



23. SLOVAKIA

23.1 Legal Framework – Waste Management Plans and Strategies

23.1.1 National Legislation concerning CDW

The Ministry of Environment is the key actor and the governmental body responsible for waste management in Slovakia. The Act on Waste is a comprehensive act that implements European Directives concerning waste management and regulates waste management in Slovakia. This Act defines terms necessary for the proper waste management. Paragraph 40c of the Waste Act 223/2001 refers to the CDW as "wastes that arise as a result of construction, safety work as well as maintenance, refurbishment or demolition work"[278].

The Act currently in place is rather recent – it was adopted on March 17, 2015 and came into force on January 1, 2016. The Act brought new rules on the waste management and introduced new concepts. It abrogated the Recycling Fund and paying of recycling fees by producers and importers[296]. At the same time, it introduced the concept of extended responsibility, meaning, producers and importers will be responsible for individual products from bringing them to the market until their disposal. It is done so to ease the burden from Slovak municipalities. Peter Žiga, Slovak Minister of Environment, claims that this scheme will lower the expanses on waste by approximately €30 million [280]. Another novelty in the Act is a requirement to develop information system that can monitor waste streams effectively. Last but not least, it implements stricter rules on illegal dumping of waste with the goal to reduce waste dumping which is currently as much as 75%. Officially, there are about 2.500 illegal dumps in Slovakia; however, the estimations are that the actual numbers are much higher and may reach even as much as 7.000 illegal dumps [280].

Other legislative instruments include Regulation 525/2003 which requires regional and district offices to be in charge of waste management and environmental protection in their respective territories; Decree 283/2001 which defines procedures for preparing and submitting reports on waste generation and waste treatment; the MoE also provided a notice 75/2001 which specifies methods for the analytical inspection of waste; Act 17/2004, Law 434/2013 and Act 582/2004 deal with fees for waste handling in general and fees for depositing waste in landfills in particular; last, Regulation 237/2000 states that before any construction work starts, an individual or a company must obtain a permission which can be given only if a project contains a CDW management plan for disposal or recovery treatment.

Moreover, Slovakia employs Act 119/2010 on Packaging. This Act sets rules for both individuals (entrepreneurs) and legal entities which (1) use packaging to pack products or fills the packaging with products, (2) place products in packaging on the market (with the exception of producers and importers of packaging who supply the obliged persons). These are then required to [280]:

- register in the register of Ministry of Environment of the Slovak Republic
- communicate the changes to this register
- keep records of the quantity and types of packaging materials

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- fill in the registration file of packaging and packaging waste
- send the annual report to the ministry
- ensure the collection of packaging waste and their recovery and recycling at least in the amount of specified limits, e.g. by the way of an authorized organization.

23.1.2 Waste management plans (WMP) and Strategies

Similar to the Czech Republic, Slovakian WMP structure is designed in a way that the national WMP assists to define regional and consequently municipal WMPs. The national WMP (2016-2020), developed by the MoE, concerns with the CDW in two sections of the plan[281]. First, it describes what CDW is and states the amounts of CDW produced in years 2010, 2011, 2012, and 2013. This section illustrates several CDW statistics. The average CDW production between 2010 and 2013 was 2.6 million tons. Further, it states that the biggest share of CDW comes from the dredging soil – in 2013, it accounted for 58% of all CDW. Regarding the handling of CDW, the process of recovery or recycling occurred in only 36% of CDW – mostly concrete, iron and steel. On the other hand, out of all the landfilled waste, 55% was CDW.

Second, the WMP sets goals regarding the CDW. The ultimate goal is to reach European requirement of recovering at least 70% of CDW. To meet this goal, Slovakia aims to:

- Develop legislation limiting landfilling of recyclable CDW
- strengthen the use of uncontaminated dredging soil and other natural material
- define the EoW criteria for CDW
- ensure that publicly financed construction projects use recovered materials
- financially support technology which contributes to recycling of CDW.

Slovakia adopted and has in force the first Waste Prevention Plan for 2014-2018. Section 4.3.5 sets measures, which aim to prevent CDW from landfill. The following table summarizes measures and strategies Slovakia developed to achieve the target of recovering at least 35% of CDW for the period of 2011-2015.





Table 87. Measures to recover, recycle and reuse CDW in Slovakia, 2011-2015[282].

Action	Responsible enforcing and monitoring authority	Responsibility for implementation	Time of completion
Uncontaminated soil and other naturally occurring material excavated during construction works not to consider to be waste (when the material is used for construction in its natural state)	District Environmental Offices	Waste producers	On-going
Increase the control over separation of waste streams in place of generation	MoE SR	Slovak Environmental Inspection, District Environmental Offices	On-going
Promote research and development in the field of recycling, reusing or recovering materials from construction and demolition waste	MoE SR	MoE SR, Universities	On-going
Set criteria for defining end-of- waste for CDW	MoE, Ministry of Transport, Construction and Regional Development of the Slovak Republic	MoE, Ministry of Transport, Construction and Regional Development of the Slovak Republic	In the time of approval of the new Waste Act 19/2015
To adapt technical standards for construction materils and their use to increase the proportion of recycled CDW and construction products containing incinerator ashes.	MoE, Ministry of Transport, Construction and Regional Development of the Slovak Republic	MoE, Ministry of Transport, Construction and Regional Development of the Slovak Republic	On-going
Support the construction and operation of CDW recovery facilities	MoE	MoE	On-going
To use recycled CDW in construction financed by public funds (mostly road works), provided that they comply with functional and technical requirements; and also to include this as a requirement in the public procurement conditions	All sectors, MoE	Suppliers	On-going
To propose an amendment to the Building Act, which impose an obligation to check the management of CDW of a project at the final inspection	MoE, Ministry of Transport, Construction and Regional Development of the Slovak Republic	MoE, Ministry of Transport, Construction and Regional Development of the Slovak Republic and Building Authorities	In the time of approval of the new Waste Act 19/2015

23.1.3 Legal framework for sustainable management of CDW

There are several topics related to the sustainable management of the CDW, which are dealt with through legislation. The legal framework includes The Waste Act 223/2001 on obligation of separation of CDW in § 40, the new Waste Act 79/2015, and the Green Public Procurement (GPP).

Though there is no requirement for pre-demolition audit, it is recommended to assess the hazardous properties of future CDW before commencing or maintaining refurbishment or demolition. It is done in accordance with § 19 of the Regulation no. 283/200139 as amended by 310/201340, with focus on removal of materials with asbestos. The Waste Act 223/2001 deals with the topic of sorting obligation in Annex 1. It says that in case that CDW exceeds





the total amount of 200 tons per year, there is an obligation to separate it. Furthermore, from January 2016, there will be a specific condition to sort organic waste, plastics, glass, metals, paper, tyres and WEEE from municipal waste. The same act deals with the topic of separate collection and management of hazardous waste from construction and demolition operations, with the requirement, from waste producers, to develop a WMP only if they produce more than 10 tons of hazardous waste or 100 tons of non-hazardous waste annually. Last, the National Action Plan for Green Public Procurement in the Slovak Republic for 2011- 2015 provides a strategic objective to increase the proportion of GPP used in Slovakia to 65% at the level of central government bodies and by 50% at the level of self-governing regions and municipalities.

23.1.4 Targets

According to the national WMP (2011-2015), Slovakia aims to follow the EU standards, meaning, the level of preparation for re-use, recycling and recovery should be:

- at least 35 % by weight by January 1, 2016
- at least 55 % by weight by January 1, 2018
- at least 70% by weight by January 1, 2020

23.1.5 End of Waste (EoW) status

Regulations regarding the EoW of CDW is non-existing in Slovakia. The amendment 343/2012 states that particular waste ceases to be waste, if it undergoes preparation for reuse or is considered as waste suitable for domestic utilisation. Simultaneously, certain waste ceases to be waste, if it undergoes any recovery and meets established criteria. These criteria derive from the European Directive and are as follows:

- Substance or object is commonly used for specific purposes
- For such substance or object, there is a market demand
- Substance or object fulfils the technical requirements for the specific purposes and meets the existing regulations and standards applicable to products
- The substance or object will not lead to overall adverse of environment

23.2 Non legislative instruments (best practices, guidelines, recommendations...)

The Slovak association supporting recycling of CDW – ZRMS, is a member of international European Quality Association for Recycling which aims to exchange best practices among members and supports spreading the idea of quality protection and quality assurance of recycled building materials on European level. At the same time, there are several projects, researches and products which enable recycled CDW to be re-used. For instance, Stered produces an insulation from textile waste from end-of-life vehicles.





In the period 2007-2013, the Operational Programme Environment financed by European Funds supported waste management infrastructure in Slovakia with about €570 million. Environmental awareness of the public is rather low and is in dire need of substantial improvement. One important tool might be to not only raise awareness but also to involve citizens.

23.3 CDW management performance – CDW data

23.3.1 CDW generation data

The amount of waste generated by the construction and demolition sector in years 2010-2013 amounted to average 2.6 million tons, which accounts for 26.2% of the total amount of waste [283]. Compared to the EU average – 33%, the percentage in Slovakia is rather low. It can, however, be caused by the lower level of construction activity in Slovakia in comparison to other EU member states. The following table illustrates CDW generation in Slovakia in period between 2010-2013 [284]. The detailed types of CDW waste data were not available. It is also important to note that numbers generated by the MoE differ from the data generated by the EUROSTAT.

Table 88 Amount of generated CDW for period 2010-2013.

	2010	2011	2012	2013
Amount of generated CDW	2.883.760	2.983.325	1.617.007	2.942.857

	2010	2011	2012	2013
Material recovery	1 633 381	985 795	714 534	1 059 220
Energy recovery	534	367	762	796
Other recovery	400 700	200 100	146 526	141 428
Landfill	633 276	914 600	659 181	1 633 240
Incineration without energy recovery	225	374	134	434
Other disposal	60 002	639 163	60 811	51 142
Other treatment	155 639	242 924	35 055	56 594
Total	2.883.760	2.983.325	1.617.007	2.942.857

Table 89 Generation and management of CDW in period 2010-2013[256].

The graph in Figure 19 summarizes the CDW management in Slovakia in 2013. It is notable that the goal of the European Commission to recover at least 70% of CDW is far from being met. In the period 2010 – 2013, the level of CDW recycling reached only 47%. The highest percentage was achieved in 2012 when it reached 53%. As up-to-date data are not available, it is difficult to evaluate the progress made [285].







Figure 19. CDW management in Slovakia in 2013.

The MoE of Slovakia has published a report on the waste management in Slovakia, in 2013. The report states export and import of the waste in general, the data on CDW in particular is missing.

In 2013, the MoE in Slovakia approved 135 cross-border transports of waste. It was in accordance with both national and European legislation and regulations. Both Import and Export of waste were measured, but without stating the exact amount of CDW. Slovakia imported 250,164 tons of waste in 2013. Austria was the provider of the biggest amount, which was 128,500 tons of waste. The export section was also measured, but with no distinction to how much of that was CDW. 118,889 tons of waste were exported. Notably, according to the report, 63.7% of the total amount of waste designated to export went to the Czech Republic [286].

23.3.2 CDW treatment data

Permission of state administration body – district or regional environmental office – is needed for operation of waste management installations such as collection, recovery and disposal. In 2012, there were 17 functioning landfills for inert waste in Slovakia. 89 landfills were for non-hazardous waste and 12 were for hazardous waste. The following table summarizes the number of landfills in separate regions of Slovakia.





Region	Inert waste Iandfills	Non- hazardous waste landfills	Hazardous waste landfills	Total
Bratislavský	2	8	2	12
Trnavský	1	8	2	11
Trenčiansky	3	11	1	15
Nitriansky	3	12	2	17
Žilinský	2	14	0	16
Banskobystrický	2	13	1	16
Prešovský	1	14	1	16
Košický	3	9	3	15
Total	17	89	12	118

Table 90 Landfills in Slovakia, 2012.

Currently, there are approximately 60 recovery treatment facilities. According to the national WMP, this number of treatment facilities is not sufficient and must be increased to meet European targets for re-use, recycling and recovery.

23.3.3 CDW exports/imports data

No data found

23.3.4 CDW treatment facilities data

No data found

23.3.5 Future projections of CDW generation and treatment

It is foreseen that Slovakia will aim to improve its targets regarding CDW management, as they are eligible to receive financial support through European Structural Funds and operational program for environmental quality 2014-2020. The treatment facilities for recovering CDW exist in Slovakia; however, it might be inevitable to promote the recovered CDW as valuable material suitable for construction.

23.3.6 Methodology for CDW statistics

In Slovakia, the government regulation 442/1992 serves as the basis for monitoring system in charge of collection of waste treatment data. Two organizations are operating the aforementioned system. They are the Waste Management Centre and the Environmental Management of the Slovakian Environmental Agency. The system includes several elements for achieving the goal. The generation and management of the waste data is done by the regional waste information system RISO. The data collected from the RISO reports is sent by the waste producers according to a limit on the obligation to report data. It is forwarded to EUROSTAT by the Statistical Office of Slovak Republic. Another element is the packaging





waste information system called PACKAGING and the last one is WEEE information system which is called ELECTRO. Further legislation backs up the current record keeping operation.

In comparison with the data by EUROSTAT, the Slovak MoE data generation is more comprehensive. It is possible that the MoE in Slovakia include excavation waste in the CDW report and therefore the numbers are higher. In comparison to the WFD, Slovakia is using three additional treatments [282].

23.4 C&D waste management in practice

23.4.1 CDW management initiatives

There are several non-legislative instruments by which Slovakia is addressing the CDW. These instruments are not legally binding but they are standards of sustainability that gain preferences when applied. The environmental management system ISO 14001 is in force since 2013 and together with the EMAS serve as standards for 1292 companies in Slovakia. Out of those, the construction sector represents 24%. Other sets of standards such as BREEAM and LEED are held by 32 buildings in Slovakia, 27 of which are in a specific part of Bratislava.

The SKGBC is an association that are sharing best practices, organizing seminars and conferences and support sustainable construction. Slovakia also has an extended producer responsibility that derive from the Waste Act 79/2015 and it is binding on a national level. The extended producer responsibility for electrical and electronic equipment, batteries, packaging, vehicles, tyres and other non-packaging products passes the responsibility to the producer to finance the collection of the product from the customer.

There are several standards upheld in Slovakia for recycled construction materials. Regulation 133/2013 on construction products requires the recycled construction material to have a declaration of conformity with the relevant standards for construction products and prove harmless for the environment and human health. The standards for recycled CDW called Standard STN IN 933-11 dictate that recycled aggregates must have a declaration of conformity with the same standards of being harmless for human health and for the environment. Standard STN EN 1744 provide the assessment method for chemical properties of aggregates. It assesses sustainability of recycled material for various uses and storage conditions. The last set of standards is dictated by § 19 of the Regulation no. 283/2001 as amended by 310/2013 and it is the requirement to identify hazardous properties of future CDW [282].

23.4.2 Drivers / barriers to increase CDW recycling

Slovakia does not reach European targets yet, however, there are several drivers that motivate the progress in CDW recovery. First, legislation has been shifting towards meeting national targets regarding the CDW. It includes stricter rules on illegal dumping of waste, extended waste producer responsibility or development of information system. Second, both governmental and non-governmental organizations share knowledge and raise





awareness through organizing seminars. In the educational sector, environmental protection is part of the curriculum. Last, landfill fee is increasing annually[285].

The reason Slovakia scored rather low on the CDW recovery scale is that many barriers prevail in Slovakia. Even though the fee of landfill annually rises, it is still considerably low. Inspections in the constructions are rather rare and sanctions are not adequate, thus, the implementation of the legislation falls behind. In recent years, the lack of End of Waste criteria and the unwillingness to build from "waste" contributes to unsatisfactory results. In Slovakia, recovered CDW is not seen as proper material, which is to be used further. Moreover, the location of recovery facilities is often far from the site, consequently, the cost of transportation increase and people are not willing to invest in it[285].

23.5 CDW sector characterization

23.5.1 CDW materials (CONCRETE, BRICKS, TILES AND CERAMIC, ASPHALT, WOOD, GYPSUM)

Product description and applications

Concrete is a composite material composed of coarse aggregate bonded together with a fluid cement that hardens over time. Most concretes used are lime-based concretes such as Portland cement concrete or concretes made with other hydraulic cements. It is used for construction of buildings, roads and infrastructure.

A brick is building material used to make walls, pavements and other elements in masonry construction. Traditionally, the term brick referred to a unit composed of clay, but it is now used to denote any rectangular units laid in mortar. A brick can be composed of clay-bearing soil, sand, and lime, or concrete materials. Bricks are produced in numerous classes, types, materials, and sizes.

A tile is a manufactured piece of hard-wearing material such as ceramic, stone, metal, or even glass, generally used for covering roofs, floors, walls, showers, or other objects such as table tops. Tiles are often used to form wall and floor coverings, and can range from simple square tiles to complex mosaics. Tiles are most often made of ceramic, typically glazed for internal uses and unglazed for roofing.

Asphalt is a sticky, black and highly viscous liquid or semi-solid form of petroleum. It may be found in natural deposits or may be a refined product; it is a substance classed as a pitch. The primary use (70%) of asphalt/bitumen is in road construction, where it is used as the glue or binder mixed with aggregate particles to create asphalt concrete.

Wood is a porous and fibrous structural tissue found in the stems and roots of trees, and other woody plants. It is an organic material, a natural composite of cellulose fibres which are strong in tension embedded in a matrix of lignin which resists compression. Wood has been used for thousands of years for fuel, as a construction material, for making tools and weapons, furniture and paper, and as a feedstock for the production of purified cellulose and its derivatives, such as cellophane and cellulose acetate.





Gypsum is a soft sulphate mineral composed of calcium sulphate dehydrate. It is widely mined and is used as a fertilizer, and as the main constituent in many forms of plaster blackboard chalk and wallboard. Among other uses, gypsum is used in buildings construction.

Quantitative analysis

The quantitative data concerning the production in Poland are available only for concrete, gypsum, and asphalt [288]. The following tables illustrate this production.

	Cone prode (millio	crete uction on m3)	Growth rate 2006/2008	Population inhabita	(million ints)	Production per capita		Production per capita		Production per Cement capita consumption (million tons)		Growth rate 2006/2008
	2006	2008		2006	2008	2006	2008	2006	2008			
SK	2.9	3.7	27.59%	5.39	5.40	0.54	0.69	2.3	2.6	13.04%		

Table 91	Concrete	production	in	Slovakia.

Table 92.Gypsum production in Slovakia.

	2005 (tons)	2008 (tons)	Population in 2008	Production per capita	Share to the EU production	Growth rate 2005/2008
SK	107.500	152.000	5.400.998	0.0281	0.5%	41.4%

Table 93. Asphalt production in Slovakia.

	2005 (million tons)	2008 (million tons)	Population in 2008	Production per capita	Share to the EU production	Growth rate 2005/2008
SK	1.8	2.2	5.400.998	0.4	0.8%	22.2%

Recovery techniques

- **Concrete**: Landfill, recycling into aggregates for read construction or backfilling, recycling into aggregates for concrete production, re-use of precast elements
- Brick: Landfill, recycling, re-use
- **Tile**: Landfill, recycling, re-use
- Asphalt: Landfill, recycling in a stationary plant, in-site recycling, material recovery
- **Wood**: Landfill, recycling into derived timber products, energy recovery
- **Gypsum**: Landfill, recycling into new plasterboards (in substitution of natural or synthetic gypsum)

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Environmental and economic impacts of CDW waste management

In many EU countries (Poland included), landfilling remains preferred method of nonhazardous CDW disposal. Nevertheless, landfilling might have severe negative impacts on environment in general and human health in particular. Though landfilled concrete, bricks and tiles prove to have negligible impact on groundwater pollution, asphalt, gypsum and wood from construction and demolition sides leave footprints on the environment. As the surface of wood used in construction is often treated with chemicals, its landfill is associated with release of methane emissions which is a greenhouse gas. Landfilling of gypsum poses a threat to environment due to the fact that it releases dangerous hydrogen sulphide gas if in contact with organic waste and exposed to rain. In some cases, asphalt landfill might prove problematic due to the use of tar in the past. If asphalt contains tar, it is hazardous waste and must be treated as such. Tar-free asphalt is not a significant risk to the environment if landfilled. The important issue at hand is not only the focus on CDW impact on groundwater pollution but also the fact that landfills cover considerable area of land which could be used otherwise.

Regarding the treatment of CDW, the preparation for re-use of nearly all CDW does not come without cost. The majority of CDW must be crushed in order to be recycled and it causes several issues – first, it creates dust which might cause serious health problems for workers and second, noise production can have negative consequences for both humans and fauna surrounding the treatment facility.

The clear benefit of re-use of CDW is that there is no need for virgin aggregates to be extracted and be processed. Resources of wood and gypsum are becoming scarce and price of them is increasing significantly. In these two cases, recycling might become encouraged due to financial aspects. For instance, due to a limited amount of raw gypsum, the price of raw gypsum increased more than 50% in the last 3 years. On the other hand, in case of bricks, tiles, cement and asphalt, cost of production from recycled materials does not differ significantly from cost of production from virgin materials.

The re-use of recovered CDW avoids the manufacturing processes which are usually associated with high energy consumption and emissions. For instance, the most negative environmental impacts of concrete derive from cement production. The direct re-use of concrete blocks avoids the production of concrete and potentially also the cement production. Moreover, the carbon footprint for recycled asphalt is lower than for asphalt made of raw materials.

Drivers / barriers to increase recycling

Provided in section 23.4.2





23.5.2 Recycled materials from CDW

No information was found regarding the re-use of CDW. There are standards, for instance, for aggregates which must not cause any harm to human health and to environment and have a declaration of conformity – STN EN 933-11.

23.5.3 Market conditions / costs and benefits

The price for taking CDW for further recycling ranges between & and &14. The selling price of recycled CDW materials such as recycled bricks, separate soil fraction, recycled concrete and recycled bitumen ranges between &1 and &4.