to help prevent accidents and protect themselves and others.

Law on the roads

The primary law that governs road traffic in Albania is "Law No. 10048, dated 08.09.2008, on Road Transport in the Republic of Albania[23]." The law outlines the rules and regulations that must be followed by all road users in Albania, including drivers, pedestrians, and cyclists.The law covers a range of topics related to road transport, including: Traffic safety: The law sets out rules and requirements for ensuring the safety of all road users, including the use of safety equipment such as seat belts, helmets, and reflective clothing[23], [24]. It also establishes penalties for traffic violations and reckless driving. Vehicle registration and licensing: The law establishes procedures for registering and licensing vehicles, including requirements for vehicle inspection, emissions testing, and insurance. Road infrastructure: The law outlines the requirements for road infrastructure, including road construction and maintenance, signage, and traffic management[23], [24]. Public transport: The law regulates public transport services in Albania, including requirements for licensing, safety, and fare structures[23], [24].

In addition to the primary law, secondary regulations provide more specific guidelines and rules related to road transport in Albania. These include regulations on vehicle standards, driver licensing, and traffic control.

In conclusion, the law and regulations related to road transport in Albania are designed to ensure all road users' safety and promote efficient and effective transportation across the country.

Secondary regulations on the transportation of dangerous goods (e.g. rulebooks, decrees, rules, orders)

In Albania, the transportation of dangerous goods is governed by "Law No. 10431, dated 20.02.2011, on Transport of Dangerous Goods" and its subsequent amendments [24]. The law sets out the general principles for the safe transportation of dangerous goods, and it outlines the responsibilities of the competent authorities and the parties involved in the transportation process.

In addition to the law, secondary regulations provide more specific guidelines for the transportation of dangerous goods in Albania [19], [20]. These include:

"Regulation on the Carriage of Dangerous Goods by Road" - This regulation, approved by the Ministry of Infrastructure and Energy, provides detailed requirements for the carriage of dangerous goods by road in Albania[23], [24]. It covers issues such as packaging and labeling requirements, documentation, and training requirements for drivers and other personnel involved in the transportation process.

"Regulation on the Transport of Dangerous Goods by Rail" - This regulation, approved by the Ministry of Infrastructure and Energy, sets out the requirements for transporting dangerous goods by rail in Albania [24]. It covers issues such as the classification of dangerous goods, the types of wagons that can be used for their transportation, and the safety measures that must be taken during loading and unloading.

"Regulation on the Transport of Dangerous Goods by Air" - This regulation, approved by the Civil Aviation Authority of Albania, provides guidelines for the safe transport of dangerous goods by air. It covers issues such as the packaging and labeling of dangerous goods, the documentation required for their transportation, and the safety measures that must be taken during loading and unloading[24].

"Regulation on the Transport of Dangerous Goods by Sea" - This regulation, approved by the Ministry of Infrastructure and Energy, sets out the requirements for the transport of dangerous goods by sea in Albania. It covers issues such as the classification of dangerous goods, the types of vessels that can be used for their transportation, and the safety measures that must be taken during loading and unloading[24].

Overall, these secondary regulations provide more detailed guidance on the safe transportation of dangerous goods in Albania, and they help ensure that the transportation process is conducted to protect public safety and the environment.

5) Problem identification of TDG key issues in WB region

The transportation of dangerous goods (TDG) in WB region is subject to a number of key issues, including:

Compliance: Ensuring that all parties involved in TDG, including shippers, carriers, and consignees, are following regulations and standards to ensure safe transport.

Safety: Minimizing the risk of accidents and incidents involving dangerous goods during transport, including leaks, spills, and explosions.

Emergency response: Ensuring that adequate measures are in place to respond to incidents involving dangerous goods, including the availability of trained personnel and equipment.

Harmonization: Maintaining consistent regulations and standards across different countries and regions to facilitate the safe and efficient transport of dangerous goods.

Environmental impact: Minimizing the environmental impact of TDG, including the release of harmful substances into the air, water, or soil.

Cybersecurity: Protecting against cyber threats to the transportation of dangerous goods, including hacking, data theft, and cyber-attacks on logistics systems and infrastructure.

These issues highlight the importance of effective TDG regulation and management to ensure the safe and efficient transport of dangerous goods in WB region.

5.1 Montenegro

5.1.1 Human and institutional capacity weakness

Transposition needs to be complemented by strict implementation measures that will prevent the occurrence of accidents involving transport of dangerous goods, thus preventing damages to human lives, property and environment. Sufficient and appropriately trained human resources are crucial for developments in this area. Attention should be focused also to ensure the dissemination in the official publications and further updating of the linguistic versions of Agreements (ADR, RID and ADN), as well as integration EU directives in national legislation.

A large number of institutions, with different roles and tasks, are involved in the field of transportation of dangerous goods. National institutions have a regarding the adoption of legislation in this area, as well as the subsequent enforcement. When it comes to Montenegrin institutional framework, we recognized several subjects included in transport of dangerous goods (Figure 3). The umbrella institutions that are responsible for implementation of the provisions of the Law on the transport of dangerous goods are Ministry of Interior and Ministry of Capital Investments. According to this Law, Ministry of Interior is in charge of identifying special locations for loading and unloading of hazardous materials, undertaking necessary measures when occur the event of disappearance of dangerous substance during transport or road accidents. Ministry of Interior also keeps records on safety advisers, issue training certificates for dangerous goods safety advisers, examination to ascertan if candidates possess the necessary level of knowledge to carry out the duties incumbent upon a safety adviser, issue approval certificate for the transport of explosive materials, autorizes subjects who issue vehicle approval certificate, perform supervision, and prepares report.

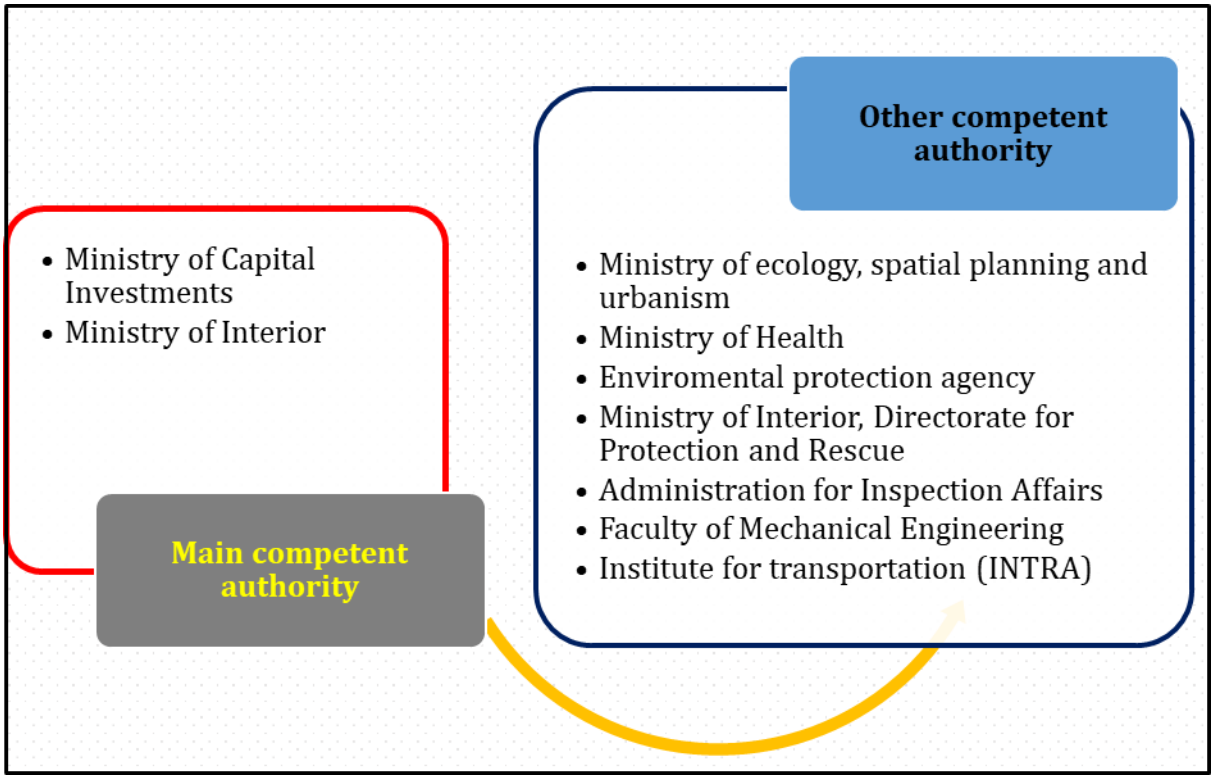

Figure 3. Institutional framework for transport of dangerous goods in Montenegro

Each undertaking, the activities of which include the consigning or the carriage of dangerous goods by road, or the related packing, loading, filling or unloading shall appoint one or more safety advisers for the carriage of dangerous goods, responsible for helping to prevent the risks inherent in such activities with regard to persons, property

and the environment. An adviser shall hold a vocational training certificate, valid for transport by road. That certificate shall be issued by the competent authority (i.e., Ministry of Interior). For training of drivers and persons participating in the carriage, packing, filling, loading or unloading of dangerous goods is responsible Institute for transportation (INTRA). However, there is a lack of organization who is responsible for training of safety adviser. Currently safety advisors have to go to the surrounding countries to acquire certificate.

Law on the transport of dangerous goods specifies supervision and enforcement in the transportation of dangerous. Detailed instructions regarding inspections are given only for general freight transport. According to this Law inspection is performed by the inspector for transport, with the assistance of a police officer. However, there is a lack of competences among police officers who have to perform control of transport of dangerous goods.

No matter how much the regulations in this area were respected, accidental situations are sometimes inevitable. When they occur, it is necessary to take all measures to minimize the consequences. That is why it is necessary to have adequate fire services, whose members have required knowledge and skills and possess modern firefighting equipment. Fire departments in Montenegro operate as a part of local institutions, which makes uniform training of their members difficult. However, it is possible to create a training program that will be coordinated in the territories of all local governments.

Vehicles for the transport of dangerous goods classified as EX/II, EX/III, FL, AT or MEMU have to meet additional requirements defined by ADR. Therefore, an ADR vehicle approval certificate is required for these types of vehicles. In Montenegro, this certificate is issued by the Control Body for Engines and Vehicles, which is part of the Faculty of Mechanical Engineering, with headquarters in Podgorica. The procedure of examination of vehicles for the transport of dangerous goods is shown in the Figure 4.

Figure 4. Procedure of examination of vehicle for transport of dangerous goods, Faculty of Mechanical Engineering, Podgorica

The recommendations of the European Commission have been highlighted by successive Directives related to transport of dangerous goods. However, little evident progress has been made on implementing the recommendations in secondary regulations on the transportation of dangerous goods in Montenegro. In addition, lack of competences and absence of human resources and effective cooperation among institutions presents a formidable barrier to progress in this area.

5.1.2 Road traffic safety issues

Road accidents continue to be a significant problem worldwide and it is very difficult to expect the roads to be completely risk-free in the near future. However, traffic engineers and planners put great effort into designing effective road safety measures that can provide the travelling of road users from origin to destination in safe conditions. However, in the period between 2010 and 2021 on Montenegrin roads in traffic accidents 27.129 people were injured and 715 killed. Figure 5 illustrates long-term trends in road fatalities in Montenegro since 2010. In general, data showed decreasing trend of the number of fatalities, and increasing trend of road fatalities. According to the latest data, 55 persons lost their lives in traffic accidents in Montenegro in 2021. This represents a 14.6% incline on 2020.

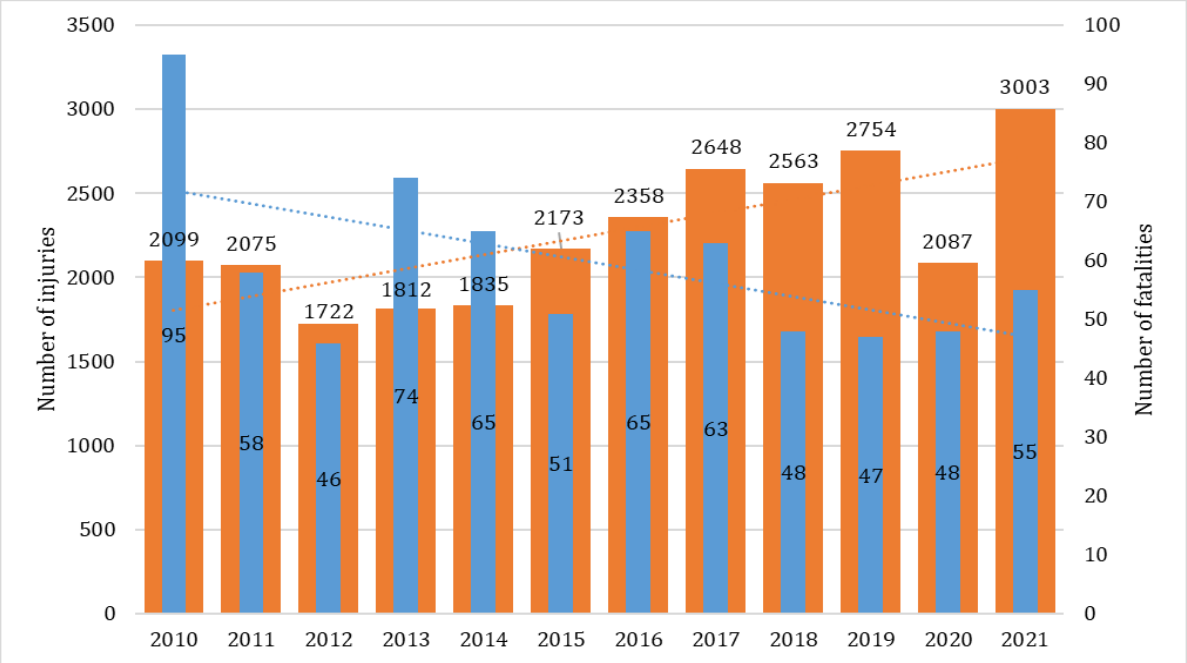

Figure 5. Road safety statistics in Montenegro, 2010 - 2021

Figure 6. shows comparative analysis of road fatalities per i million inhabitants in EU and Montenegro. Norway recorded the lowest fatality rate in recent decades among, with 14.8 fatalities per 1 million inhabitants in 2021. Nine countries had fatality rates below three in 2021: On the other side, Montenegro had fatality rate 3-4 times higher than best performing road safety countries. This fact suggests that road safety continue to be one of the most significant problems in Montenegro.

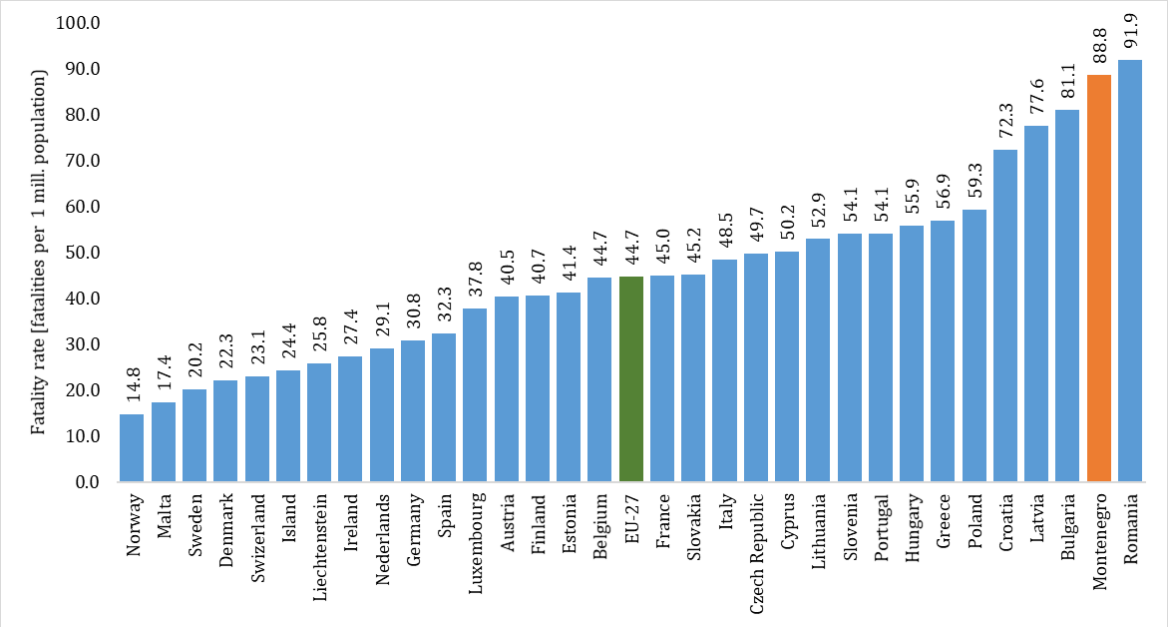

Figure 6. Road fatalities per 1 million inhabitants in EU and Montenegro, 2021 (Adapted from: ITF, 2022)

In order to examine the frequency of various forms of risky behaviour on roads, participants were asked whether they had participated in a certain behaviour in the last 12 months. These unsafe driving behaviours included following: speeding, using mobile phone, using vehicle restraint systems and driving under influence. Figure 7 displays the percentage of drivers who reported that they had participated in a particular behaviour in the last 12 months. The results of self-reported behaviour of car drivers showed that more than 84% of respondents reported that they always or often use a seat belt, while 65,6% of surveyed drivers stated that they often or always use child seats. Above 99% of drivers surveyed said that they never drove under the influence of drugs and 97% never or rarely drove under the influence of alcohol. When asked about fatigue and driving, over 94% of respondents said they never or rarely drove while tired (TRAFSAF, 2019)

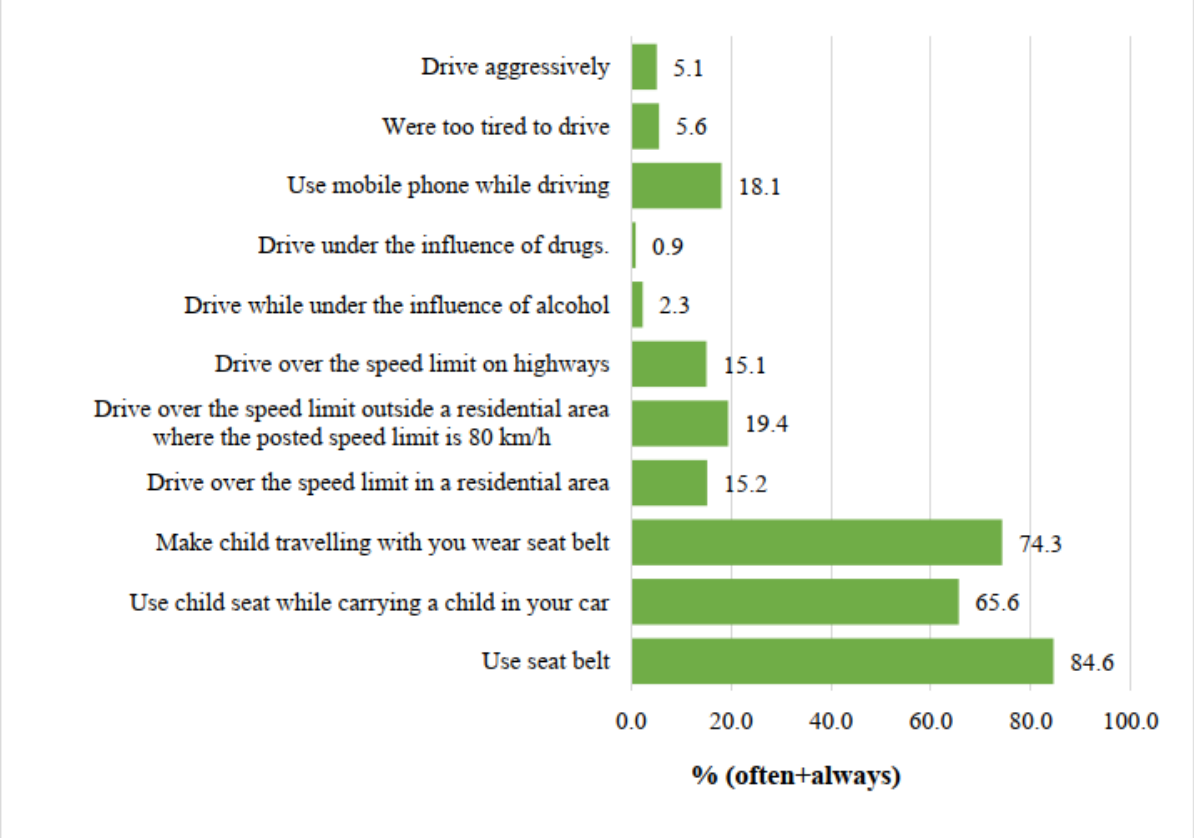

Figure 7. Self-reported driving behaviours in Montenegro (TRAFSAF, 2019)

In 2018, An International Road Assessment Programme (iRAP) has been completed, and 1853kms of road has been surveyed by a specialist vehicle. The results showed that only 2 % of roads (39.5 km) received a 4 or 5 star rating. In contrast, almost 55 % of roads (more than 1,000 km) received the worst rating of 1 star. A further 28 % (more than 500 km) of vehicle occupants received only 2 stars (Figure 8). Therefore, it can be concluded that the existing road network does not meet expected saftety requirements, especcialy

when it comes transport of heavy goods vehicles due to geometric characteristics of the roads.

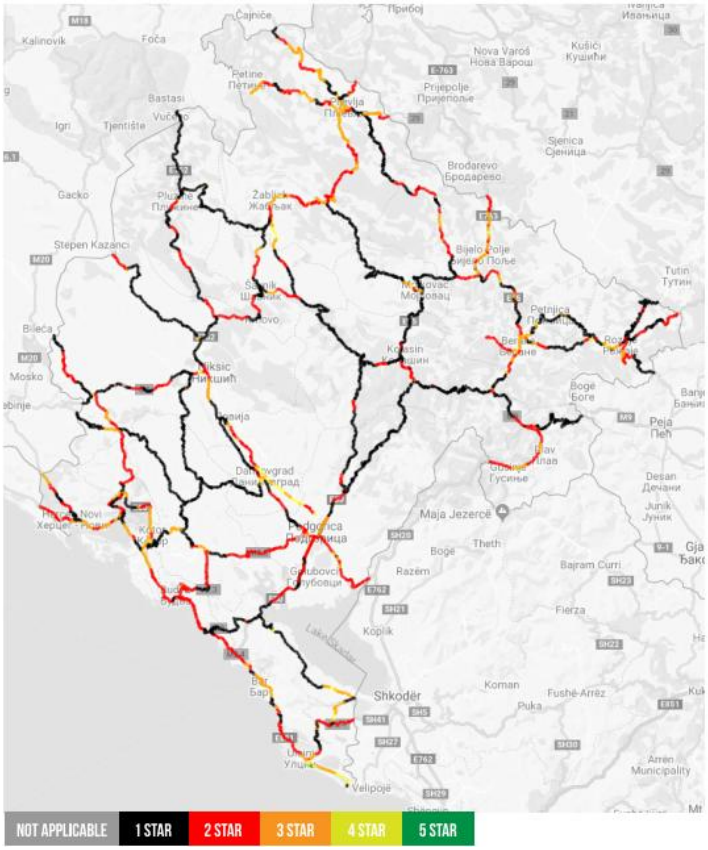

Figure 8. Safety characteristics of the state road network in Montenegro (MoCI, 2020)

Taking into account afore-mentioned statistics we can conlude that unsafe road infrastructure and risky driving behaviour presents main sources of the poor road safety performance in Montenegro.

5.1.3 Environmental issues arising from the transportation of dangerous goods

In the contemporary world, the permanent growth of the traffic volume and manufacturing, there is a need to transport hazardous materials that are necessary for certain needs. The classification of dangerous substances is very heterogeneous and each substance possess a certain risk for the environment and the population, and therefore it is necessary to focus attention on environmental and safety impact. What distinguishes the transport of dangerous goods from other types of transport are the consequences that can occur during unforeseen events such as traffic accidents or other incident situations. During incident situations, hazardous substances may spill or leak

onto the roadway, into the sewer or onto the ground. In such cases, these situations might lead to wider consequences, because it is not only the place where the incident took place that is at risk, but a much wider area, because air pollution, water courses, underground water, and land surfaces can be polluted.

Transport of hazardous materials, besides of being a threat to the environment, it is also a significant source of road noise pollution. It is well known that the noise pollution may have several adverse effects on health problems among people such as stress, disorders or hearing loss, sleep disorders, cardiovascular problems, etc. Sound is measured in decibels and a level above 65 dB is considered unacceptable. Average sound level and its duration over a period of time are usually used as indicators of noise. Previous research has revealed that the size of the vehicle does not significantly affect the amount of noise it emits during transport process. For example, trucks up to 5 tons (speed 30 - 60 km/h) for local transport emit 64 dB, while trucks of 9 tons (speed 60 - 90 km/h) for long-distance transport emit a noise level of 67 dB during a one-hour period in which 1.000 tons are transported (OECD, 1997). Therefore, this implies that for a given amount of cargo transported across a particular point, the dimensions of the heavy goods vehicle do not make a great difference regarding level of noise. In this case, context (e.g., urban or rural roads) and the volume of traffic are more prominent factors. Taking into account that dangerous goods often have to be transported throughout urban areas, as well as fact that the share of dangerous goods (in tonne-kilometres) make up significant amount of transported in Montenegro, problem is much bigger than it seems (Monstat, 2022).

Air pollution is a significant problem faced by many countries, and traffic-related air pollution is emission factor that to a large extent degrades the situation. In 2016, in order to assess the impact of air pollution on the health of Montenegrin population, an analysis of existing data on air quality was carried out for the municipalities of Podgorica, Nikšić and Pljevlja. The methods recommended by the WHO were used to check health risks. The results of the analysis indicate excessive air pollution during the winter months, which can be attributed to the burning of solid fuels for household heating and weather conditions that reduce the dispersion of pollution (Krzyzanowski, 2016). The analysis of data on the concentration of PM10 particles showed that the annual average concentrations of these particles are approximately two times higher in Pljevlja than in Podgorica or Bar. In addition, in all municipalities, the average annual values of PM10 particle concentrations (20 $\mu g/m^3$) were exceeded. According to this study, results indicated that between 64 and 217 days a year, the mean daily concentrations of PM10 particles (>50 $\mu g/m^3$) in the municipalities of Pljevlja, Podgorica and Nikšić were higher than allowed by the EU Directive (i.e., 35 days a year). Furthermore, an average annual concentrations of PM2.5, measured in four cities (but

not in Podgorica) during 2012-2014, were also higher than the cut-off values (i.e., EU of 25 µg/m^3 and WHO AQ of 10 µg/m^3). Figure 9. shows the average annual values of PM10 particles for the period 2009 - 2014.

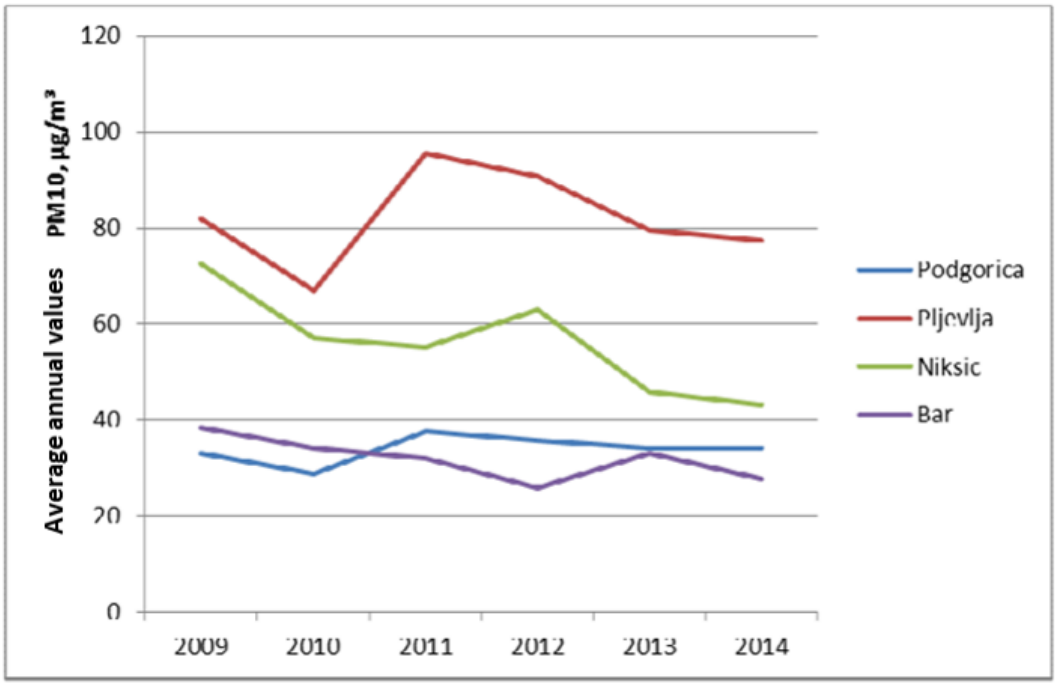

Figure 9. Average annual PM10 values in four municipalities in Montenegro from 2009 to 2014, (Adapted from: Krzyzanowski, 2016)

The main sources of pollution are related to the commercial, institutional and residential sectors with about 50% of primary PM2.5 and about 20% of PM10 in Montenegro. NOx emissions from road transport, outside of contributing to the secondary composition of PM, it also directly affects the health of the local population (Figure 10).

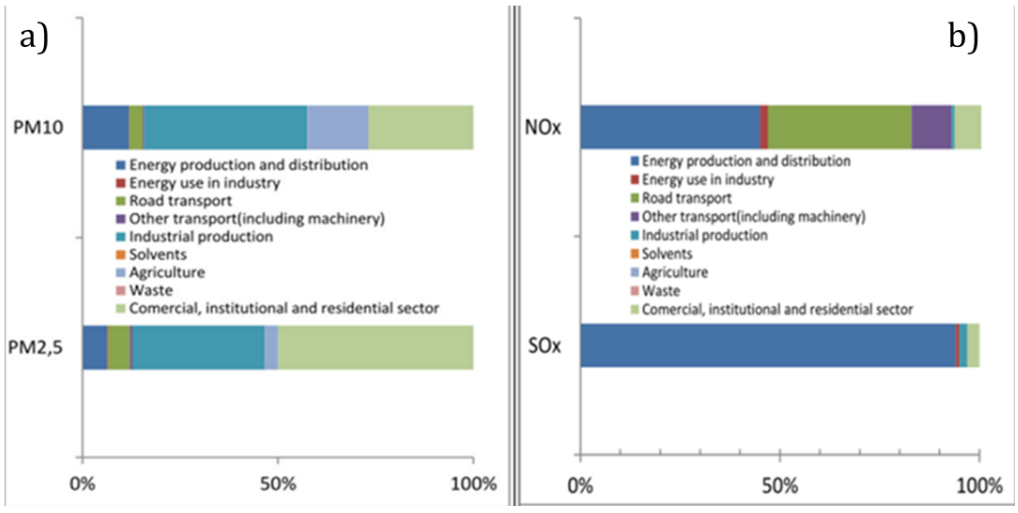

Figure 10. Percentage of the emission of (a) primary and (b) precursors of secondary particles

by sectors in Montenegro in 2010 (Krzizanovski, 2016)

Nowacki et al. (2016) carried out study to assess the risk of the transport of hazardous materials in the EU and Poland. According to their results, transport of hazardous materials in Poland is mainly performed by road (87.5%) and rail (12.5%). Similarly, they found that in the majority EU countries more than half of the transport of dangerous goods was completed on their national territory. As reported by Polish Central Statistical Office, in 2013, it was 155.31 million tons of dangerous goods transported by road, often representing lethal threat. As stated by Polish the Road Transport Inspection data, in 2011, inspectors checked more than 16 thousand vehicles carrying hazardous materials. The most common violations consisted of by passing restrictions on drivers' driving times and mandatory rest periods, lack of fire-fighting equipment in vehicles, poor labelling of goods and lack of required transport certificates and documents. Similar results were revealed in analysis of road accident involving vehicles transporting dangerous goods. Namely, these accidents were caused mainly by changes in the tankers and containers environment during transportation (such as temperature, humidity, pressure, etc.) or a mixture of goods caused by a chemical reaction and lead to combustion, explosion, toxic gas leaks, etc.

One of the strategic measures to diminish pollution in Montenegro can be related to reduction of the environmental impact of freight transport, especially transport of dangerous goods. However, according to best of our knowledge, there are no available official data that might be useful in order to quantify the adverse effects of the transport of hazardous materials in Montenegro.

5.1.4 Health issues related to the transport of dangerous goods

The aforementioned study conducted by Krzyzanowski (2016) in three Montenegrin municipalities (i.e., Podgorica, Nikšić and Pljevlja) indicates that the impact of air pollution on health is more common in the municipality of Pljevlja compared with the others. If we take into consideration the larger number of inhabitants in Podgorica and Nikšić, the impact of air pollution on health (expressed through the number of premature deaths, lost years of life and the number of hospitalizations) is similar to that in Pljevlja. The focus of the analysis was on population aged 30 and over. Although data on risk factors and mortality rates (for the period 2010 - 2012) were obtained from the Institute of Public Health, it was not verified as official data by authorized institutions. The results of this study indicated that over 250 premature deaths and 140 hospital admissions per year are associated with exposure to particles that exceed the recommended values. Natural deaths that can be attributed to air pollution comprised

approximately 6% in Podgorica, 12% in Nikšić and 22 % in Pljevlja. In 2011, it was estimated that 482 (i.e., between 317 and 634) premature deaths could be attributed to exposure to PM2.5. These particles lead to cardiovascular diseases and have also been found to be carcinogenic to humans. PM10 particles contribute to respiratory diseases and increase mortality rate. Deaths attributed to air pollution and resulting from cardiovascular diseases accounted for approximately between 68% (in Podgorica) and 80% (in Pljevlja).

Emissions of exhaust gases, especially from diesel engines, contribute significantly to the increase in the concentration of suspended particles and nitrogen oxides, which, besides of direct harmful effects on human health, contribute to the creation of ozone, which is an extremely reactive gas. Premature mortality attributed to ozone exposure in Montenegro is similar to that in neighboring countries, but higher than the EU28 average. However, there are no available data that indicate the magnitude of health problems associated with transport of dangerous goods in Montenegro.

5.2 Kosovo

5.2.1 Human and institutional capacity weakness

Human and institutional capacity weaknesses can contribute to key issues in the transportation of dangerous goods (TDG) and include:

Lack of training and expertise: Insufficient training of personnel involved in TDG, including shippers, carriers, and emergency responders, can lead to incorrect classification, packaging, and handling of dangerous goods.

Inadequate infrastructure and equipment: A lack of proper infrastructure and equipment for TDG, such as insufficient storage facilities and inadequate emergency response equipment, can increase the risk of accidents and incidents.

Poor enforcement and compliance: Weaknesses in enforcement and compliance mechanisms can result in a lack of adherence to regulations and standards, increasing the risk of accidents and incidents.

Insufficient resources: Inadequate funding and resources can limit the ability of governments and organizations to effectively regulate and manage TDG, including investments in training, infrastructure, and enforcement.

Management: A lack of coordination and cooperation among different levels of government and between different countries can result in conflicting regulations and a lack of harmonization, making it difficult to ensure consistent and effective TDG regulation.

Addressing these human and institutional capacity weaknesses is critical to ensuring the safe and efficient transport of dangerous goods and minimizing the risk of accidents and incidents.

5.2.2 Road traffic safety issues

Road traffic safety is a major concern in many countries and has significant impacts on public health and the economy. Some of the key road traffic safety issues include:

Traffic accidents and fatalities: Traffic accidents result in significant numbers of deaths and injuries each year and are a major public health problem globally.

Speeding and reckless driving: Speeding and reckless driving are major contributors to road traffic accidents and increase the risk of collisions and other incidents.

Distracted driving: Distracted driving, such as using a cell phone while driving, is a growing problem and can significantly increase the risk of accidents.

Impaired driving: Driving under the influence of drugs or alcohol is a major road safety issue, and can result in impaired judgment, reaction time, and coordination.

Poor road infrastructure: Poor road infrastructure, including poor signage, road design, and lighting, can contribute to road traffic accidents and increase the risk of collisions.

Lack of enforcement: A lack of enforcement of road safety regulations, such as traffic laws and seat belt laws, can result in dangerous driving behavior and increase the risk of accidents.

To address these road traffic safety issues, it is important to implement effective road safety policies and regulations, improve road infrastructure, and provide education and awareness programs to promote safe driving behavior. Additionally, the use of advanced technologies, such as autonomous vehicles, can help to reduce the risk of accidents and improve road traffic safety.

5.2.3 Environmental issues arising from the transportation of dangerous goods

The transportation of dangerous goods (TDG) can result in a number of environmental issues, including:

Spills and leaks: Accidents involving TDG can result in the release of hazardous substances into the environment, causing harm to wildlife, habitats, and human health.

Air pollution: The release of emissions from TDG vehicles can contribute to air pollution, which can have adverse effects on human health and the environment.

Soil contamination: Soil can become contaminated by the leakage of dangerous goods from transport vehicles, storage facilities, or handling sites.

Water pollution: Dangerous goods can be released into waterways as a result of spills or leaks, contaminating water sources and harming aquatic life.

Climate change: TDG can contribute to climate change through the release of greenhouse gases from vehicles and the generation of energy required to transport goods.

It is important to mitigate these environmental impacts by implementing effective TDG regulations and management practices, including the use of safe packaging and handling techniques, the provision of adequate emergency response measures, and the development of alternative modes of transportation.

5.2.4 Health issues related to the transport of dangerous goods

The transportation of dangerous goods (TDG) can have significant impacts on human health, including:

Exposure to hazardous substances: People who work in TDG or live near transportation routes can be exposed to hazardous substances as a result of accidents, spills, or leaks.

Respiratory problems: Exposure to air pollutants from TDG vehicles can result in respiratory problems, such as asthma and bronchitis.

Cancer and other illnesses: Long-term exposure to certain hazardous substances can increase the risk of developing cancer and other illnesses.

Psychological impacts: Communities near TDG routes may experience anxiety and stress due to the risk of accidents and exposure to hazardous substances.

Emergency response: Emergency responders, such as firefighters and medical personnel, may be at increased risk of exposure to hazardous substances in the event of an accident or incident involving TDG.

It is important to minimize the risks to human health associated with TDG through the implementation of effective regulations and management practices, including the

use of safe packaging and handling techniques, the provision of adequate emergency response measures, and the development of alternative modes of transportation.

5.3 Bosnia and Herzegovina

5.3.1 Human and institutional capacity weakness

The general assessment of human and institutional capacities in the field of transport of dangerous goods in Bosnia and Herzegovina is not at a satisfactory level. The absence of the Law on the transport of dangerous goods at the national level would clearly define the key institutional entities of the system, their competencies, and responsibilities, as well as the responsibilities of entity regulations and competencies. Defining the institutional framework would also condition the need for ensuring adequate personnel and technical-technological capacities as mechanisms for successful organization and management in the system of transport of dangerous goods.

The issue of transport of dangerous goods in Bosnia and Herzegovina is treated differently depending on the class of dangerous goods. Thus, for certain areas, there is a clearly defined institutional framework, i.e. competent institutions whose activities are specified by the appropriate regulations, while certain areas are still not regulated.

The Armed Forces of Bosnia and Herzegovina transport dangerous goods for their own purposes in accordance with the Rulebook on the Manner of Transport of Dangerous Goods in the Ministry of Defence and the Armed Forces of Bosnia and Herzegovina ("Official Gazette of B&H", No. 2/14).

Police Force Ministry of Interior FB&H and the transport of dangerous goods for their own purposes is carried out in accordance with the adopted law from the former state, i.e. the Law on Transport of Dangerous Goods "Official Gazette of the SFRY" No. 27/90. The forces of the Federal Civil Protection Administration, in cooperation with the Federal Ministry of Interior, implement measures of protection against unexploded ordnance during the transport of the same.

All activities related to the transport of class 7 dangerous goods (radioactive substances) are carried out in accordance with the Law on Radiation and Nuclear Safety in Bosnia and Herzegovina ("Official Gazette of B&H", No. 88/07) and bylaws adopted pursuant to that Law: Rulebook on Limits Beyond which Persons May Not Be Exposed to

Radiation ("Official Gazette of the Federation of B&H", Br. 8/04) and the Rulebook on Notification and Authorization of Activities related to Ionizing Radiation ("Official Gazette of the Federation of B&H", No. 64/03). State bodies, legal entities, and natural persons from the territory of the Federation engaged in the trade of radioactive substances are obliged to achieve direct cooperation with the State Regulatory Agency for Radiation and Nuclear Safety.

Transport of dangerous goods from Class 1 (explosive substances and objects with explosive substances) is carried out in accordance with the Law on Control of the Movement of Weapons and Military Equipment ("Official Gazette of B&H", No. 53/09 and 22/16) and subordinate regulations: Rulebook on the manner and procedure of processing applications for the issuance of authorizations for the movement of weapons as well as the scope of verification of applications (Official Gazette B&H, No. 95/16) and the Rulebook on the Manner and Procedure of Supervision and Control over the Implementation of the Law on Control of the Movement of Arms and Military Equipment (Official Gazette of B&H, No. 95/16).

Transport of oil and petroleum products belonging to class 3 dangerous goods (flammable liquid substances) is regulated by the Law on Petroleum Products in the Federation of Bosnia and Herzegovina ("Official Gazette of the FB&H", No. 52/14).

With regard to the administrative and territorial regulations in Bosnia and Herzegovina, there are cases of non-compliance of current and current regulations in the field of transport of dangerous goods. For this reason, it is necessary to harmonize and adopt a single comprehensive law on the transport of dangerous goods at the national level.

Thus, in the territory of the Federation of Bosnia and Herzegovina, in practice and activities related to the transport of dangerous goods, the determinants of the adopted law from the former state, i.e. the Law on the Transport of Dangerous Goods ("Official Gazette of the SFRJ" No. 27/90), which does not have clearly prescribed bylaws and regulations regulating issues such as the regulation on determining road routes for the transport of dangerous goods, are used, as well as the time of movement for the appropriate class of hazardous substances and the conditions for determining the place for stopping and parking vehicles with associated equipment and signaling for the appropriate class of dengerious substances.

The non-compliance of existing regulations at different levels is reflected in the fact that one canton (West Herzegovina) as a lower level of government has adopted the Law on transport of dangerous goods with accompanying regulations, while at the state level such a law does not exist, but the downloaded and outdated Law on transport of dangerous goods from the former Yugoslavia is used, which in certain segments is not aligned with the determinants of ADR.

Institutions in Bosnia and Herzegovina that deal with the issue of transport of dangerous goods and which are responsible for the implementation and implementation of rules and procedures for safe and regulated transport of dangerous goods, and for ensuring the protection of the environment and people, are:

- Ministry of Communications and Transport of Bosnia and Herzegovina.
- State Regulatory Agency for Radiation and Nuclear Safety.
- Federal Ministry of Internal Affairs - responsible for regulating and supervising the safety of transport of dangerous goods in the FB&H entity.
- Ministry of Internal Affairs of the West Herzegovina Canton (classes 2, 3, 4, 5, 6, 8, 9.
- Ministry of Internal Affairs of the Republic of Srpska (class 1-9) - responsible for regulating and supervising the safety of transport of dangerous goods in the Republic Srpska entity.
- Environmental Protection Agencies - responsible for monitoring and controlling the impact of transport of dangerous goods on the environment and human health.
- Inspection bodies - responsible for checking and supervising whether participants in transport comply with regulations and standards for the transport of dangerous goods in Bosnia and Herzegovina.
- Police agencies - responsible for ensuring road safety and controlling the transport of dangerous goods, and for responding in case of incidents or accidents.
- Institutes for Standardization - responsible for the application of international regulations and standards for the transport of dangerous goods in Bosnia and Herzegovina.

A complex political system with multiple levels of government in Bosnia and Herzegovina can be an obstacle to more efficient management of the transport of dangerous goods. Different levels of government have different responsibilities and powers in regulating and supervising the safety and security of the transport of dangerous goods, which can lead to inconsistencies in regulations and standards, and to difficulties in coordination and cooperation between different institutions. In addition, the complex political system includes various local self-government units, which further complicates the matter and can lead to inconsistencies in the regulation and supervision of the safety and security of the transport of dangerous goods.

A fundamental basis for the creation of a single law on the transport of dangerous goods and accompanying regulations should be ADR – "European Agreement on the International Carriage of Dangerous Goods by Road". Because ADR is updated and

updated very often, the main problem in Bosnia and Herzegovina is the lack of up-to-date national regulations.

The right to training and professional training of drivers for the transport of dangerous goods in Bosnia and Herzegovina may vary depending on the level of government and certain institutions responsible for regulating and supervising the safety of the transport of dangerous goods. It is important to note that for the transport of dangerous goods must adhere to regulations and standards for safe transport, in order to ensure the protection of the environment and people.

In Bosnia and Herzegovina, the right to training and vocational training of drivers for the transport of dangerous goods can be attributed to the following institutions:

- Federal Ministry of Internal Affairs - responsible for regulating and supervising the safety of transport of dangerous goods at the federal level.
- Ministry of Transport and Communications of the Republic of Srpska - responsible for regulating and supervising the safety of transport of dangerous goods at the level of the RS entities.
- Professional institutions and educational institutions - responsible for training and certification of drivers transporting dangerous goods, and for ensuring that they comply with regulations and standards for the safe and safe transport of dangerous goods.

Professional training of drivers for the transport of dangerous goods in the territory of the Federation of Bosnia and Herzegovina is carried out by institutions authorized by the Federal Ministry of Internal Affairs – Federal Police Administration, namely:[15] Institute for Occupational Safety ltd Sarajevo, Institute "Kemal Kapetanović", Institute for Protection and Ecology Zenica, Promet Mid d.o.o. Kiseljak, Inzio d.o.o. Tuzla, Mining Institute d.d. Tuzla, Institute for Safety and Environment d.d. Tuzla and Vita Plus, PU Centre for Adult Education Cazin.

Professional training of drivers for the transport of dangerous goods in the territory of the Republic of Srpska is carried out by institutions authorized by the Ministry of Internal Affairs of the Republic of Srpska: company "Automotive center – vehicle center" ltd. Sarajevo and the University of East Sarajevo, Faculty of Transport and Traffic Engineering Doboj authorized to conduct professional training of motor vehicle drivers for the transport of dangerous goods.

[15] Federalna uprava policije http://fup.gov.ba/?page_id=18418

Izvor: https://unece.org/country-information-competent-authoritiesnotifications

Figure 11: Driver training ADR certificate models

Training of all persons involved in the transport of dangerous goods regarding safety and environmental protection is essential. Active cooperation with freight forwarders, retailers, and customers to ensure safety and safety at work during loading, during transport and unloading of dangerous goods. Prescribing emergency measures for employees and customers in the event of an accident, and regular examination of all transport processes and means of transport.

It is necessary to establish a uniform and clear regulation for the transport of dangerous goods, as well as to strengthen coordination and cooperation between different institutions.

5.3.2 Road traffic safety issues

Traffic safety and safety are conditioned by the volume of traffic and transport, as well as measures are taken on preventive action in preventing the occurrence of dangerous traffic situations.

The volume of goods and transport in the territory of Bosnia and Herzegovina in 2020 is shown in Tables 1 and 4, which includes the transport of dangerous goods. In tables 2, 3 and 5, data on the types and consequences of traffic accidents in Bosnia and Herzegovina in road and rail traffic are presented.

Table 1. Transport by type of goods in 2019 and 2020_Road transport

Type of goods	Transported goods, 000t		Tonne-kilometers, 000tkm	
	2019	2020	2019	2020
01. Products of agriculture, hunting, and forestry; fish and other fishing products	311	412	166563	202187
02. Coal and lignit; crude petroleum and natural gas	933	804	112016	118744
03. Meal ores and other mining and quarrying products; peat; uranium and thorium	569	519	102362	81293
04. Food products, beverages and tobbacco	652	781	449917	199416
05. Textiles and textile products; leather and leanther products	313	245	231074	673220
06. Wood and products of wood and cork (except furniture); articles of straw and plaiting materials; pulp; paper and paper products; printed matterial and recorded media	996	1140	581943	673220
07. Coke, refined petroleum products	282	259	99057	99120
08. Chemicals, chemical products, and man-made fibres; rubber and plastic products; nuclear fuel	503	356	310256	184531
09. Other non-metalic mineral products	1275	1142	170907	108554
10. Basic metals; fabricated metal product, except machinery and equipment	334	291	21170	190555
11. Machinery and equipment n.e.c.; office machinery and computers; electrical machinery and apparatus n.e.c.; radio, television and communication equipment and apparatus; medical; precision and optical instrument; watches and clocks	236	231	160673	151999
12. Transport equipment	75	61	62385	41098
13. Furniture; other manifactured goods n.e.c.	268	371	213903	237685
14. Secondary raw materials; municipal wastes and other wastes not specified elsewhere in CPA	141	194	133379	139061
15. Mail, parcels	0	2	0	1808
16. Equipment and material utilised in the transport of goods	29	10	26745	9055
17. Goods movede in the course of household and office; baggage transported seperatly grom Passengers; motor vehicles being moved for repair; other non-market goods n.e.c.	13	20	11928	22128
18. Grouped goods; a mixture of types of goods which are transported together	339	536	254917	370362
19.Unidentifable goods. Goods which for any reason can't be indentified and therefor can't be assigned to groups 01-16	542	242	340989	175714
20. Other goods n.e.c.	1455	1253	739357	520097
Total	9266	8869	4380071	3901256

Source: Saobraćaj 2021_TRA_00_2021_TB_1_BS.pdf, str 28. Thematic bulletin ISSN 1986-104X Agency for Statistics of B&H, Sarajevo, Bosnia and Herzegovina

Table 2. Road traffic accidents

	2015	2016	2017	2018	2019	2020
Total	38282	39104	37357	36541	34313	29678
With material damage	30646	31638	29960	30347	27184	23361

Source: Saobraćaj 2021_TRA_00_2021_TB_1_BS.pdf, str 33. Thematic bulletin ISSN 1986-104X Agency for Statistics of B&H, Sarajevo, Bosnia and Herzegovina

Table 3. Killed and injured persons in road traffic accidents

	2015	2016	2017	2018	2019	2020
Total	10998	11376	10312	10666	10214	8820
Killed	337	318	291	279	257	243
Injured	10661	11058	10021	10387	9957	8577

Source: Saobraćaj 2021_TRA_00_2021_TB_1_BS.pdf, str 33. Thematic bulletin ISSN 1986-104X Agency for Statistics of B&H, Sarajevo, Bosnia and Herzegovina

Table 4. Transport by type of goods in 2020_Railway

Type of goods	Transported goods, t	Tonne-kilometers
01. Products of agriculture, hunting, and forestry; fish and other fishing products	1	114
02. Coal and lignit; crude petroleum and natural gas	5807	439233
03. Meal ores and other mining and quarrying products; peat; uranium and thorium	3092	342628
04. Food products, beverages and tobbacco	230	39542
05. Textiles and textile products; leather and leanther products	0	0
06. Wood and products of wood and cork (except furniture); articles of straw and plaiting materials; pulp; paper and paper products; printed matterial and recorded media	108	6362
07. Coke, refined petroleum products	475	47400
08. Chemicals, chemical products, and man-made fibres; rubber and plastic products; nuclear fuel	536	56730
09. Other non-metalic mineral products	185	9947
10. Basic metals; fabricated metal product, except machinery and equipment	397	35419
11. Machinery and equipment n.e.c.; office machinery and computers; electrical machinery and apparatus n.e.c.; radio, television and communication equipment and apparatus; medical; precision and optical instrument; watches and clocks	2	0
12. Transport equipment	301	20616
13. Furniture; other manifactured goods n.e.c.	1	196
14. Secondary raw materials; municipal wastes and other wastes not specified elsewhere in CPA	269	30901
15. Mail, parcels	0	0
16. Equipment and material utilised in the transport of goods	3	205
17. Goods movede in the course of household and office; baggage transported seperatly grom Passengers; motor vehicles being moved for repair; other non-market goods n.e.c.	0	0

18. Grouped goods; a mixture of types of goods which are transported together	0	0
19. Unidentifable goods. Goods which for any reason can't be indentified and therefor can't be assigned to groups 01-16	0	0
20. Other goods n.e.c.	8	999
Total	11414	1030294

Source: Saobraćaj 2021_TRA_00_2021_TB_1_BS.pdf, str 14. Thematic bulletin ISSN 1986-104X Agency for Statistics of B&H, Sarajevo, Bosnia and Herzegovina

Table 5. Accidents and victimes in railway transport

	Accidents		Killed		Injured person	
	2019	2020	2019	2020	2019	2020
Total	12	97	4	9	21	7
Collisions of trains	2	0	0	0	0	0
Derallments	9	4	0	0	0	0
Accidents involving level crossing	7	2	3	4	12	2
Accidents to persons coused by rolling stock in mot.	3	7	0	4	3	2
Fire in rolling stock	1	1	0	0	0	0
Other	10	53	1	1	6	3

Source: Saobraćaj 2021_TRA_00_2021_TB_1_BS.pdf, str 15. Thematic bulletin ISSN 1986-104X Agency for Statistics of B&H, Sarajevo, Bosnia and Herzegovina

It is of utmost importance in the execution of the transport of dangerous goods to define the obligations of each participant in the transport process from the aspect of safety and safety, i.e., defining the obligations that are necessary for the supplier, carrier, recipient, and driver of the motor vehicle. In addition to the obligations of these participants, the obligations should be fulfilled by a safety and safety advisor who plays a major role in preventing the occurrence of an incident situation and educating drivers within the transport company.

The transport of dangerous goods has a potential risk to safety and safety, regardless of whether the transport is carried out by road, rail, water, or air transport and transport. However, when it comes to the transport of dangerous goods on the roads, the risk of accidents is higher, due to the larger number of vehicles and environments, i.e., settlements through which significant road routes most often pass.

In Bosnia and Herzegovina, on the national level, safety and safety in the transport of dangerous goods on the roads is an issue that is treated in the Law on the Basics of Road Traffic Safety in Bosnia and Herzegovina, the Law on International and Inter-Entity Road Transport, and bylaws: The Rulebook on Dimensions, Total Mass and Axle Load of Vehicles, On Devices and Equipment That Vehicles Must Have and On The Basic Conditions That Must Be Met by Road Traffic Devices and Equipment, Regulation on

technical inspections of vehicles, Rulebook on vehicle approval and Rulebook on vehicle certification and conditions that vehicle certification organizations must meet.

As in other countries, there are certain risks in Bosnia and Herzegovina that can occur during the transport of dangerous goods. These risks include accidents, fires, explosions, leaks, and environmental pollution. Managing these risks requires the application of certain standards and procedures for the transport of hazardous goods, as well as the application of appropriate technology and equipment. In this regard, it is necessary to ensure that drivers driving vehicles for the transport of dangerous goods have appropriate training and knowledge on the transport of dangerous goods, as well as that they comply with all laws and regulations relating to the transport of dangerous goods. It is also necessary to ensure that vehicles used for the transport of hazardous goods meet the appropriate standards and technical requirements.

In Bosnia and Herzegovina, competent authorities, such as the Ministry of Internal Affairs and Inspection Bodies", carry out inspections and controls to ensure safety in the transport of dangerous goods on the roads. However, as in other countries, there are sometimes problems in the application of laws and regulations, as well as in the lack of human and technical resources for effective control. Safety in the transport of dangerous goods on the roads in Bosnia and Herzegovina is an important problem that requires continuous attention and supervision, to ensure the safety of passengers and reduce the risk of accidents and environmental pollution. It is necessary to strengthen regulations and inspection controls, as well as raise awareness of safety in the transport of dangerous goods.

When it comes to the transport of dangerous goods, there are specific problems related to different types of hazardous substances. Problems that may arise when transporting certain types of hazardous goods in Bosnia and Herzegovina:

- Explosive substances: The transport of explosive materials is particularly risky, as there is a high risk of accidents and explosions. This problem can be alleviated by applying appropriate procedures for packing, manipulation, and transport of explosive materials, as well as by adequate driver training.
- Chemical substances: Transportation of chemical materials may be risky due to the possibility of leakage and contamination of the environment. In addition, some chemical substances can be dangerous to human and animal health. Therefore, it is important to ensure that chemical substances are transported in appropriate containers, which are well-sealed and meet the prescribed standards.
- Radioactive materials: The transport of radioactive materials is particularly risky, as these materials are characterized by a high danger to human health and the environment. Therefore, it is important that the transport of radioactive materials is carried out in

accordance with strict procedures and standards, and drivers must have adequate training and knowledge of handling these materials.
- Fuels and gases: Transporting fuels and gases also pose a risk, as these materials are flammable and can cause fire or explosion. For this reason, it is important to ensure that vehicles carrying fuels and gases meet the appropriate technical requirements and standards, and drivers must be well-trained and educated about handling these materials.

Vehicles carrying dangerous goods must undergo special inspections to ensure that they are correct and safe for the transport of dangerous goods. These inspections are carried out in accordance with the specific regulations defined in the laws and regulations for the transport of dangerous goods. The method of inspection of vehicles intended for the transport of dangerous goods must be based on the instructions and rules defined by the relevant ADR agreement. In the regulations of Bosnia and Herzegovina, there are elements that define the ways and procedures necessary for inspections and fulfillment of the conditions for vehicles transporting dangerous goods, namely: the Rulebook on technical inspections of vehicles, the Rulebook on vehicle approval and the Rulebook on vehicle certification and the conditions that vehicle certification organizations must meet.

By analyzing the current situation and circumstances under which the transport of dangerous goods takes place in Bosnia and Herzegovina, it is possible to identify certain priority problem areas that need to be treated to improve:
- Improving personnel capacities, and training drivers and other actors involved in the process of transporting dangerous goods.
- Training and improving the knowledge and skills of personnel involved in the control of the roadworthiness of vehicles for the transport of dangerous goods.
- Improving the technical and technological capacities of entities involved in the control and inspection supervision of the process of transport of dangerous goods.
- Creating a risk management system in the transport of dangerous goods, which will be based on the creation of a database and keeping records of carriers, drivers, vehicles, cargo, infrastructure, weather, and environmental conditions.
- Improving the operation of emergency medical services and rescue services after traffic accidents involving vehicles for the transport of municipal materials.
- Implementation of detailed recording of data on traffic accidents with vehicles for the transport of dangerous goods, to use them for preventive action.
- Improving elements of traffic infrastructure on the road network with the identification of risky segments such as bridges, passes, tunnels, "bottlenecks", sections that do not have alternative routes, etc.

5.3.3 Environmental issues arising from the transportation of dangerous goods

The transport of dangerous goods plays an important role in modern society, as they are transported in large quantities between different locations. However, the transport of these substances has the potential to lead to environmental pollution and other environmental problems.

Some of the most common environmental problems arising because of the transport of dangerous goods:

- Land pollution: Empty packaging of hazardous substances can end up in garbage dumps, which can cause soil contamination. If the soil is contaminated, groundwater pollution may occur, which can affect the quality of drinking water in the area.
- Water pollution: In the event of an accident or leakage of hazardous substances during transportation, liquids may be poured into surrounding bodies of water, which can cause water pollution. If this happens, consequences such as plant and animal deaths, reductions in fish stocks, water supply difficulties, and health problems for people who drink polluted water are possible.
- Air pollution: Dangerous substances transported by road can be highly toxic and can emit gases that pollute the air. This can affect air quality in surrounding areas and cause health problems for people breathing polluted air.
- Improper disposal: Empty packaging and other hazardous material residues can be discarded in inappropriate places, which can lead to serious environmental problems. For example, if empty packaging of hazardous chemicals is disposed of in a public place, it can pose a danger to people and animals in the area.

Significant amounts of production waste can occur in transport daily. Production waste is generated in the production process and is no longer suitable for returning to the production process. It consists of various unstable substances of organic and inorganic origin, and according to its characteristics, it is divided into dangerous waste and non-dangerous waste.

Table 6. Total annual waste from production activities in the FB&H and the share of non-hazardous and hazardous waste in total waste quantities

Year	Amount of waste from production activities		
	Total (t)	Of these, the amount of non-dangerous waste (t)	Of these, the amount of dangerous waste (t)
2010	12 759 109	12 753 381	5 728
2011	15 641 871	15 637 674	4 197
2012	17 789 448	17 781 409	8 039
2014	18 131 658	18 125 041	6 617
2016	15 056 409	15 046 683	9 726
2018	36 399 591	36 390 598	8 993

Source: Fond za zaštitu okoliša: Izvještaj o zštiti okoliša, 2022. http://fzs.ba/index.php/publikacije/statisticki-godisnjaciljetopisi/

Everything should be done to reduce the impact of the transport of dangerous goods on the environment. This includes strict enforcement of regulations on the transport of hazardous goods, conducting regular inspections to ensure that all involved in transport adhere to laws and norms, and ensuring control over how waste is disposed of.

The transport of dangerous goods does not have a special impact on the environment if the prescribed procedures such as packaging, protection, insurance, selection of the appropriate means of transport, insurance of other required conditions are followed, etc. However, in the process of transport itself, there is always a risk of arising unwanted situations and this risk cannot be completely eliminated. The risk of unintended consequences during the transport of dangerous goods is particularly characteristic of traffic conditions, development, and characteristics of the road network in Bosnia and Herzegovina. Therefore, the highest traffic load was recorded on the main roads that make up the largest share and are the basis of the road network of Bosnia and Herzegovina. The most important main road routes are located right next to the riverbeds and pose a particularly pronounced risk in case of possible accidents with the participation of vehicles for the transport of dangerous goods. The most important main routes pass through the central cores of the largest cities in Bosnia and Herzegovina, which also poses a particularly pronounced risk in case of possible accidents. A particular problem is the fact that for certain sections and segments of the trunk road network, there are no adequate and safe alternative routes. This problem can especially come to the fore in case of the inability of rescue teams to access the locations where accidents in the transport of dangerous goods occurred when it is necessary to carry out an urgent reaction and take measures to repair damages and prevent serious consequences.

5.3.4 Health issues related to the transport of dangerous goods

The transport of dangerous goods can pose a risk to the health of workers involved in this process, as well as to the population and the environment near the accident site. When dangerous goods are transported on the roads, accidents and accidents can occur that can endanger people's lives and health and can also have long-term consequences for the environment. Dangerous substances can be toxic, flammable, explosive, corrosive or radioactive. They can cause various health problems such as eye and skin irritation, suffocation, poisoning, burns, cancer, etc. In addition, the long-term impact of exposure to dangerous substances can lead to the development of various health problems, such as cancer, respiratory diseases, neurological problems, and fertility problems. That is why it is important that all aspects of human health and environmental protection are considered when transporting dangerous goods.

Workers involved in the transport of dangerous goods must be educated on safety measures and procedures in the event of an accident, to reduce the risk of accidents and injuries.

There are examples of accidents related to the transport of dangerous goods in Bosnia and Herzegovina that occurred in the past.

One example is the accident that occurred in September 2014 in the city of Tuzla, when there was a fire in a truck carrying gas cylinders. A truck and buildings nearby were burned, and two workers were injured. The cause of the crash has not yet been determined, but it is believed to have occurred due to a gas leak.

Similar accidents are occurring all over the world, including in other countries in the region. According to 2018 data released by the International Civil Protection Organization, there are about 50 accidents per year worldwide involving the transport of dangerous goods, often resulting in severe consequences for human health and the environment.

As already mentioned, the transport of dangerous goods can pose a serious risk to human health and the environment, and therefore rigorous safety measures are needed to reduce this risk. It is necessary to educate workers and drivers about safety measures and comply with regulations on the transport of dangerous goods to avoid accidents and accidents.

To keep statistics on accidents involving vehicles carrying dangerous goods in B&H, it is necessary to establish a national register of accidents in transport that would include data on all types of accidents, including those with dangerous goods. To maintain such statistics, it is necessary to define the criteria for classifying accidents, which would allow the precise collection of data on the causes, consequences, and impact on the environment and human health.

The authority to keep statistics on accidents involving vehicles transporting dangerous goods in B&H can be given to one of the institutions dealing with this issue, such as the Ministry of Communications and Transport, the Ministry of Internal Affairs, the Ministry of Health, the Civil Protection Directorate, etc.

An example of a country that keeps regular statistics on accidents in the transport of dangerous goods is Germany, which through the national agency for the transport of dangerous goods (Bundesamt für Güterverkehr) monitors not only the number of accidents, but also the causes and consequences thereof. This type of statistics enables the identification of problems and the adoption of adequate measures for the prevention and reduction of risks in the transport of dangerous goods.[16]

Health care institutions and institutions, such as hospitals and emergency medical services, play an important role in mitigating the consequences of such accidents. They provide emergency medical assistance and treatment of injured persons and work to prevent and reduce the risk of spreading harmful substances. In addition, these institutions often cooperate with other services and organizations involved in accident management involving dangerous substances.

In the context of Bosnia and Herzegovina, there is a possibility to include institutions and institutions in the field of health care in the processes of managing the transport of dangerous goods. For example, it is possible to ensure that healthcare professionals are part of the operational teams responsible for managing accidents, which would allow for a quick and effective response in the event of accidents involving dangerous substances. Also, institutions and institutions in the field of health can provide expert advice and recommendations regarding the risks posed by the transport of dangerous goods to human health. In some other countries, healthcare institutions and institutions play a significant role in the management of the transport of dangerous goods.

[16] https://www.dguv.de/en/index.jsp

In Germany, the German Accident Protection Society (DGUV) conducts research and collects statistics on accidents occurring in the transport of dangerous goods, and provides advice and recommendations to reduce risks and improve safety. This organization cooperates with other services and organizations, including institutions and institutions in the field of health.

5.4 Albania

5.4.1 Human and institutional capacity weakness

Transporting dangerous goods is a complex and challenging issue that requires robust human and institutional capacity to ensure safety and compliance with regulations. In the Western Balkan region, there are several key issues related to the transport of dangerous goods, including:

Inadequate infrastructure: The region lacks modern infrastructure and facilities to handle the transport of dangerous goods, which increases the risk of accidents and incidents.

-Weak regulatory frameworks: The existing regulations are often outdated and do not comply with international standards, leading to inconsistencies and gaps in enforcement.

-Lack of technical expertise: There is a shortage of trained personnel in the region who can handle the transport of dangerous goods and respond to emergencies effectively.

-Insufficient monitoring and control: There is a lack of monitoring and control mechanisms to ensure compliance with regulations and to detect and prevent non-compliance.

-Limited resources: Many countries in the region face financial constraints, which limit their ability to invest in infrastructure and human capacity development.

Addressing these key issues requires a concerted effort from governments, industry, and other stakeholders. Strategies may include improving infrastructure, developing modern and effective regulatory frameworks, providing training and technical assistance, increasing monitoring and control measures, and mobilizing resources to support capacity-building initiatives.

5.4.2 Road traffic safety issues

In addition to the human and institutional capacity weaknesses, there are also road traffic safety issues related to the transport of dangerous goods in the Western Balkan (WB) region[25]. These issues include:

-Inadequate road infrastructure: The existing road infrastructure in many parts of the WB region is not well-maintained or designed to handle heavy vehicles transporting dangerous goods [25], [26]. This can lead to accidents and incidents on the road.
-Lack of safety equipment: There is a shortage of safety equipment, such as warning signs and barriers, to help ensure the safe transport of dangerous goods on the roads. [25], [26]

-Non-compliance with safety regulations: Non-compliance with safety regulations, including those related to speed limits, driver fatigue, and load limits, can lead to accidents and incidents on the road. [25], [26]

-Limited enforcement capacity: The capacity to enforce safety regulations is often limited, due to a shortage of trained personnel, inadequate resources, and poor coordination among relevant agencies. [25], [26]

-Insufficient public awareness: There is often limited awareness among the general public and transport industry stakeholders about the risks associated with the transport of dangerous goods and the need to follow safety regulations.[25], [26]
Addressing these road traffic safety issues requires a multi-pronged approach that involves improving road infrastructure, providing safety equipment, strengthening enforcement capacity, increasing public awareness, and promoting compliance with safety regulations. Furthermore, this should be accompanied by a broader strategy to improve human and institutional capacity in the transport sector in the WB region.

5.4.3 Environmental issues arising from the transportation of dangerous goods

Transportation of dangerous goods can have significant environmental impacts, including:

Spills and leaks: Accidents during transportation can lead to spills and leaks of dangerous goods. These spills can contaminate soil, water, and air, causing harm to the environment and wildlife.

-Air pollution: Transportation of dangerous goods can contribute to air pollution, especially when transportation is done by trucks, ships, and planes that emit harmful gases such as nitrogen oxides, sulfur dioxide, and particulate matter.

-Water pollution: In the case of accidents, dangerous goods can spill into water bodies, polluting them and affecting aquatic life. Even small spills can have a significant impact on the environment, as dangerous goods can be highly toxic and persistent.

-Climate change: Transporting dangerous goods requires energy, which can contribute to greenhouse gas emissions and thus contribute to climate change.

-Infrastructure impacts: The transportation of dangerous goods can require the construction of specialized infrastructure such as pipelines, storage facilities, and ports. These constructions can have an impact on the environment and wildlife, including the destruction of natural habitats.

-Waste generation: The transportation of dangerous goods generates waste, such as contaminated soil or other materials, which can also impact the environment if not handled appropriately.

To mitigate these environmental issues, it is essential to have proper safety and handling procedures and enforce regulations to ensure that dangerous goods are transported safely.

5.4.4 Health issues related to the transport of dangerous goods

Transporting dangerous goods can pose serious health risks to those who come into contact with them. Here are some of the health issues that can arise:

-Exposure to toxic chemicals: Dangerous goods, such as chemicals and gases, can harm human health. Exposure can occur through inhalation, ingestion, or skin contact. Depending on the chemical type and exposure level, this can lead to acute symptoms, such as headaches, dizziness, and nausea, or long-term health effects, such as cancer, neurological damage, or respiratory problems.

-Radiation exposure: Radioactive materials like nuclear waste are sometimes transported as dangerous goods. Radiation exposure can cause acute symptoms, such as skin burns and radiation sickness, or long-term health effects, such as cancer.

-Fire and explosion: Some dangerous goods are highly flammable or explosive. In the event of a fire or explosion, those in the vicinity may suffer burns, smoke inhalation, or other injuries.

-Mental health issues: Exposure to traumatic events, such as accidents or spills involving dangerous goods, can psychologically affect those involved. These effects include anxiety, depression, and post-traumatic stress disorder (PTSD).

To prevent health issues related to the transport of dangerous goods, it is essential to follow proper safety protocols, such as wearing protective clothing and gear, avoiding contact with the materials, and taking appropriate measures in case of an accident or spill. Providing appropriate training and resources to emergency responders who may be called upon to deal with incidents involving dangerous goods is also important.

6) Recommendation for managing TDG key issues in Western Balkan region

6.1 Montenegro

The management of the transport of dangerous goods is a critical issue in the Western Balkan region, and several steps can be taken to improve the situation:

Develop and implement a comprehensive regulatory framework: A comprehensive regulatory framework for transporting dangerous goods should be developed and implemented, including rules on the classification, labeling, packaging, and handling of dangerous goods. The framework should also include regulations for the training and certification of personnel involved in the transport of dangerous goods. Organization who is responsible for training of safety adviser in Montenegro should be authorized.

Strengthen enforcement and inspection capabilities: There should be a stronger focus on enforcing the regulatory framework and conducting inspections to ensure that regulations are being followed. This can include training and equipping enforcement agencies with the necessary tools and resources.

Improve emergency response planning and capabilities: Emergency response planning and capabilities should be improved to better handle accidents and spills involving dangerous goods. This can include developing comprehensive emergency response plans, training and equipping emergency responders, and conducting regular drills to ensure readiness.

Increase public awareness and education: Public awareness and education campaigns can help increase understanding of the risks associated with transporting dangerous goods and promote safe practices. This can include targeted outreach to communities along transport routes and the development of educational materials for schools and other institutions.

Promote the use of alternative, less hazardous materials: Efforts should be made to promote the use of alternative, less hazardous materials where possible, such as non-toxic chemicals, to reduce the risks associated with transporting dangerous goods. Overall, addressing the key issues related to transporting dangerous goods in the Western Balkan region requires a collaborative effort involving government agencies, industry stakeholders, and the public. Working together makes it possible to improve safety and mitigate the environmental and health risks associated with transporting dangerous goods (UNECE, 2020)

Seminars concerning specific topics can be organized to build up upon critical areas, where know-how might be lacking, including conferences for experts dealing with translations and domestic application of the agreement. The key issue remains the active application of rules by all Regional Partners; the involvement in the knowledge sharing of the professional organizations of haulers, safety advisers, enforcers, consignors etc. would be welcomed.

6.2 Kosovo

To manage the key issues in the transportation of dangerous goods (TDG) in the Western Balkans region, the following recommendations can be made:

Harmonization of regulations: The Western Balkans region should strive for harmonization of regulations to ensure consistent and effective TDG regulation across the region. This can include adopting international standards and best practices, as well as working to align national regulations.

Training and capacity building: Personnel involved in TDG, including shippers, carriers, and emergency responders, should receive adequate training and capacity building to ensure they are equipped to handle dangerous goods safely and effectively.

Infrastructure and equipment: Governments and organizations should invest in the necessary infrastructure and equipment to ensure the safe and efficient transport of dangerous goods, including storage facilities and emergency response equipment.

Effective enforcement: Effective enforcement mechanisms should be put in place to ensure compliance with TDG regulations and standards, including the imposition of penalties for non-compliance.

Emergency response planning: Governments and organizations should develop effective emergency response plans to minimize the impact of incidents involving dangerous goods, including the availability of trained personnel and equipment.

Public involvement and transparency: Governments and organizations should engage with the public and stakeholders to ensure transparency in TDG decision-making and to build trust and confidence in TDG regulation and management.

Environmental and health protection: Measures should be taken to minimize the environmental and health impacts of TDG, including the implementation of safe packaging and handling techniques, the provision of adequate emergency response measures, and the development of alternative modes of transportation.

Implementing these recommendations can help to ensure the safe and efficient transport of dangerous goods in the Western Balkans region and minimize the risks to human health, the environment, and public safety.

6.3 Bosnia and Herzegovina

Most traffic accidents occur due to human and technical factors that are directly related to the vehicle for the transport of dangerous goods. A good part of accidents could be reduced or avoided if adequate control and maintenance of vehicles for the transport of dangerous goods were carried out and the rule educated staff working on it as well as by properly educating drivers and handlers of dangerous goods.

The transport of dangerous goods should be approached in a coordinated, professional, and institutional multidisciplinary manner if one wants to avoid inevitably bad consequences due to untimely monitoring of the event and mastering the problem in all its complexity. The transport and transport system with all its parts, consequently the transport of dangerous goods, base their development on information technology that has been implemented in modern technologies of transport of dangerous goods.

The application of IT problem solving determining the itinerary of the transport of dangerous goods becomes another in a series of unavoidable segments in the transport of dangerous goods, and it is necessary and inevitable to include it in the multidisciplinary problem of solving the problem of dangerous goods.

For preventing the danger that can be produced by hazardous matter, it is necessary to develop tools to optimize and solve the problem of transport of dangerous goods in several directions:

- improving the technical characteristics of devices and equipment of vehicles carrying dangerous goods,
- education of participants in the process of transporting dangerous goods,
- building and restoring transport infrastructure on the principles of sustainable development,
- increasing the environmental awareness of all parts of the community,
- institutional, multidisciplinary, comprehensive monitoring and resolution of complex problems of hazardous substances,
- establishing a system of passing regulations and redesigning optimal itineraries for the transport of dangerous goods.
- Adoption of uniform and accident (event) reports in the carriage of dangerous goods/goods in accordance with ADR section 1.8.5,

To ensure safe and safe transport and minimize the risk of accidents related to human health or environmental pollution, and increase the level of safety and safety in the transport of dangerous goods in B&H, the following measures are recommended:

1. The Law on Transport of Dangerous Goods of B&H, as soon as possible adopted in accordance with all European directives and standards covering all forms of transport and transport (road, railway, water, air, and piping), and harmonize entity regulations and regulations of Brčko district in the segment of transport and transport of dangerous goods,
2. Multiline legislation (ministries: Industry and Energy, Trade, Transport and Communications, Environmental Protection) stimulate the import and transport of liquid petroleum products by rail,
3. To tighten the conditions and criteria for issuing import licenses to companies engaged in the traffic of oil and petroleum products, and other importers of dangerous goods to better control the quantity and quality of imports and transport of dangerous goods,
4. Consider the possibility of introducing additional environmental taxes for imports by road transport and transport to increase the risk of this mode of transport from accidents and environmental pollution.
5. Improve personnel capacities and training of drivers and other actors involved in the process of transporting dangerous goods.
6. Training and improving the knowledge and skills of personnel involved in the control of the roadworthiness of vehicles for the transport of dangerous goods.
7. Improving the technical and technological capacities of entities involved in the control and inspection supervision of the process of transport of dangerous goods.
8. Creating a risk management system in the transport of dangerous goods, which will be based on the creation of a database and keeping records of carriers, drivers, vehicles, cargo, infrastructure, weather, and environmental conditions.
9. Improving the operation of emergency medical services and rescue services after traffic accidents involving vehicles for the transport of municipal materials.
10. Implementation of detailed recording of data on traffic accidents with vehicles for the transport of dangerous goods, to use them for preventive action.
11. Improving elements of traffic infrastructure on the road network with the identification of risky segments such as bridges, passes, tunnels, "bottlenecks", sections that do not have alternative routes, etc.

6.4 Albania

The management of the transport of dangerous goods is a critical issue in the Western Balkan region, and several steps can be taken to improve the situation:

Develop and implement a comprehensive regulatory framework: A comprehensive regulatory framework for transporting dangerous goods should be developed and implemented, including rules on the classification, labeling, packaging, and handling of dangerous goods. The framework should also include regulations for the training and certification of personnel involved in the transport of dangerous goods.

Strengthen enforcement and inspection capabilities: There should be a stronger focus on enforcing the regulatory framework and conducting inspections to ensure that

regulations are being followed. This can include training and equipping enforcement agencies with the necessary tools and resources.

Improve emergency response planning and capabilities: Emergency response planning and capabilities should be improved to better handle accidents and spills involving dangerous goods. This can include developing comprehensive emergency response plans, training and equipping emergency responders, and conducting regular drills to ensure readiness.

Increase public awareness and education: Public awareness and education campaigns can help increase understanding of the risks associated with transporting dangerous goods and promote safe practices. This can include targeted outreach to communities along transport routes and the development of educational materials for schools and other institutions.

Promote the use of alternative, less hazardous materials: Efforts should be made to promote the use of alternative, less hazardous materials where possible, such as non-toxic chemicals, to reduce the risks associated with transporting dangerous goods.[3]

Overall, addressing the key issues related to transporting dangerous goods in the Western Balkan region requires a collaborative effort involving government agencies, industry stakeholders, and the public. Working together makes it possible to improve safety and mitigate the environmental and health risks associated with transporting dangerous goods[3], [25], [26].

Seminars concerning specific topics can be organized to build up upon critical areas, where know-how might be lacking, including conferences for experts dealing with translations and domestic application of the agreement. The key issue remains the active application of rules by all Regional Partners; the involvement in the knowledge sharing of the professional organizations of haulers, safety advisers, enforcers, consignors etc. would be welcomed.

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