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THE WASTE & WATER SECTOR

IN SERBIA

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THE WASTE & WATER SECTOR IN SERBIA

December 2020

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Contents

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1. INTRODUCTION

Serbia has advanced with harmonizing its legal framework with the environmental EU acquis in recent years, but further substantial efforts are needed, especially in the areas of waste management, water management and wastewater treatment, nature protection, industrial pollution control and risk management, as well as air quality. Moreover, Serbia needs to further align with climate legislation. Serbia was granted EU candidate status in March of 2012 and its environmental policies and legal framework are strongly influenced by the EU accession negotiations. As a candidate country for EU accession, it is slowly adapting to the EU's environmental standards. Chapter 27, the largest of the 35 negotiation Chapters in terms of legislation, is yet to be opened. The European Commission noted, in its 2019 assessment report, that Serbia has achieved some level of preparation in the area of environment and climate change. More specifically, limited progress was made in further alignment with the acquis and on strategic planning.

Further recommendations for development are the following:

- enhance administrative and financial capacity of the public central and local administration authorities including the Environmental Protection Agency, operationalizing and adequately resourcing the Green Fund and further improving inter-institutional coordination, in particular between central and local levels;
- intensify implementation and enforcement work, such as closing non-compliant landfills, investing in waste reduction, separation and recycling, reinforcing air quality monitoring, advancing river basin management and preparing for Natura 2000;
- implement the Paris Agreement, including by adopting a comprehensive climate strategy and law, consistent with the EU 2030 framework for climate and energy policies and well integrated into all relevant sectors and develop a National Energy and Climate Plan, in line with Energy Community obligations.

Environmental policy is, after all, the single most participatory EU policy providing the public with far-reaching rights regarding access to information, justice and participation in decision-making. Given the magnitude of the task ahead, but also bearing in mind the significant benefits, Serbia will from this stage onwards need to mobilize all available resources in order to make tangible progress in managing its environment and climate change challenges and succeeding in accession negotiations. The EU supports Serbia in this endeavor. Since the year 2000, approximately a billion euros has been

granted to the environment and climate change sector, with over 1.5 million direct beneficiaries in the country.

The waste management system in Serbia is based on waste collecting, transporting and landfilling. In this regard, Serbia is no different than other countries in Southeast Europe, where landfilling is still the predominant method. Serbia's waste management is inadequate, particularly in rural areas. Collection is poorly organized and landfills are not subject to controls. By EU comparison, organic waste as a proportion of total residual waste is high and the recycling rate is very low. As yet, the population shows little awareness of environmental issues. According to ASWA (Association of Serbian Waste Utility Companies) Serbia is currently recycling between 5 and 8 percent of municipal solid waste. The cities most active in recycling are Novi Sad and Čačak (around 10 percent), but the biggest problem present numerous towns and municipalities which do not recycle waste at all. The modernization of waste management by joining the transition towards a circular economy is a declared political objective. By 2030 Serbia plans to achieve the recycling target of 50 percent of total municipal solid waste.

Serbia's new Waste Management Strategy for 2019-2024 marks a shift from the concept of regional sanitary landfills to the model of regional waste management centers to include waste sorting, separation, and recycling, as well as non-recyclable waste treatment.

1.1. GENERAL INFORMATION ON THE REPUBLIC OF SERBIA

Serbia, officially the Republic of Serbia (Serbian: Република Србија/Republika Srbija), is a landlocked sovereign state situated at the crossroads of Central and Southeast Europe, covering the southern part of the Pannonian Plain and the central Balkans. Serbia is situated along a number of cultural, geographic, and climatic crossroads. It borders Hungary to the north; Romania and Bulgaria to the east; North Macedonia and Kosovo to the south; Croatia to the northwest, Bosnia-Herzegovina and Montenegro to the southwest. Serbia's population numbers around 7 million residents, and its capital, Belgrade, ranks among the largest cities in Southeast Europe.

Region – Southeast Europe, non EU member

Size – 77,474 km^2

Geography – mountainous in the south, fertile plains in the north

Language – Serbian 88.1%, Hungarian 3.5%, Romani 2.1%, Bosnian 2%, other 4.3%

Religion – Serbian Orthodox 84.6%, Catholic 5%, Muslim 3.1%, other 7.3%

Monetary Unit – Serbian dinar

Natural Resources – oil, gas, coal, iron ore, copper, zinc, antimony, chromite, gold, silver, magnesium, pyrite, limestone, marble, salt, arable land.

Industry – automotive, base metals, furniture, food processing, machinery, chemicals, sugar, tires, clothes, pharmaceuticals

Average Life Expectancy – male 72.6 years, female 77.7 years

GDP per capita, current US$ $7,397 (in 2019)

President: Aleksandar Vučić

1.2. ECONOMIC OVERVIEW

Recent Economic Developments

The growth in 2019 has contributed to labor market improvements. The activity rate and employment rate among population aged 15 and above continued to increase in 2019, reaching 54.8 and 49.1 percent, respectively.

The employment rate remains lower among female workers and youth. Unemployment declined to an estimated 10.3 percent in the second quarter of 2019 (the unemployment rate for population aged 15-64 stood at 10.8 percent).

In the first half of 2019, average wages increased by 9.9 percent in nominal terms (in real terms 7.2 percent). The private/public sector wage gap has narrowed, with private sector wages growing by 10.7 percent compared to 9.5 percent in the public sector.

Thanks to these trends, combined with higher pensions, poverty (living on income under $5.5/day in 2011 PPP terms, the standardized middle income-country poverty line) is estimated to have declined from 23.8 percent in 2014 to 19.8 percent in 2019.

The consolidated general government budget showed a surplus of 0.3 percent of GDP in the first half of 2019. Revenues increased by 7.6 percent in nominal terms, compared to the same period of 2018. Budgetary spending rose by 9.6 percent in nominal terms, corresponding to 1.7 percent of annual GDP.

Inflation is on a declining path, after reaching a peak in April of 3.1 percent (y/y). External imbalances widened as evidenced by an increase in the CAD by 51 percent in the first half of the year, now projected at 6.7 percent of GDP for 2019. FDI inflows remain strong – up 28 percent in the first half of the year. Total external debt continued to decline as a share of GDP, to 62.5 percent at end March 2019. Public debt declined to 54 percent of GDP by end-June 2019.

1.3. ECONOMIC OUTLOOK

The economy is expected to continue to grow at around 3-4 percent over the medium-term. Investment and consumption will be the main drivers of growth. Consumption will increase as wages and employment are expected to continue to grow. The rising consumption will continue to push up

imports, widening the CAD. The medium-term growth projections crucially depend on the pace of structural reforms and political developments.

Acceleration of the EU accession process is important not only from the point of view of strengthening institutions but also as a signaling device to attract investment. Short to medium term growth prospects may be affected by lead times for the election campaign and formation of the government. With economic growth and improvements in the labor market, poverty is expected to continue its gradual decline. Poverty, measured as income below the standardized $5.5/day 2011PPP line, is estimated to fall to around 18.7 percent by 2020.

1.4. SERBIA | ECONOMIC FORECASTS | 2019-2021 OUTLOOK

Overview	Actual	Q1	Q2	Q3	Q4	2020
GDP Annual Growth Rate (%)	4.80	3.6	3.8	3.7	3.9	3.9
Unemployment Rate (%)	9.50	11.6	10.9	9.6	10	10
Inflation Rate (%)	1.50	2.6	2.7	2.8	2.9	3.1
Interest Rate (%)	2.25	2.25	2.25	2	2	3
Balance of Trade (USD Million)	-574.50	-680	-560	-490	-850	-680
Government Debt to GDP (%)	54.50	47.5	47.5	47.5	47.5	45

2. WATER SECTOR – GENERAL INFORMATION

Surface water resources are relatively substantial in Serbia. However, it should be noted that large international rivers (the Danube, the Tisa and the Sava) and small transboundary rivers account for 90% of all surface water resources that amount to some 162 billion m^3 per annum.

The territory of Serbia includes parts of the Black Sea Basin (through the Danube River Basin), the Adriatic Sea Basin and the Aegean Sea Basin. Most of the country (about 92%) is situated in the Black Sea Basin (the Danube River Basin). The Danube River, with a discharge at its mouth of some 6,500 m^3, is the 24th largest river in the world and the 2nd largest in Europe. In Serbia, the Danube is joined by three major tributaries: the Tisa, the Sava and the Velika Morava, as well as a number of minor tributaries.

Water management is under the jurisdiction of the national government, which has delegated the various tasks to the Ministry of Agriculture, Forestry and Water Management, other ministries, provincial administrative bodies, agencies of local administrations, and government-held water management companies. Major administrative functions related to water management reside with the Ministry of Agriculture, Forestry and Water Management, or rather the National Water Directorate attached to it. Three government-held water management companies operate in Serbia: Srbijavode (Serbia Waters), Vode Vojvodine (Waters of Vojvodina) and Beogradvode (Belgrade Waters).

The lack of a national water protection strategy hampers strategic investment planning in the water sector. The completion of the surface and groundwater monitoring network is pending. Water pollution is another major problem, mainly due to outdated technology, lack of pollution abatement installations, inadequate storage and disposal of by-products, untreated industrial and municipal waste water, drainage water from agriculture, leachate from landfills, and pollution related to river navigation. Serbia will need to comply with the Water Framework, Urban Waste Water, Drinking Water, Groundwater, Water Quality Standards directives requiring Serbia to invest in the relevant water management and wastewater treatment facilities in the coming years. Currently, they exist in 21 municipalities out of over 200 registered agglomerations. Only 5% of industrial wastewater undergoes the full three stages of wastewater treatment.

The implementation of EU environmental standards, through Chapter 27, will provide clean water and air over the long term, reduce pollution, enriching and diversifying nature.

Strengths	Weaknesses
• Strong government support and European funding for upgrades and modernizations of water networks and water treatment facilities. • Majority of urban population connected to mains and sewage networks. • Low tariffs good for industrial complexes. • New legislation governing water pollution and distribution. • Growing project pipeline for water infrastructure, particularly wastewater treatment and sanitation	• High wastage of water due to low tariffs. • Relatively high water losses due to poor or outdated facilities and equipment • Limited number of wastewater treatment facilities, resulting in high pollution levels. • Few rural areas connected to sewage systems. • Limited and ineffective anti-pollution legislation. • Limited water conservation mechanisms. • Complicated and inefficient government authorities overseeing various aspects of the water supply, treatment and distribution. • Poor legislation allowing wastage and pollution of water
Opportunities	**Threats**
• Expansion and modernization of water facilities • New legislation should increase water quality and ease of access, particularly for commercial and industrial sectors. • Large government investment opportunities and possible PWC privatizations.	• Continuing inefficiency regarding government authorities could further complicate ease of access. • Reliant on water sources from outside of its national territory, so regional unrest could affect water supplies. • Rising pollution levels in water could result in widespread disease

3. WASTEWATER MANAGEMENT IN SERBIA

Wastewater is one of the main polluters of surface and groundwater which form a natural source of drinking water. This especially applies on industrial waste and landfill leachate that in a large

percentage are not treated. A great amount of care needs to be devoted to wastewater treatment in order to minimize the problem of drinking water, which is directly associated with the health of the population. Water pollution is difficult to prevent and annul, but with efficient treatment its impact can be significantly reduced. This is accomplished by frequent monitoring the quality of wastewater and the recipients, through tests of harmful substances - namely pollution levels. In this way, the compliance with legal regulations is ensured, that is, the discharge of the treated wastewater into the water courses and efficient control of plant for waste water is established. The main goal of the application of such measures is to reduce the influence of wastewater to surface and groundwater water conservation and improve their quality in order to be able to secure the natural sources of drinking water.

Main problems in Serbia:

- Degraded quality of water bodies
- Big percent of population is not connected to the sewage system
- Inadequate maintenance of the old sewage systems
- Lack of data in some areas about the population connectivity
- Discharge of the untreated wastewaters even from the big cities into the water bodies
- Unawareness of the population about the environmental issues
- Unsatisfying analysis for the design of wastewater collection and treatment facilities (too much assumptions and small investment into the analysis part of the design).
- The least regulated water industry
- Insufficient and inadequate public utility infrastructure as well as pre-treatment and industrial wastewater treatment
- Insufficient investment
- Jurisdiction over water services
- Institutional capacity
- Preparation and implementation of projects
- Complex administrative procedures

In the network of public health institutions during 2018, 4238 wastewater samples were examined from 968 industrial plants.

Research of the tested wastewater samples during 2018 showed that 1907 or 45% of the total number of tested samples which were recorded did not meet the quality standards. This percent is a bit lower than the one from 2017 while it is roughly the same as in 2016. Also, the number of samples of wastewater tested in 2018 that in quality corresponded to the prescribed standards for limit values of pollutants was 2331 or 55%, which is approximately the same as in 2016, and almost 5% more than in 2017. This means that in 2018 the number of untreated wastewater decreased by approximately 5% compared to 2017.

Table 1: Records on the total number and quality of tested wastewater samples by health institutes on the territory of the Republic of Serbia, for the period from 2016 to 2018

Health institute location	Number of industrial plants			Overall number of tested wastewater samples			No. of unfitting wastewater samples			% of unfitting wastewater samples		
	2016	2017	2018	2016	2017	2018	2016	2017	2018	2016	2017	2018
Subotica	67	64	58	391	374	324	175	185	179	44,76	49,46	55,25
Zrenjanin	20	19	22	108	101	114	59	55	62	54,63	54,46	54,98
Kikinda	50	47	49	45	31	35	30	27	31	66,67	87,10	88,57
Pančevo	12	12	14	103	65	99	64	53	86	62,13	81,54	86,87
Sombor	20	14	15	207	114	110	76	70	74	36,71	61,40	67,27
Institute for public health of Vojvodina	47	39	44	208	166	214	116	75	74	55,77	45,18	34,58
Belgrade	14	14	14	167	143	123	35	42	42	20,96	29,37	34,15
Šabac	59	79	79	162	233	244	71	102	75	43,83	43,78	30,74
Valjevo	18	17	19	26	26	33	21	19	18	80,77	73,08	54,55
Požarevac	76	83	87	223	356	377	120	207	248	53,81	58,15	65,78
Kragujevac	44	44	42	200	223	213	139	140	136	69,5	62,78	63,85
Ćuprija	19	33	31	646	419	392	287	356	157	44,43	84,96	40,05

Zaječar	40	53	55	223	226	233	44	80	85	19,73	35,40	36,48
Užice	81	91	95	262	308	343	114	137	137	43,51	44,48	39,94
Čačak	45	46	45	205	213	227	58	64	95	28,29	30,05	41,85
Kraljevo	46	64	71	241	281	323	65	87	109	26,97	30,96	33,75
Kruševac	88	79	71	314	290	264	116	89	73	36,94	30,69	27,65
Niš	54	54	46	274	350	277	176	209	112	64,23	59,71	40,43
Pirot	9	11	9	50	36	24	16	7	10	32	19,44	41,67
Leskovac	53	52	51	143	154	137	54	60	54	37,76	38,96	39,42
Vranje	37	37	30	143	112	98	42	26	31	29,37	23,21	31,63
Kosovska Mitrovica	15	15	15	15	15	15	9	7	7	60	46,67	46,67
Institute of Public Health of Sebia-Batut	19	12	6	89	51	19	48	27	12	53,93	52,94	63,16
TOTAL	**933**	**979**	**968**	**4445**	**4287**	**4238**	**1935**	**2124**	**1907**	**43,53**	**49,54**	**45**

The need for reconstructed and technologically advanced sewage systems and the construction of wastewater treatment facilities is very high, because the total length of sewage collectors, according to the Statistical Office of Serbia, is 16,000 kilometers, while about four million inhabitants (57%) are connected to public water collection, drainage and wastewater systems, which testifies to the fact that sewage systems and particularly sewage treatment plants, aren't sufficiently developed.

In a financial sense, according to data of the Republic Directorate from 2017, funds needed for works on atmospheric sewage and channeling and water protection through the treatment of municipal

wastewater in the period up to 2034 amount to around € 9.3 billion. Apart from securing the required funds, the biggest problem generally in preparations for constructing the systems of plants themselves is an insufficiently updated and comprehensive information system and accurate data, as well as insufficient preparedness of technical project documentation.

In the area of wastewater treatment, around 55% of the Serbian population is connected to the wastewater collection system, while only 7.3% of wastewater is treated biologically. It is necessary to construct 359 facilities for wastewater treatment and around 10,000 km of additional infrastructure for wastewater collection.

Greater Belgrade itself, a city with over two million inhabitants, does not treat wastewater since there is no wastewater treatment plant. Thus, wastewater ends up in the Danube river. Nowadays, Serbia is one of least developed countries in Europe in terms of the state of utility services, while numerous floods that had previously hit Serbia additionally influenced this sector.

In most of the European cities the percentage of households connected to the sewerage system varies around 95% while in Belgrade this number reaches only 85%. At the national level these indicators show an even worse situation. For example in the Province of Vojvodina the same indicator is around 45%, while in central Serbia it goes even lower with around 37% of the population connected to the sewerage system.

The results of an analysis performed within the project 'Global Waste Water Study in Serbia & Pre-feasibility Study for Belgrade Waste Water Management' show that about 75% of the total urban population in Serbia is connected to the public sewerage system. The percentage of the rural population connected the public sewerage system is about 9%. Only three urban municipalities have a rate higher than 75%: Kragujevac, Novi Sad and Sremski Karlovci. Agglomerations with a population smaller than 25,000 are usually equipped with a general sewerage system while municipalities with 25,000 to 250,000 citizens have a separate storm water system. The city of Novi Sad has only one sewerage system.

4. SOLID WASTE MANAGEMENT IN SERBIA

The biggest challenges in the process of European integration in the field of environmental protection will be large investments in the infrastructure of waste management and wastewater treatment.

Besides financial and technical challenges, the next challenge is administrative as the European Commission considers that the Ministry in charge should have more experts who will deal exclusively with this area. The development of waste management on the other hand represents the potential for new jobs. Some studies say that each ton of processed waste could open up to 8 jobs on daily bases at a recycling rate bigger than 50%. On the other hand, the creation of new jobs poses a challenge in the field of education of appropriate waste management experts.

According to the Statistical Office of the Republic of Serbia, during 2018, the sections: Agriculture, forestry and fishing, Mining and quarrying, Manufacturing, Electricity, gas, steam and air conditioning supply, Water supply, sewerage, waste management and remediation activities, Construction and Other service activities of the Republic of Serbia generated waste amounting to 49.2 million tons, out of which 68.8% related to non-hazardous and 31.2% to hazardous waste. The greatest share of generated hazardous waste was from the section of Mining and quarrying (39.5%).

Generated waste quantities, observed by sections and relative to the previous year, noted the following trends in 2018: Agriculture, forestry and fishing – decrease of 2.4%, Mining and quarrying – increase of 0.6%, Manufacturing – increase of 6.9%, Electricity, gas, steam and air conditioning supply – decrease of 1.0%, Water supply, sewerage, waste management and remediation activities – increase of 17.8%, Construction – increase of 4.4% and Other service activities – decrease of 1.9%.

In 2018 the total treated waste quantity was 48.9 million tons.

Total recycled waste quantities in 2018 noted an increase of 13.1% relative to 2017, which was mostly created due to an increase of metal waste recycling. The quantity of recycled waste that was used as fuel for energy production also noted an increase of 45.9% relative to 2017.

Table 2: Generated waste in the Republic of Serbia by sections, 2017 and 2018

	2017	2018		
	t	t	Non-hazardous waste, %	Hazardous waste, %
Generated waste – total	**48 847 978**	**49 214 766**	**68.8**	**31.2**
Agriculture, forestry and fishing	95 240	92 922	99.7	0.3
Mining and quarrying	38 377 803	38 625 967	60.5	39.5
Manufacturing	1 436 348	1 535 334	96.2	3.8
Electricity, gas, steam and air conditioning supply	7 573 055	7 495 442	100.0	0.0
Water supply, sewerage, waste management and remediation activities	468 592	551 988	91.4	8.6
Construction	527 151	550 436	99.8	0.2
Other service activities	369 789	362 678	96.0	4.0

In the Republic of Serbia a total of 2.130.000 t of municipal waste is produced annually, while in the field of industrial production 6.124.981 t of waste is generated. The institutional framework in the field of waste management is made by the Ministry of Environmental Protection within which the Environmental Protection Agency is active. The responsibility of the Ministry of Environmental Protection is also the issuing of waste management permits. According to the latest data, waste management companies have received 2.158 permits for the collection, transport, storage, treatment and disposal of waste.

The biggest number of companies in Serbia deals only with the collection, transport and storage of waste, and over 2000 permits were issued for the performance of these activities. However, organized collection of municipal waste is carried out for only 80% of the territory of Serbia, which indicates that the companies in Serbia that have a permission for collection, transportation and storage of waste are directed towards the collection of waste which can be valorized on a commercial basis as a recyclable waste (metal, plastic, paper, rubber, waste vehicles).

Table 3: - An overview of the valid permits issued for waste management (November 2019)

Of the total number, only 46 companies have a permit for waste disposal, but when it comes to waste deposition, currently there are only 10 sanitary landfills in Serbia. The three largest cities in Serbia (Belgrade, Novi Sad and Niš) currently do not have a sanitary landfill.

	The Ministry			AP of Vojvodina			Local self-governments
	Overall	Non-hazardous	Hazardous	Overall	Non-hazardous	Hazardous	Non-hazardous
Collection	624	589	187	51	47	15	157
Transport	664	638	145	56	53	14	158
Storage	163	137	127	101	91	49	829
Treatment	155	129	112	83	81	32	662
Disposal	3	3	1	3	2	2	40
Total per authority	982			162			1014
Total no. of valid permits	2158						

4.1. MUNICIPAL WASTE

Municipal waste is household waste, as well as any other waste which is due to its nature or composition similar to household waste. It has been estimated that the collection rate of organized municipal waste collection amounts to 60% in the Republic of Serbia. Collection is organized primarily in urban areas, whereas rural areas are significantly less covered. Most of local self-government units have the machinery and vehicles for waste collection, however there is a lack of appropriate equipment since different types of vehicles are used for collection: from waste collection vehicles with a press for waste pressing and car-lifters for big containers, up to regular trucks and tractors with trailers. Such an incoherent system cannot function adequately and the change of such condition in the direction of applying the modern sanitary and safe ways for handling waste cannot be expected without significant assets. The only economically feasible solution is the creation of regional waste management centers where the waste would be collected from several municipalities and treated at

the plants for separation of recyclable waste while the rest of it would be disposed of at the regional landfills, as it was defined in the 2003 National Waste Management Strategy. These regions will implement the principles of integrated waste management systems for a longer period of time. There is no systematically organized separate collection, sorting and recycling of waste in the Republic of Serbia. The current degree of recycling i.e. waste utilization is not sufficient. Although, primary recycling in Serbia has been set forth under the law and envisages separation of paper, glass and metal in specially labelled containers, recycling is not functioning in practice.

In October of 2017, global waste and water management company Suez Groupe SAS and I-Environment Investments Ltd, a subsidiary of Itochu Corporation have announced that, following an international tender held by the City of Belgrade, Serbia, they were awarded a 25-year waste management and energy project. The project will allow the closure and remediation of one of Europe's largest active landfills with the construction of an 80 MW waste-fired combined heat and power (CHP) plant.

When it comes to the treatment of *biodegradable waste*, 160 companies are licensed to treat this type of waste, which is a small number given the fact that about 1,300,000 tons of biodegradable waste (municipal and industrial) is generated in Serbia annually. Except for several small capacity installations installed in enterprises that generate this type of waste, no public utility or private enterprise entrusted with the collection and treatment of municipal waste, conduct the treatment of biodegradable waste in Serbia. It should also be emphasized that in Serbia there are only 8 authorized waste testing laboratories from which 5 are located in Belgrade, 2 in Novi Sad and 1 in Bor.

4.2. HAZARDOUS WASTE

Serbia annually generates about 80,000 tons of hazardous waste (94,507t in 2018). However, there is no facility for the disposal and processing of hazardous waste in the country, or an adequate system solution for hazardous waste. Therefore, most hazardous wastes are exported to EU countries. The cost of processing tonnes of hazardous waste is from 1000 to 3000 Euros, depending on the type of waste. However, the disposal of hazardous waste by export is about to come to an end. Namely, after 2020, the export of hazardous waste to the EU country will be disabled. The issue of building a physical-chemical waste treatment plant started in 2001, but no government has found an adequate solution, largely leaving the problem of the next post. The solution in terms of plant construction

was circumvented by outsourcing – the state left the disposal of hazardous waste to private companies.

In Serbia there is no location for hazardous waste disposal. In general, there are no authorized facilities for thermal and physical-chemical treatment of hazardous waste. In the recent period hazardous waste solidification and bioremediation processes have been applied. Biological re-cultivation of ash and slag dumps in TENT A and TENT B is performed in accordance with the 'General design of re-cultivation of ash and slag dumps in public company TPP Nikola Tesla A and Nikola Tesla B'. There is no permanent hazardous waste storage area on the territory of the Republic of Serbia. In such circumstances, hazardous waste generators store hazardous waste temporarily in their own locations in temporary storages, although waste has been stored for 20 or more years in some of them.

The circulation of waste is subject to a permit system, in conformity with the Law on Ratification of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal as well as the Law on Environmental Protection. Hazardous waste import is prohibited. Exceptionally, certain types of hazardous waste which are needed as secondary raw materials in the processing industry in the Republic of Serbia, in compliance with the national goals of that waste type processing, may be imported according to the permit. The government decides on the types of the hazardous waste which may be imported as secondary raw materials.

Most commonly exported are PCBs, pharmaceutical waste, waste paint and varnish, oil and oil emulsions waste, chemical industry waste, slag, as well as specific types of hazardous waste, characteristic of certain technological processes. The Republic of Serbia is a member of the Basel Convention and transboundary movement is performed in accordance with the adopted principles. The Ministry is responsible for the database on transboundary movement of waste (waste import, export and transit) on the basis of the permits it issues, which is recorded as a planned quantity of waste which is the imported/exported subject for the time period for which the permit is issued.

According to the National Waste Management Strategy, it is estimated that the amount of hazardous waste generated in the Republic of Serbia, originating from all plants, including plants that are required to obtain an integrated permit, equals about 100,000 tons per year, while the historical pollution is also about 100,000 tons.

The Strategy states that the final resolution of the problem of historical waste was designed even before 2019, which will be the reason to have an integrated approach to hazardous waste management by all relevant stakeholders in the protection of the environment. Alarming is the fact that on the territory of the Republic of Serbia there are huge quantities of hazardous, historic waste temporarily stored at different locations, which pose a threat to human health and the environment. After the Republican Inspection for Environmental Protection, at the end of 2014, compiled a detailed report on hazardous waste in enterprises in restructuring and bankruptcy, it was found that on the locations of the current temporary storage of hazardous waste it is necessary to react quickly for relocation, treatment and final disposal of historical waste.

This led to the beginning of the first rehabilitation projects in 2015, when the Ministry of Agriculture and Environmental Protection allocated funds for solving this problem at some of the most critical locations. One of them was 'Prva Iskra Barič', as 650 tons of hazardous waste were deposited at that location, as well as removal of more than 92 tons of hazardous waste from the company 'Eko-gas MGS' in Šabac.

The biggest project realized in 2015 was the removal of historical hazardous waste from ten companies in restructuring, which had hazardous waste at their locations, at an estimated amount of 915 tons. For rehabilitation projects, the Ministry of Agriculture and Environmental Protection has provided funds of about 230 million dinars. A consortium of four companies implemented this project: Miteco Kneževac, Kemis, Modekolo and Yunirisk.

Although these projects have influenced the improvement of the situation in this area, experts agreed that the main challenge in the field of waste management in Serbia is still insufficient coverage and capacity for basic services such as collection, transportation and disposal of waste, as well as the lack of processing infrastructure and disposal facilities for hazardous waste.

4.3. EE (ELECTRONIC) WASTE

Options for the treatment and disposal of EE-waste in Serbia are: depositing, recycling and re-use. The most common method is still depositing due to the fact that EE-waste is disposed of as a part of the 'unclassified flow' of municipal waste.

The request for re-utilization and recycling of e-waste in Serbia is in accordance with the EU Directive and defined by its regulations. The targets for re-use and utilization range from 70% - 80%, while for recycling of components, materials and materials of waste e-equipment the amount ranges between 50% to 75%.

In the Republic of Serbia there are four operators that organize collection and recycling, and according to the estimated data, between 15,000-20,000t and about 20% of the total quantity is generated. The recycling process in all four plants is mostly based on the sorting of waste by classes of EE-equipment and the separation of components and parts that can be manually separated. After separation of the fractions, components such as motherboards, cathode ray tubes, processors, hard drives, and similar types of waste, are send abroad for further processing.

On the other hand, mechanical processes that involve size reduction (primary shredding of EE equipment using a shredder and additional grinding by mills) and then separation of ferrous metals (iron, steel, nickel, etc.) by using a magnetic separator and non-metal parts in the EE-waste by using eddy current separators (copper, aluminum, plastic, glass, etc.), are generally not available. The only processes of this type are used in a few facilities that have a line for mechanical treatment of refrigerators and other cooling devices, where separation of freons is carried out, as well as the production of useful secondary raw materials such as Fe, Cu, Al, PVC and the like.

The importance of proper management of EE-products arises from the fact that the substances contained in the devices easily 'migrate' to the environment and contaminate it. Each producer is responsible for the product that at the end of the life cycle becomes hazardous waste. Control of these products and waste in Serbia almost does not exist, although the existing regulations partially control the import/export and trade with these products and waste. The treatment of EE-waste through the informal sector leads to uncontrolled emissions into the environment and at the same time gives a different socio-economic dimension and a risk to safety and health at work.

4.4. LEGISLATION

The Ministry of Environmental Protection is the key institution in the waste sector, responsible for policy making, legislation and control (permits) and assisted by the Serbian Environmental Protection Agency (SEPA). The autonomous province of Vojvodina has the responsibility to administer and control its own territory. Practical implementation of waste collection and management is vested with the Local Self Government units (provided by the Public Utility Companies (PUCs). The Ministry of Health and the health care facilities are competent authorities for health care issues regarding to waste management. The Ministry in charge of energy and mining also participates in the work of the waste management sub-sector and is responsible for harmonization with Directive 2006/21/ EC on the management of waste from extractive industries.

The Republic Water Directorate in the Ministry of Agriculture, Forestry and Water Management (MAFWM) is responsible for issues related to strategic and policy formulation in the field of water management at national level, including water supply and protection from pollution, as well as monitoring the implementation of water management and water protection policy. Public utility companies are under the jurisdiction of the Ministry of Construction, Transport and Infrastructure and the Law on Communal Activities.

After the adoption, in 2004, of the general Law on the Protection of the Environment, the ecological legislation in Serbia has undergone important and profound changes. The two major characteristics of this transformation were, on the one hand, the adoption of numerous special laws and, on the other, the progressive harmonization of national legislations with EU law. However, in many areas, the EU law is only partially transposed, especially when the application of legal provisions depends on governmental decrees and/or ministerial decisions. Given the technicity of numerous ecological standards, national legislation often remains practically inapplicable without a series of acts implementing standards that are globally defined by provisions of general and special legislation.

By implementing amendments into the new Law on Environmental Protection new elements have been introduced into the environmental legislation of the Republic of Serbia, which signifies another step taken towards harmonization with EU legislation. One of the elements introduced by this Law is the obligation of legal entities and individual persons degrading the environment to implement rehabilitation and remediation measures according to a precisely specified plan, with the prior consent of the competent Ministry. If they fail to carry out such obligation, the Ministry itself may

implement the specified measures, which will be charged to the entity or person whose obligation it was.

One of the most important elements introduced by the amendments to the Law on Environmental Protection is the establishing of the Serbian Green Fund, as a budgetary fund, the purpose of which is to finance priority projects in the domain of environmental protection. The founding of the Green Fund of the Republic of Serbia, as one of the key mechanisms in financing programs and projects in the area of environmental protection, has enabled the financing of projects and subsidies aimed at environmental protection; while significant investments into large infrastructure projects in the field of waste management and wastewater management infrastructure have also been announced. Procedures to forge public-private partnerships for communal waste management and its permanent disposal have commenced as well.

Additionally, legal conditions for sorting household communal waste and the obligations of local communities to create conditions for the collection and separation of such waste have been created; while legal entities owning an integrated permit for the operation of facilities have been enabled to import non-hazardous waste for re-use for own purposes, something which will significantly facilitate a balanced use of waste as well as increase competitiveness on the market.

5. PROJECTS - WASTEWATER MANAGEMENT

The Water directorate of the Ministry of agriculture and environmental protection of the Republic of Serbia has prepared the Water Management Strategy of the territory of the Republic of Serbia as a master planning document that will serve as a blueprint for the implementation of water sector reforms through the year 2030, aimed at achieving needed water management standards at the national, regional and local levels, and at fulfilling water management objectives. The Strategy also proposes the structural and nonstructural measures required to achieve set objectives and outlines the needed funding, the implementation timetable, and the functions whose proper performance will govern the effective achievement of objectives.

The main goals of this Strategy are the achievement of integrated water management in Serbia, the objectives by water sector segment (water use, water pollution control and protection against the adverse effects of water), the needed funding and capacities, and the implementation time frame.

Here are the goals regarding water pollution control (water protection):

- Establishment and implementation oversight of restrictions on wastewater discharges containing pollutants in excess of stipulated levels;
- Establishment and implementation of a Water Pollution Control Plan and setting up of surface water and groundwater monitoring based on suitable programs and applicable regulations;
- Development of municipal infrastructures and wastewater treatment plants (reconstruction of existing and building of new plants) in agglomerations greater than 2,000 PE (85% population coverage);
- Reduced pollutant discharges from industrial facilities through wastewater pretreatment to prescribed levels;
- Removal of illegal solid waste dumps, primarily from protected areas, riparian lands with an unfavorable hydrological regime and the like, and rehabilitation of existing and construction of new landfills per applicable strategic and planning documents;
- Reduced pollutant discharges from diffuse sources, such as farmland, forest land, roads and agglomerations smaller than 2,000 PE;
- Reduced pressures on groundwater quality, through the establishment, monitoring and maintenance of sanitary protection zones of drinking water supply sources;
- Conservation and achievement of a good quantitative status of groundwater, to ensure sufficient amounts of water of satisfactory quality, to respond to present and future demands of all legitimate users;
- Establishment of comprehensive monitoring of chemical and quantitative status of groundwater and systematic observation of pollutants in large rivers (the Sava, the Danube, the Tisa and the Velika Morava), and of groundwater sources of the bank filtration type in the alluvial aquifers of these rivers.

Other than the goals of the Strategy, it is useful to mention the single project pipeline for water management subsector projects.

Revised **Single project pipeline** (August 30th 2018)

Definition of Group:

Group 1 – Ready for tendering and investment realization

- Group 1a – projects with technical documentation prepared, ready for tender preparation or tendering
- Group 1b – projects with preparation of technical documentation ongoing, and ready for tendering when it is finished

Group 2 - Ready for preparation of technical documentation

- Group 2a – projects with spatial planning documentation completed with preconditions for land acquisition in place
- Group 2b – projects with gaps in spatial planning documentation with preconditions for land acquisition still pending

			I phase of the Methodology	II phase of the Methodology
WATER MANAGEMENT SUBSECTOR PROJECTS			Total score based on Strategic relevance	Group based on GAP
1.	Construction of Waste Water Treatment Plants and collection system in the city of Belgrade (without Batajnica sewage system)	€ 421.82m	100	2a
2.	Požega wastewater collection and treatment	€ 18m	92	2b
3.	Regional water supply system 'Toplički' for water supply of Blace, Kuršumlija, Prokuplje, Merošina, Žitorađa and Niš	€ 77.5m	92	2b
4.	Waste Water Treatment System in Kraljevo City	€ 17.1m	92	1a
5.	Zrenjanin Waste water collection and treatment	€ 22.4m	88	2b

6.	Ivanjica wastewater collection and treatment	€ 14.46m	88	2b
7.	Bajina Basta wastewater collection and treatment	€ 3.03m	88	2a
8.	Uzice (Gorjani) wastewater collection and treatment	€ 15.4m	88	2a
9.	Čačak Wastewater collection and treatment	€ 20.03m	88	2b
10.	Jagodina wastewater collection and treatment	€ 7.6m	88	2a
11.	Nis WWTP	€ 74.8m	83	2a
12.	Novi Sad WWTP	€ 70.3m	83	2a
13.	Stara Pazova Indjija WWTP	€ 43.4 m	83	2b
14.	Surface Waste Water treatment of the Majdanpek Copper Mine Southern Open Pit	€ 15m	83	2a
15.	Construction of the Waste Water Treatment Facility for Makis I and Makis II	€ 7.3m	83	2a
16.	Pancevo WWTP	€ 20.7m	83	2b
17.	Novi Pazar Wastewater collection and treatment	€ 26m	83	2b
18.	Improvement and construction of major facilities of Batajnica sewage system with wastewater treatment plant Batajnica	€ 43.9m	83	2b
19.	Požarevac wastewater collection and treatment	€ 12m	83	2b
20.	Arilje wastewater collection and treatment	€ 10.48m	83	2b
21.	Kolubara regional water supply system - construction of main pipeline from the reservoir in Slovac to Ub, Lajkovac and Lazarevac and main pipeline Divci-Mionica	€ 7.88m	83	2a
22.	Vrsac wastewater collection and treatment	€ 4.85m	79	2a
23.	Kikinda wastewater collection and treatment	€ 6.5m	79	2a
24.	Pirot wastewater collection and treatment	€ 12m	79	2a

25.	Zaječar wastewater collection and treatment	€ 12.88m	79	2b
26.	Tutin wastewater collection and treatment	€ 9.89m	79	2a
27.	Bor WWTP	€ 23.4m	75	2b
28.	Lebane wastewater collection and treatment	€ 10.9m	75	2b
29.	Knjaževac wastewater collection and treatment	€ 15.5m	75	2a
30.	Odžaci wastewater collection and treatment	€ 18m	75	2a
31.	Loznica wastewater collection and treatment	€ 9.94m	75	1b
32.	Brus and Blace WWTP and sewerage network	€ 11.65m	71	1b ongoing for 1a
33.	Prokuplje wastewater collection and treatment	€ 21.6m	71	2b
34.	Kuršumlija wastewater collection and treatment	€ 12.26m	71	2a
35.	Protection of Lake Bovan Catchment area (Soko Banja)	€ 8m	70	2b
36.	Srbobran wastewater collection and treatment	€ 24.04m	67	1b
37.	Reconstruction and extension of WTP "Cerovića brdo" Užice	€ 6.6m	67	1b
38.	Water supply and wastewater in Pomoravlje district	€ 22.13m	67	2b

6. PROJECTS – SOLID WASTE MANAGEMENT

EU IPA II funds had allocated around 160 million euros for environment and climate change projects. The Serbian environment and climate sector received around EUR 275 million of international donor assistance, including around EUR 200 million from IPA national programs over the period 2007-13. IPA support included investment projects especially in wastewater treatment, municipal and hazardous waste management, reduction of emissions from the thermal plants, legal alignment and

capacity building, including support to the Serbian Environmental Protection Agency, Natura 2000, chemicals management and environmental inspection. From the EU Member States especially Germany, Sweden, the Netherlands and Spain have provided support in this area. Soft loans have been provided by EBRD, KfW and the World Bank. The objective of EU assistance is to align Serbian legislation with the EU environmental and climate change acquis and to strengthen institutional capacities for implementation and enforcement. A further objective is to develop and improve environmental infrastructure, especially in the areas of waste management, water management and urban wastewater treatment.

Also, Serbia's new waste management strategy for 2019-2024, which will soon be adopted, will mark a shift from the concept of regional sanitary landfills to the model of regional waste management centers to include waste sorting, separation, and recycling, as well as non-recyclable waste treatment.

Recently, the European Bank for Reconstruction and Development (EBRD) has approved a EUR 72.25 million loan for the Belgrade's Vinča landfill project, while arranging a syndicated loan of EUR 35 million for the account of the participants. The Bank will also mobilize EUR 21 million in concessional finance funded by TaiwanICDF. The investment includes the construction of an energy-from-waste facility, a facility for construction and demolition waste (CDW), the remediation, closing and aftercare of the existing landfill, and the construction of a new EU-compliant landfill, the EBRD said. The new landfill will replace the existing landfill in Vinča, a suburb of Belgrade, which is currently unsanitary and reaching maximum capacity.

Below is a single project pipeline of waste management subsector projects, including the one previously mentioned.

Revised **Single project pipeline** (August 30th 2018)

			I phase of the Methodology	II phase of the Methodology
WASTE MANAGEMENT SUBSECTOR PROJECTS			Total score based on Strategic relevance	Group based on GAP
1.	Facility for physical-chemical treatment of industrial waste	€ 12.6m	93	2b
2.	Remediation of the Great Backa Canal (phase 3)	€ 34.7m	89	2b
3.	Regional Waste Management System Nis	€ 15 m	80	2a
4.	Regional Waste Management System Novi Sad	€ 92 m	80	2a
5.	Regional Waste Management Centre in the city of Belgrade including rehabilitation of existing landfill	€ 85m	78	2a
6.	Regional Waste management centre Kalenic in Valjevo region	€ 30 m	77	1b
7.	Regional Waste Management System Kragujevac	€ 19 m	77	2b
8.	Regional Waste Management System Pančevo	€ 6 m	75	2a
9.	Construction of the Regional Waste Management Centre in Zrenjanin	€ 18.5m	73	2a
10.	Construction of the Regional Centre for Waste Management on the territory of Sombor	€ 14.7m	73	2a
11.	Construction of the Regional Centre for Waste Management in Vranje	€ 7.3m	73	2a
12.	Construction of the Regional Centre for Waste Management for the region of Krusevac	€ 28.5 m	73	2b
13.	Construction of the Regional Centre for Waste Management for the region of Kraljevo	€ 31.4 m	73	2b
14.	Regional Waste Management Centre in Indjija	€ 8 m	73	1b
15.	Completion of phase 1 infrastructure for RWMC Sremska Mitrovica	€ 0.7 m	73	2a
16.	Regional waste management centre in	€ 12.5	70	2b

	Nova Varos	m		
17.	Rehabilitation of dumpsites and unsanitary landfills and establishment of primary separation in the waste management region Duboko	€ 28.7 m	67	1b/2b
18.	Rehabilitation of dumpsites and unsanitary landfills and establishment of primary separation in the waste management region of Pirot	€ 3.9 m	67	1b/2b

7. USEFUL LINKS

Ministry of Ecology
https://www.ekologija.gov.rs/

Ministry of Agriculture, Forestry and Water Management of the Republic of Serbia – water directorate
http://www.rdvode.gov.rs/?menu_id=19

Ministry of European Integration – Government of the Republic of Serbia
http://www.mei.gov.rs/eng/

Environnemental Protection Agency
http://www.sepa.gov.rs/

Public Water Management Company "Srbija vode"
http://www.srbijavode.rs/

Public Water Management Company "Vode Vojvodine"
http://www.vodevojvodine.com/Vesti

Exhibition on Water / Water forum
http://www.sajamvoda.rs/

EcoFair- International Fair of Environment and Natural Resources Protection
http://sajam-energetika-ekologija.talkb2b.net/en

Renexpo – International trade fair and conference for renewable energy, energy efficiency, water and waste management
http://renexpo-belgrade.com/en/home-en/

JKP "Gradska čistoća" – PUC City Maintenance (Belgrade)
http://www.gradskacistoca.rs/

JKP "Gradska čistoća" – PUC City Maintenance (Novi Sad)
https://www.cistocans.co.rs/

Regional landfill of Subotica
http://deponija.rs/?lang=en

Association of recycler of Serbia
https://reciklerisrbije.com/clanovi/

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