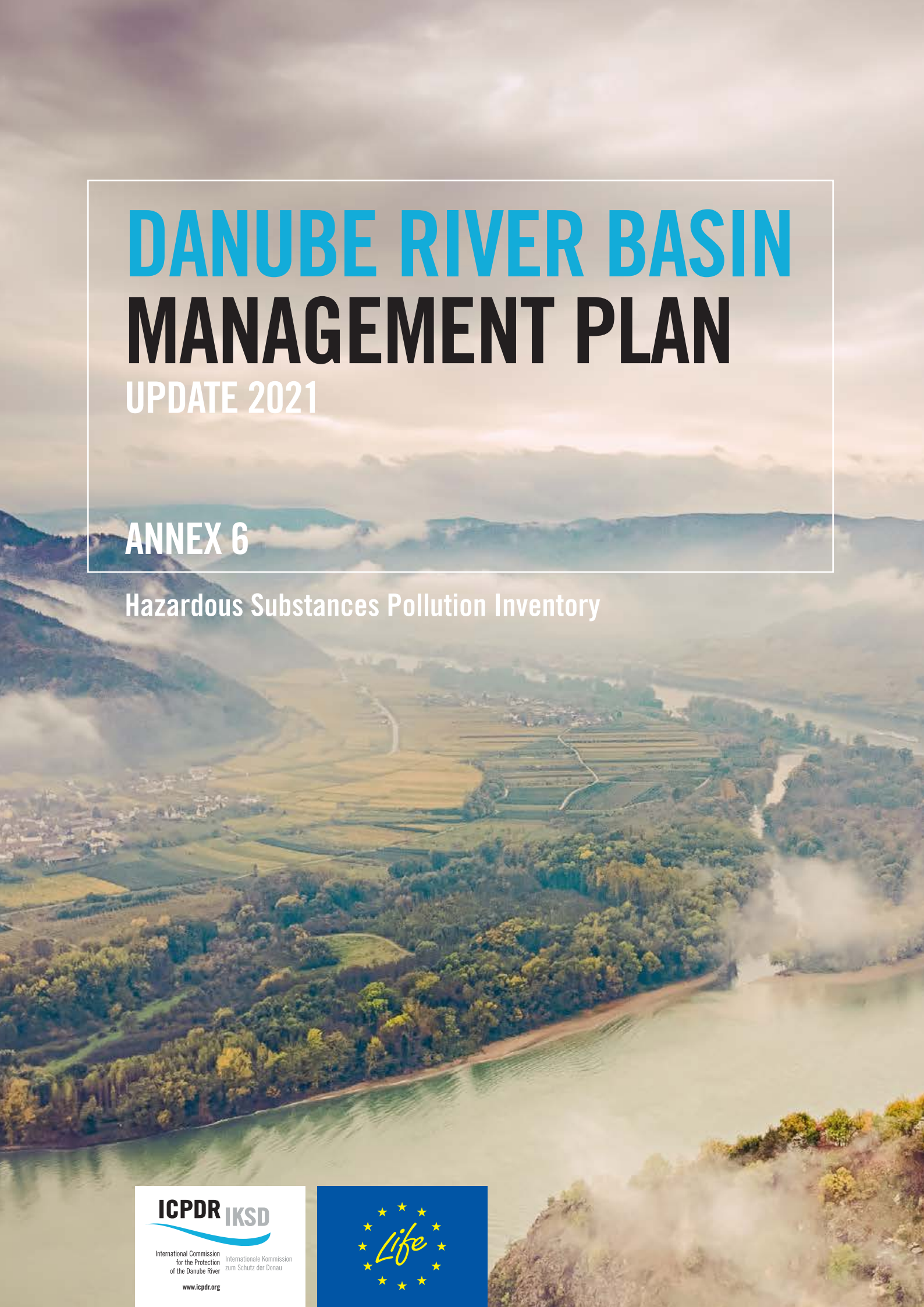
DANUBE RIVER BASIN MANAGEMENT PLAN

UPDATE 2021

ANNEX 6

Hazardous Substances Pollution Inventory



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Hazardous substances release data were collected from the E-PRTR database (note that some data might have been updated since November 2021) and directly from the countries which do not report under the E-PRTR system. The data served the assessments of the point source hazardous substances emissions via direct industrial dischargers for the reference year 2018. Summarizing tables of the data submitted are presented in the followings.

Table 1: Number of industrial facilities and urban wastewater treatment plants with reported direct hazardous substance releases according to industrial sectors and countries

Activity	DE	AT	CZ	SK	HU	SI	HR	BA	ME	RS	BG	RO	MD	UA	Basin
Energy sector	1	4	2	2	3	0	2	4	0	0	0	3	0	0	21
Production and processing of metals	3	7	0	2	2	1	0	0	0	1	0	4	0	0	20
Mineral industry	1	0	1	0	0	0	0	1	0	10	2	1	0	0	16
Chemical industry	3	1	2	3	2	3	1	1	0	1	1	3	0	0	21
Urban wastewater management	24	15	5	1	6	3	1	0	0	2	4	19	0	0	80
Waste and industrial wastewater management	0	5	0	0	4	0	0	0	0	0	0	0	0	0	9
Paper and wood production processing	0	1	0	2	1	1	0	0	0	1	1	0	0	0	7
Products from the food and beverage sector	0	1	0	0	0	0	0	0	0	1	0	0	0	0	2
Other activities	0	0	1	1	1	0	0	0	0	0	0	0	0	0	3
Total	**32**	**34**	**11**	**11**	**19**	**8**	**4**	**6**	**0**	**16**	**8**	**30**	**0**	**0**	**179**

Table 2: Number of industrial facilities and urban wastewater treatment plants with reported direct hazardous substance releases according to compounds and countries

Substance	Pollutant group	DE	AT	CZ	SK	HU	SI	HR	BA	ME	RS	BG	RO	MD	UA	Basin
Chloro-Alkanes (C10-13)	CHLORG	0	1	0	0	0	1	0	0	0	0	0	0	0	0	**2**
Dichloroethane-1,2 (DCE)	CHLORG	0	0	0	1	1	0	0	0	0	0	0	0	0	0	**2**
Dichloromethane (DCM)	CHLORG	1	1	0	0	0	1	0	0	0	0	0	0	0	0	**3**
Halogenated Organic Compounds	CHLORG	3	2	3	4	3	1	0	0	0	0	0	0	0	0	**16**
Pentachlorophenol (PCP)	CHLORG	0	1	0	0	0	0	0	0	0	0	0	0	0	0	**1**
Polychlorinated Biphenyls (PCBs)	CHLORG	0	0	0	1	0	0	0	0	0	0	0	0	0	0	**1**
Tetrachloroethylene (PER)	CHLORG	0	0	1	1	0	0	0	0	0	0	0	0	0	0	**2**
Trichlorobenzenes (TCH)	CHLORG	0	0	0	1	0	0	0	0	0	0	0	0	0	0	**1**
Trichloroethylene (TRI)	CHLORG	0	0	0	2	0	0	0	0	0	0	0	0	0	0	**2**
Trichloromethane	CHLORG	1	2	0	1	0	0	0	0	0	0	0	0	0	0	**4**
Vinyl Chloride	CHLORG	0	0	0	0	1	0	0	0	0	0	0	0	0	0	**1**
As and Compounds	HEVMET	4	0	4	1	5	1	0	0	0	4	2	1	0	0	**22**
Cd and Compounds	HEVMET	2	2	1	3	4	0	0	0	0	1	2	1	0	0	**16**
Cr And Compounds	HEVMET	4	3	1	3	5	1	1	1	0	0	5	9	0	0	**33**
Cu and Compounds	HEVMET	16	11	2	1	4	2	1	0	0	8	3	9	0	0	**57**
Hg and Compounds	HEVMET	3	0	2	5	5	0	1	1	0	0	1	1	0	0	**19**
Ni and Compounds	HEVMET	23	14	6	2	9	4	1	2	0	5	3	19	0	0	**88**
Pb and Compounds	HEVMET	3	6	1	1	4	0	0	2	0	7	3	11	0	0	**38**
Zn and Compounds	HEVMET	27	18	4	3	4	7	1	1	0	10	5	22	0	0	**102**
Chlorides	INORG	12	0	1	2	1	1	0	2	0	0	2	6	0	0	**27**
Cyanides	INORG	0	2	2	2	1	1	0	0	0	1	1	3	0	0	**13**
Fluorides	INORG	4	4	3	2	3	0	0	0	0	0	2	1	0	0	**19**
DEHP	OTHORG	20	2	2	3	0	3	1	0	0	0	0	1	0	0	**32**
Fluoranthene	OTHORG	0	1	0	0	0	0	0	0	0	0	0	0	0	0	**1**
NP/NPEs	OTHORG	0	13	1	0	0	3	1	0	0	0	0	0	0	0	**18**
Octylphenols and Ethoxylates	OTHORG	0	0	1	0	0	1	0	0	0	0	0	0	0	0	**2**
Organotin Compounds	OTHORG	0	0	1	0	0	0	0	0	0	0	0	0	0	0	**1**

Substance	Pollutant group	DE	AT	CZ	SK	HU	SI	HR	BA	ME	RS	BG	RO	MD	UA	Basin
Phenols	OTHORG	0	1	2	5	5	0	2	0	0	3	3	11	0	0	**32**
PAHs	OTHORG	1	1	0	2	0	0	0	0	0	0	0	0	0	0	**4**
Diuron	PEST	4	3	0	0	0	0	0	0	0	0	0	0	0	0	**7**
Isoproturon	PEST	1	1	0	0	0	0	0	0	0	0	0	0	0	0	**2**
Lindane	PEST	0	0	0	0	0	0	0	0	0	0	0	1	0	0	**1**

Table 3: Reported direct hazardous substance releases according to compounds and countries (kg/year)

Substance	DE	AT	CZ	SK	HU	SI	HR	BA	ME	RS	BG	RO	MD	UA	Basin
Chloro-Alkanes (C10-13)	0.0	20.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**20.8**
Dichloroethane-1,2	0.0	0.0	0.0	308.0	259.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**567.0**
Dichloromethane	44.0	28.0	0.0	0.0	0.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**102.0**
Halogenated Organic Compounds	5,540.0	4,780.0	2,811.4	22,693.2	8,240.0	1,075.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**45,139.6**
Pentachlorophenol	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**1.9**
Polychlorinated Biphenyls	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.6**
Tetrachloroethylene	0.0	0.0	11.5	28.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**40.3**
Trichlorobenzenes	0.0	0.0	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**3.7**
Trichloroethylene	0.0	0.0	0.0	149.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**149.8**
Trichloromethane	125.0	82.0	0.0	327.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**534.0**
Vinyl Chloride	0.0	0.0	0.0	0.0	360.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**360.0**
As and Compounds	38.4	0.0	52.5	43.9	899.9	18.0	0.0	0.0	0.0	79.0	1,551.1	8.5	0.0	0.0	**2,691.3**

Substance	DE	AT	CZ	SK	HU	SI	HR	BA	ME	RS	BG	RO	MD	UA	Basin
Cd and Compounds	16.8	17.4	16.8	180.9	296.7	0.0	0.0	0.0	0.0	6.0	670.5	20.0	0.0	0.0	**1,225.1**
Cr and Compounds	417.2	790.0	108.0	776.5	2,091.6	218.0	626.0	2.4	0.0	0.0	6,930.5	4,165.9	0.0	0.0	**16,126.1**
Cu and Compounds	4,881.3	7,343.1	432.0	556.5	2,592.0	874.0	3,250.0	0.0	0.0	28,886.0	7,021.5	18,968.7	0.0	0.0	**74,805.1**
Hg and Compounds	10.0	0.0	19.5	204.2	43.4	0.0	27.8	0.4	0.0	0.0	20.4	18.0	0.0	0.0	**343.7**
Ni and Compounds	1,412.8	5,442.1	1,564.0	1,210.3	3,100.3	401.0	952.0	147.9	0.0	353.0	2,854.4	4,245.7	0.0	0.0	**21,683.4**
Pb and Compounds	267.5	968.4	42.0	1,650.3	2,901.0	0.0	0.0	162.6	0.0	3,426.0	3,210.2	1,976.3	0.0	0.0	**14,604.2**
Zn and Compounds	35,013.0	67,288.0	4,379.6	2,330.1	13,265.0	4,584.0	3,290.0	220.3	0.0	11,347.0	29,774.3	45,309.0	0.0	0.0	**216,800.3**
Chlorides	96,630,000.0	0.0	4,963,864.0	8,637,866.7	10,400,000.0	2,897,562.0	0.0	842.4	0.0	0.0	7,952,441.8	325,590,000.0	0.0	0.0	**457,072,576.8**
Cyanides	0.0	2,260.0	124.6	1,283.9	451.0	48.0	0.0	0.0	0.0	561.0	8.0	7,455.0	0.0	0.0	**12,191.6**
Fluorides	39,230.0	127,660.0	31,533.0	81,945.5	21,170.0	0.0	0.0	0.0	0.0	0.0	554.5	3,570.0	0.0	0.0	**305,663.0**
DEHP	102.5	16.2	36.5	199.4	0.0	16.0	2.1	0.0	0.0	0.0	0.0	968.0	0.0	0.0	**1,340.7**
Fluoranthene	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**3.0**
NP/NPEs	0.0	66.5	2.7	0.0	0.0	59.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**130.3**
Octylphenols	0.0	0.0	1.4	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**3.4**
Organotin Compounds	0.0	0.0	64,864.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**64,864.2**
Phenols	0.0	538.0	404.1	2,530.4	3,187.8	0.0	257.3	0.0	0.0	92.0	2,324.7	12,274.7	0.0	0.0	**21,609.0**
PAHs	5.5	6.9	0.0	12.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**25.2**
Diuron	9.1	5.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**14.3**
Isoproturon	1.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**2.5**
Lindane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	**1.3**

Table 4: Number of industrial facilities and urban wastewater treatment plants with reported direct hazardous substance releases according to compounds and industrial sectors

Substance	Pollutant group	Energy sector	Production and processing of metals	Mineral industry	Chemical industry	Waste and industrial wastewater management	Urban wastewater management	Paper and wood production processing	Intensive livestock production and aquaculture	Products from the food and beverage sector	Other activities	Basin
Chloro-Alkanes (C10-13)	CHLORG	0	1	0	0	0	1	0	0	0	0	**2**
Dichloroethane-1,2 (DCE)	CHLORG	0	0	0	2	0	0	0	0	0	0	**2**
Dichloromethane (DCM)	CHLORG	0	1	0	2	0	0	0	0	0	0	**3**
Halogenated Organic Compounds	CHLORG	2	1	0	2	1	7	3	0	0	0	**16**
Pentachlorophenol (PCP)	CHLORG	0	0	0	0	1	0	0	0	0	0	**1**
Polychlorinated Biphenyls (PCBs)	CHLORG	1	0	0	0	0	0	0	0	0	0	**1**
Tetrachloroethylene (PER)	CHLORG	0	1	0	0	0	1	0	0	0	0	**2**
Trichlorobenzenes (TCH)	CHLORG	0	0	0	1	0	0	0	0	0	0	**1**
Trichloroethylene (TRI)	CHLORG	0	1	0	1	0	0	0	0	0	0	**2**
Trichloromethane	CHLORG	0	1	0	2	1	0	0	0	0	0	**4**
Vinyl Chloride	CHLORG	0	0	0	1	0	0	0	0	0	0	**1**
As and Compounds	HEVMET	4	1	4	0	3	10	0	0	0	0	**22**
Cd and Compounds	HEVMET	1	1	1	0	0	12	1	0	0	0	**16**
Cr And Compounds	HEVMET	3	6	0	1	0	21	2	0	0	0	**33**
Cu and Compounds	HEVMET	5	5	6	1	1	38	1	0	0	0	**57**
Hg and Compounds	HEVMET	1	1	0	4	0	12	1	0	0	0	**19**
Ni and Compounds	HEVMET	9	11	4	4	2	54	1	0	1	2	**88**
Pb and Compounds	HEVMET	4	5	4	1	1	21	2	0	0	0	**38**
Zn and Compounds	HEVMET	7	14	9	6	2	60	3	0	1	0	**102**
Chlorides	INORG	2	2	2	5	0	16	0	0	0	0	**27**
Cyanides	INORG	1	2	1	2	0	7	0	0	0	0	**13**
Fluorides	INORG	2	4	3	4	1	5	0	0	0	0	**19**
DEHP	OTHORG	0	1	0	2	1	26	1	0	0	1	**32**
Fluoranthene	OTHORG	0	1	0	0	0	0	0	0	0	0	**1**
NP/NPEs	OTHORG	0	2	0	1	2	12	1	0	0	0	**18**

Substance	Pollutant group	Energy sector	Production and processing of metals	Mineral industry	Chemical industry	Waste and industrial wastewater management	Urban wastewater management	Paper and wood production processing	Intensive livestock production and aquaculture	Products from the food and beverage sector	Other activities	Basin
Octylphenols and Ethoxylates	OTHORG	0	0	0	0	0	2	0	0	0	0	**2**
Organotin Compounds	OTHORG	0	0	0	0	0	1	0	0	0	0	**1**
Phenols	OTHORG	7	3	1	6	1	13	0	0	1	0	**32**
PAHs	OTHORG	1	1	0	0	1	1	0	0	0	0	**4**
Diuron	PEST	0	0	0	0	0	7	0	0	0	0	**7**
Isoproturon	PEST	0	0	0	0	0	2	0	0	0	0	**2**
Lindane	PEST	0	0	0	1	0	0	0	0	0	0	**1**

Table 5: Reported direct hazardous substance releases according to compounds and industrial sectors (kg/year)

Substance	Energy sector	Production and processing of metals	Mineral industry	Chemical industry	Waste and industrial wastewater management	Urban wastewater management	Paper and wood production processing	Intensive livestock production and aquaculture	Products from the food and beverage sector	Other activities	Basin
Chloro-Alkanes (C10-13)	0.0	20.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**20.8**
Dichloroethane-1,2 (DCE)	0.0	0.0	0.0	567.0	0.0	0.0	0.0	0.0	0.0	0.0	**567.0**
Dichloromethane (DCM)	0.0	28.0	0.0	74.0	0.0	0.0	0.0	0.0	0.0	0.0	**102.0**
Halogenated Organic Compounds	3,141.7	1,389.8	0.0	7,480.0	2,610.0	9,446.4	21,071.7	0.0	0.0	0.0	**45,139.6**
Pentachlorophenol (PCP)	0.0	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	**1.9**
Polychlorinated Biphenyls (PCBs)	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.6**
Tetrachloroethylene (PER)	0.0	28.8	0.0	0.0	0.0	11.5	0.0	0.0	0.0	0.0	**40.3**
Trichlorobenzenes (TCH)	0.0	0.0	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	**3.7**
Trichloroethylene (TRI)	0.0	28.8	0.0	121.0	0.0	0.0	0.0	0.0	0.0	0.0	**149.8**
Trichloromethane	0.0	27.2	0.0	452.0	54.8	0.0	0.0	0.0	0.0	0.0	**534.0**
Vinyl Chloride	0.0	0.0	0.0	360.0	0.0	0.0	0.0	0.0	0.0	0.0	**360.0**
As and Compounds	63.4	11.0	73.5	0.0	704.0	1,839.4	0.0	0.0	0.0	0.0	**2,691.3**
Cd and Compounds	140.2	28.8	6.0	0.0	0.0	1,038.1	11.9	0.0	0.0	0.0	**1,225.1**

Substance	Energy sector	Production and processing of metals	Mineral industry	Chemical industry	Waste and industrial wastewater management	Urban wastewater management	Paper and wood production processing	Intensive livestock production and aquaculture	Products from the food and beverage sector	Other activities	Basin
Cr And Compounds	925.1	1,556.9	0.0	2.4	0.0	13,496.7	145.0	0.0	0.0	0.0	**16,126.1**
Cu and Compounds	1,310.1	2,183.0	42,487.0	437.0	110.5	28,007.5	270.0	0.0	0.0	0.0	**74,805.1**
Hg and Compounds	84.7	5.8	0.0	128.3	0.0	117.0	8.0	0.0	0.0	0.0	**343.7**
Ni and Compounds	2,515.2	1,711.8	232.0	198.8	660.1	16,106.1	139.0	0.0	59.1	61.4	**21,683.4**
Pb and Compounds	2,119.3	3,448.0	1,014.0	51.6	87.0	7,728.4	156.0	0.0	0.0	0.0	**14,604.2**
Zn and Compounds	2,360.8	27,112.9	10,099.3	20,584.0	3,332.7	150,346.8	2,463.8	0.0	500.0	0.0	**216,800.3**
Chlorides	842.4	7,491,044.7	7,952,441.8	325,496,822.0	0.0	116,131,426.0	0.0	0.0	0.0	0.0	**457,072,576.8**
Cyanides	65.5	2,206.4	561.0	320.5	0.0	9,038.2	0.0	0.0	0.0	0.0	**12,191.6**
Fluorides	20,474.0	35,150.0	8,314.5	110,397.5	10,100.0	121,227.0	0.0	0.0	0.0	0.0	**305,663.0**
DEHP	0.0	181.1	0.0	6.5	12.7	1,123.9	14.0	0.0	0.0	2.5	**1,340.7**
Fluoranthene	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**3.0**
NP/NPEs	0.0	4.5	0.0	2.1	8.1	112.1	3.4	0.0	0.0	0.0	**130.3**
Octylphenols and Ethoxylates	0.0	0.0	0.0	0.0	0.0	3.4	0.0	0.0	0.0	0.0	**3.4**
Organotin Compounds	0.0	0.0	0.0	0.0	0.0	64,864.2	0.0	0.0	0.0	0.0	**64,864.2**
Phenols	2,845.3	916.3	44.0	875.7	31.0	16,875.7	0.0	0.0	21.0	0.0	**21,609.0**
PAHs	5.1	7.7	0.0	0.0	6.9	5.5	0.0	0.0	0.0	0.0	**25.2**
Diuron	0.0	0.0	0.0	0.0	0.0	14.3	0.0	0.0	0.0	0.0	**14.3**
Isoproturon	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	**2.5**
Lindane	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	**1.3**

Technical information on the national inventories on priority substances emissions, discharges and losses were collected directly from the countries by a questionnaire. Summarizing tables of the answers are provided in the followings.

Table 6: Answers to Questions 1-4

Country	Q1	Q2	Q3	Q4
	EU MS: what is the current status of the elaboration of the PS EDL inventory and when will the assessments be available? Non-EU MS: is there any similar activity on-going or planned?	Which point sources are involved into the assessments? How are the emissions quantified?	Do you address PS diffuse pollution? How do you assess the diffuse emissions?	Which pollutants/pollutant groups have been involved to the emission assessments?
DE	The second PS EDL inventory for Germany was prepared in December 2019. It comprises methodological aspects as well as values and assessments for all PS. The findings will be published soon in a contribution which will be included in all River Basin Management plans.	Point sources included industrial discharges, municipal discharges, and in the case of the RPA data, emissions from historic mining sites. Sources were: (a) PRTR data from industrial dischargers and municipal point sources (> 100,000 p.e.), if PRTR data were not available for the latter see (b). (b) For discharges from municipal WWTPs > 50 PE, data using emission factors were used (for 11 substances: Cd, Hg, Ni, Pb, Diuron, Isoproturon, DEHP, 4-iso-Nonylphenol, PFOS, Terbutryn, Fluoranthene), based on data from a Germany-wide research project (Toshovski et al. 2020). UWWTD data were used as baseline information. (c) Emissions from historical mining sites are based on monitoring information from the Ger-man federal states (for metals only). PRTR data: Measurements or estimates of wastewater concentrations. Municipal wastewater treatment plants: emission factors, if available.	Depending on data availability either the riverine load approach or the regionalised pathway-oriented analysis approach (Cd, Hg, Ni, Pb, PAHs) of CIS Guidance No 28 were used to estimate diffuse emissions. Therefore, the model MoRE (Modelling of Regionalized Emissions) was used.	All PS were considered using the 2-step approach described in CIS Guidance 28. 16 substances were identified as “not relevant” (in the context required in the Guidance) in all ten German RBD. Substances identified as relevant have been involved to further emission assessment.

Country	Q1 EU MS: what is the current status of the elaboration of the PS EDL inventory and when will the assessments be available? Non-EU MS: is there any similar activity on-going or planned?	Q2 Which point sources are involved into the assessments? How are the emissions quantified?	Q3 Do you address PS diffuse pollution? How do you assess the diffuse emissions?	Q4 Which pollutants/pollutant groups have been involved to the emission assessments?
AT	Status PS EDL: For point sources the Austrian Emission Register for emissions into surface waters EMREG-OW is the basis for the PS EDL supplemented by data from the E-PRTR. First estimates for diffuse emissions were developed within the project "Emissionsabschätzung prioritäre Stoffe". A detailed emission modelling was done within the project "STOBIMO Spurenstoffe". For selected ubiquitous persistent, bioaccumulative and toxic priority (uPBT) substances emissions to surface waters via various pathways were modelled.	The assessment considers urban wastewater treatment plants (UWWTP) as well as industrial facilities and waste disposal systems, discharging directly to surface waters. Emissions from these installations are either reported to the national emissions register EMREG-OW or to E-PRTR or estimated based on monitoring programs. Emissions from UWWTP were documented in the report "Emissionen ausgewählter prioritärer und sonstiger Stoffe aus kommunalen Kläranlagen". Selected uPBT substances were measured in industrial facilities representing the most important industrial activities in AT within the project „STOBIMO Spurenstoffe". Those measured concentration values have been used in the modelling. In case no measures or emission factors are available for point sources emissions are calculated on base of maximum allowable concentrations (legislation).	Depending on data availability either the riverine load or the regional path analysis approach of CIS Guidance No 28 were used to estimate diffuse emissions. Within the projects "Emissionsabschätzung prioritäre Stoffe" und "STOBIMO Spurenstoffe" a combination of pathway and source-oriented approach was applied. Several pathways for diffuse emissions as direct atmospheric deposition for surface waters, surface runoff, diffuse emissions from urban areas via combined sewer overflows and separate sewer discharges, erosion from natural and agricultural soils as well as groundwater and interflow were included. Load calculation for these diffuse pathways are based on monitoring data. Selected pilot catchment areas were monitored in order to generate data for the AT wide modelling.	All PS were taken into account using the 2-step approach described in CIS Guidance 28. For point source emissions from UWWTP and industrial facilities all emission data reported to EMREG-OW and E-PRTR is assessed. Additionally, all substances identified as relevant for UWWTPs within the project "Emissionen ausgewählter prioritärer und sonstiger Stoffe aus kommunalen Kläranlagen" were considered. The modelling within the project "STOBIMO Spurenstoffe" focussed on uPBT substances as metals (cadmium, lead, nickel, mercury, copper and zinc), PBDE, TBT, PFOS and PAH.
CZ	In the Czech Republic, the PS EDL inventory was developing by the project in the years 2012 to 2014. Assessment is available in the form of certified methodology. The methodology establishes principles for the assessment of emissions impact; it describes the individual steps, from the identification of relevant pollutants in the catchment area, through the analysis of pollution sources and pathways, to the classification of the significance of groups of sources and pathways for individual substances and water bodies.	All known sources of pollution were involved into the assessment (municipal, industrial, combined, diffusion, point and nonpoint sources of pollution). Analysis of the sources and pathways of pollutants used a wide range of data available on a national scale. When emissions data were not available, emission factors were processed (coefficients of substances inputs per unit, designated by expert estimate).	The equation: "Difference of surface water load and point source emissions (- natural background load) = emissions from diffuse sources" is insufficient in some cases. More used is specific knowledge of movement of substances (behaviour substances). E.g. in agriculture: total applied load and pathways (use of emission factor for pathways) up to the pathway coming into surface waters.	There were assessed all priority and priority hazardous substances (Annex X of the Water Framework Directive) and other substances relevant for the Czech Republic (total 79 substances or quality indicators in the project).
SK	Elaboration of the PS EDL inventory is available.	Into assessment industrial facilities, E-PRTR were involved. (UWWTD data lack information on pollution by PS). Point sources emissions were quantified on the base of effluent measurements.	PS diffuse pollution was addressed. Diffuse loads were calculated by formula: Ldif = Ly (total riverine load) – Dp (total point source discharge) – Lb (natural background load) The quantification of emissions, discharges and losses was carried out by calculating of the riverine load (by OSPAR, 2004 equation - recommended by technical guidance) and then by linking results with existing information on the pollution sources or eventually with natural background. For metals the natural background concentrations - developed for	Relevance substances for RBD and sub-basins. They were identified on the base of following criteria: i.) the substance causing the failure state of at least one water bodies ii.) the average concentration of the substance is over half EQS in more than one waterbody

Country	Q1	Q2	Q3	Q4
	EU MS: what is the current status of the elaboration of the PS EDL inventory and when will the assessments be available? Non-EU MS: is there any similar activity on-going or planned?	Which point sources are involved into the assessments? How are the emissions quantified?	Do you address PS diffuse pollution? How do you assess the diffuse emissions?	Which pollutants/pollutant groups have been involved to the emission assessments?
			each of the WB, were taken into account. In case of synthetic substances - for level of background concentration, half of the limit of quantification (0,5LOQ) have been used.	iii.) Data from E-PRTR and national Central water database (SEV) confirm the release, which could lead to a concentration corresponding to the above criteria, iv.) there are known sources and activities causing inputs to the basin that could lead to a concentration corresponding to the above criteria.
HU	The compilation of the inventory is still ongoing. Final results will be available by December of 2021.	UWWTPs, Industrial facilities. Industrial facilities - every facility with above 15 m^3 wastewater discharge/operative days, not just E-PRTR UWWTP - > effluent measures, industrial facilities effluent measures, and for metals also used emission factors.	Hungary takes into consideration loads from air deposition, groundwater and transportation. By air deposition we used data from European Monitoring and Evaluation Programme (EMEP) and Corine Land Cover. And also, we take account our air deposition monitoring program results. To assess loads from groundwater we took the estimated interflow and ps. concentrations of the infiltration area. By loads of transportation we used the number of motor vehicles and emission factors of toxic metal loads from break wear, tire wear and exhaust gases.	Due to the results of the chemical status assessment we tried to consider all the relevant substances. Depending on the substance it resulted in different detailed inventories.
SI	Summary of the PS EDL inventory is part of national RBMP.	In the assessment industrial facilities and UWWTPs data are included. For UWWTP > 100.000 PE the emissions were quantified using values reported in E-PRTR system. For the UWWTP < 100.000 PE and for industrial facilities annual reports of emission monitoring (effluent measurements) performed were used.	Evaluation of emissions from diffuse sources depends on data availability and takes into account the CIS Guidance No 28.	PS, PHS and pollutants relevant on the national level were involved.
HR	The compilation of the inventory is still ongoing. Summary of the PS EDL inventory will be available in national RBMP.	Point sources included industrial and municipal discharges. Emission from industrial and municipal discharges are based on measurements of wastewater concentrations or using emission factors.	Evaluation of emissions from diffuse sources depends on data availability and takes into account the CIS Guidance No 28.	PS, PHS and pollutants relevant on the national level were involved.
BA	No information available.			
ME	No information available.			
RS	There is no established inventory of emissions, discharges and losses. Currently, SEPA is developing and maintaining PRTR register in Serbia. From 2011, SEPA voluntarily report to the EEA E-PETR priority data flow. Serbian PRTR register was established in 2008 and in	All point sources subject to water permit, which means sewage systems and/or WWTPs and industrial facilities (PRTR facilities), are obligated to deliver a report on wastewater emissions, providing the concentrations of PS in wastewater, although the number and the quality of the reports are still not	No. PS diffuse pollution has not evaluated due to lack of adequate data.	Heavy metals, together with total phosphorus and nitrogen, are pollutants that are mostly represented and involved in emission assessment.

Country	Q1	Q2	Q3	Q4
	EU MS: what is the current status of the elaboration of the PS EDL inventory and when will the assessments be available? Non-EU MS: is there any similar activity on-going or planned?	Which point sources are involved into the assessments? How are the emissions quantified?	Do you address PS diffuse pollution? How do you assess the diffuse emissions?	Which pollutants/pollutant groups have been involved to the emission assessments?
	2010 was harmonized with the EU Regulation 166/2006, except for reporting thresholds. All PRTR facilities must report all emissions regardless to the reporting thresholds. All facilities which have obligation to report to Serbian PRTR register submit the relevant reports by means of the established information system. All pollutants prescribed by e-PRTR Protocol, with regard to the activity of the facility, are being reported to SEPA, and PRTR Report delivered to European Agency has only emissions above prescribed limit values The data collection and reporting system has been improved gradually to cover all releases and transfers to all media covered by the E-PRTR Regulation. Separately, there is Cadastre of polluters which contains register, permits and technical and other documentation on sources of pollution, quantity and type of emission, as well as information on recipients.	satisfying. Emissions are delivered based on measurements, estimates or calculation.		
RO	Romania has established the EDL inventory based on the EU Guidance no. 28 “Technical Guidance on the Preparation of an Inventory of Emissions, Discharges and Losses of Priority and Priority Hazardous Substances”. The last inventory developed included the analysis of EDL from 2017-2019. This assessment/result of the inventory is part of the draft of the National Management Plan-2021 and of the draft River Basin Management Plans-2021 (at sub-unit level).	In Romania all point sources which are subject of water management license have been analysed in the inventory (i.e. urban waste waters and industrial waters) if priority substances were discharged. The concentrations in effluent have been measured and the PS load has been calculated.	The estimation of diffuse sources contribution was calculated (as difference between the total annual riverine load and the point source load).	Emission assessments were made only for relevant PS at the basin/sub-basin unit.
BG	The PS EDL inventory for Bulgaria was prepared in 2016 based on the EU Guidance no. 28 “Technical Guidance on the Preparation of an Inventory of Emissions, Discharges and Losses of Priority and Priority Hazardous Substances”.	According to the guidelines for determining the mass load of pollutants in wastewater from point sources of pollution in the inventory of emissions, discharges and losses of priority substances and some other pollutants are taken into account the following data: from the monitoring of wastewater from the sites forming waste water, including treatment plants in settlements, including self-monitoring of permit holders, as well as reported data, in accordance with the obligation of operators listed in Annex I to Regulation № 166/2006 establishing a European Pollutant Release and Transfer Register (E-PRTR), to report data on the release and transfer of pollutants listed in Annex II of the Regulation.	An approximate estimate of the diffuse pollution from priority substances, calculated as an arithmetic difference between the calculated load of the surface water body and the emissions from point sources of pollution.	All PS were taken into account using the 2-step approach described in CIS Guidance 28. In the calculations data on the concentrations of the substances from the conducted monitoring of the surface waters from the “Water Monitoring Information System” were used and industrial facilities all emission data reported to E-PRTR is assessed. Five priority substances, four heavy metals - mercury, lead,

Country	Q1	Q2	Q3	Q4
	EU MS: what is the current status of the elaboration of the PS EDL inventory and when will the assessments be available? Non-EU MS: is there any similar activity on-going or planned?	Which point sources are involved into the assessments? How are the emissions quantified?	Do you address PS diffuse pollution? How do you assess the diffuse emissions?	Which pollutants/pollutant groups have been involved to the emission assessments?
		The calculation of the mass load of pollutants in the wastewater is based on the available data from the conducted own monitoring of the sites with discharge permits or complex permits, including the amount of wastewater and the concentration of emitted pollutants, as well as the data from the control monitoring. At concentrations of the substance below the limit of determination, ½ LOQ was used in the calculations. The mass load of pollutants in wastewater from point sources is calculated by multiplying the average annual concentration of the respective pollutant by the annual amount of discharged wastewater.		nickel, cadmium and 1,2 - dichloroethane were inventoried.
MD	In 2016 the e -PRTR register has been developed, aimed for the companies to report and for the public to get information about activities, types of pollutions, sources, etc. In 2018, the Regulation regarding the National Register of pollutant release and transfer was approved by GD #.373/ 2018. This Regulation addressed the basis for establishing of an automated national system with data on pollutant emissions into water, air, etc. to be reported by operators carrying out one or more activities.	In currently reported wastewater statistics, the emissions are counted on the basis of influent-effluent measures.	Currently, due to some objective reasons, the established Register is not officially handed over to the Environmental Agency which is a body responsible for its administration. By the time being, the Register contains some info collected during its elaboration before 2018, and only few of them relate to emission into water from operators situated out of Danube basin.	None.
UA	The only National Inventory of Pollutant Emissions operates by the time being. This inventory contains data on all substances, including PS. Monitoring begun in one river basin in 2019. In 2021 PS monitoring cover all other 7 river basin for 37 substances.	Point sources facilities (UWWTP and industry) which are subject of water management license are considered. Industrial facilities - every facility with above 20 m3 wastewater discharge. Point sources emission are calculated on the base of effluent concentrations.	Diffuse pollution is calculated as Total river load – Point sources emissions.	Emission assessments are made only for relevant PS at the basin/sub-basin unit.

Table 7: Answers to Questions 5-8

Country	Q5	Q6	Q7	Q8
	Which pollutants/pollutant groups have been measured in the water bodies? What kind of monitoring is used? Is the data frequency appropriate for load calculations?	What particular substances have been found of national importance?	What are the most important problems/gaps identified related to the inventory compilation?	Have specific measures been recommended to control PS emissions?
DE	Most of the PS were measured at surveillance monitoring sites (mostly in water samples, sometimes also in suspended solid material). Especially the new substances were only rarely monitored yet. Most measurements were done at regular stations.	Using the 2-step approach described in the CIS Guidance No 28 two ubiquity substances were identified as "relevant" in all German RBD (Hg, BDE). 14 substances are "relevant in more than two German RBD. The main results will be published soon.	Several analytical problems have been encountered. For example, normal sampling times for emission monitoring programs are too short to provide a robust long-term average signal need-ed for load calculations. Sometimes the quantitation limit was not low enough to produce inventory data. The WFD sample preparation is not consistent for certain substances. Heavy metals are analysed as filtered sample for the status assessment, but as unfiltered sample for the inventory calculation. As is to be expected, the results differ. Similar problems exist for substances for which only biota standards are specified. For many substances, there is a lack of reliable environmental data to characterize diffuse emission pathways (groundwater, atmospheric deposition, erosion, urban wastewater systems).	Further analytical method development is necessary for some substances in order to meet the requirements of the EQS Directive and its national implementation (OGewV). There is a need for harmonisation in planning and implementation of monitoring programs in the German federal states. The existing data base should be further expanded through coordinated and harmonized research work. In view of the high priority of diffuse input pathways and the current data situation, further efforts must be made to im-prove the data basis as well as to further develop the tools for substance input modelling.
AT	Different pollutant groups are monitored regularly or in specific monitoring campaigns. Most of the PS were measured at surveillance monitoring sites in water or in biota samples. For Heavy metals the data frequency is appropriate for load calculations (12 per year) in single years. However, data above the detection limit are sparse for some substances, hindering the appropriate calculation of loads. Some pollutants (e.g. pesticides) are measured only in specific campaigns. Some PS, for which biota EQS are defined, are monitored in biota only. For those substances the calculation of appropriate riverine loads is not possible.	Nutrients and some ubiquity substances are in the focus: Tributyltin; PAH; mercury; PBDE and PFOS (Draft RBMP 2021).	The availability of resilient data for PS in different diffuse pathways (e.g. deposition, groundwater; erosion) are the most important gaps in Austria related to the inventory compilation.	Point source discharges have to meet the requirements of the branch specific emission ordinances (Abwasseremissionsverordnungen). For most relevant/ problematic PS as uPBT substances the dominant emissions derive from diffuse sources and one major emission is via erosion. Reducing erosion also reduces EDL of uPBT substances to surface waters. In the draft version of the NGP (National water management plan) no specific measures are foreseen for the most problematic uPBT substances mercury and PBDE.
CZ	The monitored indicators are deriving according to the requirements of the National Monitoring Program, which be accepted by the Ministry of the Environment and the Ministry of Agriculture. In the monitored	Problematic is mainly the content of some heavy metals, PAH components and pesticides.	Knowledge about the loads of surface waters by priority substances coming from different diffuse pathways - derivation of emission factors.	-

Country	Q5	Q6	Q7	Q8
	Which pollutants/pollutant groups have been measured in the water bodies? What kind of monitoring is used? Is the data frequency appropriate for load calculations?	**What particular substances have been found of national importance?**	**What are the most important problems/gaps identified related to the inventory compilation?**	**Have specific measures been recommended to control PS emissions?**
	water bodies, where the measurement frequency is sufficient, you can calculate the load. In some cases (seasonal emission fluctuations), the measurement frequency needs a specific approach.			
SK	Priority substances and substances relevant for SK. Mostly surveillance and operational monitoring. For assessment of chemical status are measured all priority substances, frequency is one in month, 12 per year. River basin specific pollutants are measured in the relevant water bodies, where are discharged.	Following the requirements of the European Water Framework Directive (WFD), a process of selecting relevant dangerous substances and developing a related Pollution Reduction Programme (PRP) has started in the Slovakia in 2001. Based on the results of a three years investigative screening campaign, 59 chemical substances were identified as relevant dangerous substances in 2004 and included in the national PRP. From this list of 59 chemical substances, 33 priority substances were already included in the EQS Directive (2008/105/EC). The remaining 26 relevant dangerous substances were assigned as river basin specific pollutants (Annex VIII substances of the WFD) for the Slovakia. Priority substances relevant for Danube RBD belongs 21 substances: 1. Alachlor 2. Atrazine 3. Cadmium and its compounds 4. Cyclodiene pesticides 5. para-para-DDT 6. Bis(2-etylhexyl)- phthalate (DEHP) 7. Endosulfan 8. Fluoranthene 9. Hexachlorobenzene 10. Hexachlorobutadiene 11. Hexachlorocyclohexane 12. Lead and its compounds 13. Mercury and its compounds 14. Naphthalene 15. Nonylphenol (4-nonylphenol) 16. Octylphenol ((4-(1,1',3,3'-tetrametylbutyl)phenol)) 17. Pentachlorobenzene 18. Pentachlorophenol 19. Polyaromatic hydrocarbons (PAH) 20. Tetrachlorethylene	• insufficiently precise analytical methods for determining some substances as required by Directive 2009/90 / EC laying down further to Directive 2000/60 /EC of the EP and a number of technical requirements for chemical analysis and monitoring of water status • absence of data on the concentrations of PS and SK relevant substances (identified in 2008) in sediment and biota, • insufficient scope of monitoring quality of discharged waste water in relation to PS and SK relevant substances (legislation lacks a tool for compulsory periodic updating of indicators of the pollution - monitoring the full range of PS and SK RS as part of the renewal of the authorization for the discharge of wastewater) • lack of data on air pollution, specific organic substances (PS, SK RS) • comparability of water contamination by heavy metals in the stream, and the wastewater discharges. Issued permits for waste water discharge prescribe- the limit values for total form (bound, not only to water but also of suspended solids), in contrast to the requirements for the chemical status of water bodies - where EQS apply to the filtered water. Therefore, it is presently difficult to estimate the contribution from point and diffuse source in the total riverine load. • insufficient information about the content of PL and RL pollution in municipal wastewater.	For identified sources of pollution (point and diffuse) measures were proposed. In addition to improve future PS EDL inventory following measures were proposed: • reducing the limits LOQ laid down in the case of methods which do not meet the LOQ required by Directive 2010/108 / EC, respectively a switch to other matrix setting of relevant indicators, • introduce monitoring of the organic matter in the monitoring of emissions to air, • creating tools to increase the level of future emissions inventories (e.g. Models, data on the production and use of substances – e.g. REACH, from the analysis of substance cycles, production and emission factors).

Country	Q5	Q6	Q7	Q8
	Which pollutants/pollutant groups have been measured in the water bodies? What kind of monitoring is used? Is the data frequency appropriate for load calculations?	What particular substances have been found of national importance?	What are the most important problems/gaps identified related to the inventory compilation?	Have specific measures been recommended to control PS emissions?
		21. Trichloromethane (chloroform) From SK relevant substances (identified in 2008) 10 substances are relevant for Danube RBD: 1. 2-methyl-4-chlorophenoxyacetic acid (MCPA), 2. 4-metyl-2,6-di-terc butylphenol, 3. arsenic and its compounds, 4. Dibutyl phthalate, 5. phenanthrene, 6. Chromium and its compounds 7. cyanides, 8. copper and its compounds, 9. PCB and its congeners (28, 52, 101, 118, 138, 153,180), 10. zinc and its compounds.		
HU	We used mainly the data of surveillance monitoring stations (12 samples/year), and many operational and investigative monitoring program results. Quantity and quality of monitoring data was almost sufficient.	We have many problems with PBTs (almost all of it), PAHs and Cd.	Estimations on diffuse loads have significant uncertainty. Mainly from historical pollution sources e.g. diffuse emission from soil via erosion. Many of cross border influent water bodies are in bad status, but we have lack of information about emission source on the upstream catchments. Other problem is heterogenic monitoring data and information gap on priority substances emission coming from UWWT. Emission and immission data cannot be compared because the measured parameters are different. By metals the emission site measures the total amount yet the immission only the dissolved. Pesticides and organic compounds are measured as components, but by emissions we have got only parameter group data: halogenated organic compounds, or PAHs etc.	Between measures provided for river basin management plan there are many which consider supplementary monitoring (UWWTPs, industrial facilities). We plan investigate monitoring programs for better describing emission pathways e.g. soil and air depositions, and UWWTP and chemical industry discharge monitoring to get more information on PS discharges.
SI	One year during the RBMP period the surveillance monitoring on surveillance monitoring stations is being performed. In this surveillance monitoring mostly/mainly the whole set of priority substances is included.	Some substances are found as being relevant at the basin/sub-basin unit.	The lack of tools to estimate diffuse sources of pollution (such as pesticides/biocides from agricultural activities, illegal landfills, pollution from urban areas, storm overflows).	The requirements of the national legislation have to be fulfilled.

Country	Q5	Q6	Q7	Q8
	Which pollutants/pollutant groups have been measured in the water bodies? What kind of monitoring is used? Is the data frequency appropriate for load calculations?	**What particular substances have been found of national importance?**	**What are the most important problems/gaps identified related to the inventory compilation?**	**Have specific measures been recommended to control PS emissions?**
	On the other (regular) monitoring stations or during the other 5 years of the RBMP period the priority substances are being measured as circumstances require with regard to emissions, discharges and findings of the previous monitoring (if any excess over the quality standard is being measured, we confirm it or annul it in the next years with proceeded monitoring). On principle specific campaigns are not performed, exceptionally for the purpose of the investigative monitoring. The frequency of priority substances measurement is in line with the WFD (12 times/year).			
HR	All Priority substances and substances relevant for HR. Mostly surveillance and operational monitoring. For assessment of chemical status are measured all priority substances, frequency is one in month, 12 per year. River basin specific pollutants are measured in the relevant water bodies, where are discharged.	We have problems with PBTs in biota (Hg, BDE).	The lack of tools to estimate diffuse sources of pollution (such as urban areas, storm overflows).	The requirements of the national legislation have to be fulfilled.
BA	No information available.			
ME	No information available.			
RS	In 2021, 54 prescribed priority substances were monitored through operational monitoring together with additional 32 that were chosen based on results from previous years. Frequency of monitoring varies depending on waterbody, from 4 to 12 times per year. Due to insufficient financial and human capacity, monitoring still doesn't cover all designated water bodies in RS.	In the Environmental Status Report, heavy metals are pointed out as relevant.	Main gap is insufficient data pool due to lack of human and financial resources. Also, the lack of information on diffuse emissions, no established system on gathering data on agricultural use of priority substances, landfill pollution, etc.	In the draft version of the RBMP proposed measures are implementation IED regulates and key measures: phasing-out / reduction of emissions, discharges and losses of PS, remediation of contaminated sites (historical pollution including sediments, groundwater, soil), upgrades or improvements of industrial wastewater treatment plants and research, improvement of knowledge base reducing uncertainty.

Country	Q5 Which pollutants/pollutant groups have been measured in the water bodies? What kind of monitoring is used? Is the data frequency appropriate for load calculations?	Q6 What particular substances have been found of national importance?	Q7 What are the most important problems/gaps identified related to the inventory compilation?	Q8 Have specific measures been recommended to control PS emissions?
RO	The monitoring of emissions of priority substances (included in Annex 1 of the Directive 2013/39/EU) was performed taking into account the existence of analysis methods, the type of wastewater discharged (taking into account the specific field of activity from which they come), but also the presence (identification) of these substances in the water body. For C10-C13-chloroalkanes, no method was available. Tributyltin compounds, dioxins, and dioxin-type compounds are not analysed because the method held and applied involves high risks of use/operation for personnel. Monitoring data are coming from regular monitoring according to the WFD requirements. Sampling and analysis is usually conducted with frequencies of 12 times per year. The frequency of monitoring data is appropriate for annual riverine load calculation.	Heavy metals are found as being relevant at the basin/sub-basin unit. The relevance step was based on the criteria EU Guidance no. 28.	The main gaps are the followings: lack of tool to estimate the diffuse emissions, lack in certain cases of point sources and frequent of diffuse sources, there was not possible the assign a certain substance found in the aquatic environment to an appropriate source.	The measures proposed are designed for reduction of a number of substances (e.g. heavy metals).
BG	Pollutants from the group of Priority Substances, Annex 1 of EC Directive 2008/105 have been measured. The results are from the planned / conducted control and operational monitoring with a frequency of 12 / year, according to the monitoring program. Pollutants from the same group of Priority Substances have been measured and used in the assessment, but with a frequency of 1 to 4 times a year at the points of discharge of industrial plants and treatment plants, which are defined in the plans for own monitoring approved by the Danube Basin Directorate.	For all heavy metals in the group of priority substances, emissions from point sources of pollution have decreased for the period 2009-2015. The substance 1,2-dichloroethane was not detected in 2015. For heavy metals cadmium, lead and nickel, emissions from diffuse sources of pollution have decreased for the period 2009-2015. The substance 1,2-dichloroethane in 2015 and as a diffuse source is not detected.	At the time of the inventory process, some of the PS / 4 in number / are not analyzed due to undeveloped in the EEA methodologies for analysis. Some priority substances do not have a set of 12 samplings and a correspondingly lower number of results within a year due to bad weather conditions (monitoring stations are high in the mountains). Lack or insufficiently correct monitoring of the quantities of discharged wastewater.	Mercury emissions through diffuse pollution have increased and as a result, expanded monitoring of mercury in the other two matrices is planned - biota and sediment for the period of RBMP 2016-2021, seeking additional information from the analysis of priority substances.
MD	In the frameworks of Feasibility Study, there were preliminary identified HS relevant for entire Republic of Moldova, as well as facilities emitting HS. Thus, on the nation-wide level, there were identified next relevant to PRTR industrial sectors fall under the Protocol's requirements according to capacity thresholds: energy (3 facilities), production and processing of metals (1 facility), mineral	Particular HS of national importance were not identified yet.	Institutional constrains & lack of funds.	None.

Country	Q5 Which pollutants/pollutant groups have been measured in the water bodies? What kind of monitoring is used? Is the data frequency appropriate for load calculations?	Q6 What particular substances have been found of national importance?	Q7 What are the most important problems/gaps identified related to the inventory compilation?	Q8 Have specific measures been recommended to control PS emissions?
	industry (ac. 19 facilities) , chemical industry/ pharmaceutical (1 facility), waste and waste water management (4-5 facilities, from which 1 landfill, and 3-4 UWWTPs), paper production and processing (2 facilities), intensive livestock production, etc. However, it shall be mentioned that not even one UWWTP or industrial facility with exceeding threshold values was identified in the Moldovan part of the Danube basin Besides, there were identified the following officially reported to national statistics HS: N tot., P tot., As, Cd, Cr, Cu, Pb, Ni, Hg, Zn, DDT, Benzene, Phenols, PAH, chlorides, and cyanides. For the monitoring are used both regular stations and specific campaigns. In fact, Hydrometeorological Service regularly monitors in rivers 73 chemical parameters, including heavy metals, organic substances, organochlorine pesticides and PAH. Data frequency is appropriate for load calculation.			
UA	37 from the 45 PS are measured at surveillance monitoring sites. Frequency is one in month, 12 per year.	Screening of water samples and bottom sediments is performed to determine the list of specific synthetic and non-synthetic pollutants in 3 river basins. List of hazardous substances in wastewater from enterprises was compiled based on national industry standards; special investigations Pollutant groups are: 21 pesticides (some of which were banned in EU), trace metals, polyaromatic hydrocarbons (PAH), trichloromethane, pentachlorobenzene.	The main gaps are the followings: insufficiently precise of analytical measurements for determining some substances, absence data in sediments and biota, lack of tool to estimate the diffuse emissions constrains & limited funds.	No specific measures have been recommended.

Hazardous substances concentration data in wastewater effluents were collected and analysed in the framework of the SOLUTIONS project (https://www.solutions-project.eu/). The data served the assessments of the toxicity risk of the released substances. Summarizing tables of the analysis results are presented in the followings.

Detailed technical information is available: *Alygizakis, N. A., Besselink, H., Paulus, G. K., Oswald, P., Hornstra, L. M., Oswaldova, M., Medema, G., Thomaidis, N. S., Behnisch, P. A., Slobodnik, J. (2019). Characterization of wastewater effluents in the Danube River Basin with chemical screening, in vitro bioassays and antibiotic resistant genes analysis. Environment International, Volume 127, 420-429.*

Table 8: Number of detected organic compounds at the selected WWTPs according to substance groups

Chemical group	Bucharest	Cluj	Sabac	Zagreb	Varazdin	Ljubljana	Budapest	Vipap	Zilina	Brno	Amstetten	Augsburg
Pharmaceuticals	73	68	67	71	51	71	82	35	61	69	55	67
Antibiotics	23	23	20	21	12	19	22	9	17	18	17	16
Antipsychotic drugs	22	26	29	30	21	28	31	13	25	31	29	27
Hypoglycaemic agents and artificial sweeteners	6	5	5	6	5	6	6	4	5	5	4	6
Drugs of abuse, steroids and tobacco ingredients	20	17	15	17	19	18	17	10	13	17	17	17
Pesticides & Insecticides	25	23	27	26	17	22	25	17	12	22	17	18
Industrial chemicals	24	23	19	23	15	22	29	23	23	23	27	25
Total	**193**	**185**	**182**	**194**	**140**	**186**	**212**	**111**	**156**	**185**	**166**	**176**

Table 9: Cumulated PNEC exceedance ratios of the sampled WWTPs for organic compounds according to substance groups

Chemical group	WWTP1	WWTP2	WWTP3	WWTP4	WWTP5	WWTP6	WWTP7	WWTP8	WWTP9	WWTP10	WWTP11	WWTP12	All WWTPs
Pharmaceuticals	103.7	74.7	85.5	12.5	105.7	90.9	40.3	9.5	67.1	32.7		22.2	644.8
Antibiotics	151.2	14.5	15.4	4.0		12.2	28.0	1.4	1.6	3.0		1.1	232.3
Antipsychotic drugs	1.6	1.1		2.4			12.3	1.6	2.6	2.4		1.0	25.0
Hypoglycaemic agents, sweeteners													
Drugs of abuse, steroids, tobacco	1.4						2.2			1.6			5.1
Pesticides & Insecticides	12.1	2.8	23.0	3.7		9.9	5.5	1.3	2.0	2.8	2.0	7.2	72.2
Industrial chemicals	68.4	102.8	35.5	116.5	26.1	15.0	11.0	83.4	20.4	30.1	44.9	12.7	566.7
Total	**338.4**	**195.8**	**159.3**	**139.1**	**131.7**	**128.0**	**99.3**	**97.2**	**93.6**	**72.5**	**46.9**	**44.3**	**1,546.1**

PNEC: Predicted No Effect Concentration

WWTPs are ranked based on the PNEC exceedance (WWTP1… WWTP12)

Table 10: Cumulated PNEC exceedance ratios of the sampled WWTPs for heavy metals

Heavy metal	WWTP1	WWTP2	WWTP3	WWTP4	WWTP5	WWTP6	WWTP7	WWTP8	WWTP9	WWTP10	WWTP11	WWTP12	All WWTPs
Cadmium	2.0	2.0	2.7										6.7
Chromium	2.5												2.5
Copper								1.2					1.2
Mercury					1.1								1.1
Nickel	1.3			1.4	1.3		1.4						5.4
Lead													
Zinc	2.0	5.3	3.8	3.6	1.4	3.3	1.7	1.6	2.0	1.9			26.7
Total	**7.8**	**7.3**	**6.5**	**5.0**	**3.8**	**3.3**	**3.1**	**2.7**	**2.0**	**1.9**			**43.6**

WWTPs are ranked based on the PNEC exceedance (WWTP1… WWTP12)

Emissions of selected hazardous substances from point and diffuse sources were estimated by the DHSM model in the framework of the Danube Hazard m3c project (preliminary results to be revised, updated and completed in 2022). Summarizing tables of the preliminary modelling results are presented in the followings.

Detailed technical information is available: *Assessment of preliminary modelling results - Pilot region modelling and basin-wide results. Interim Report, Deliverable of the Danube Transnational Programme Project "Danube Hazard m^{3}c - Tackling hazardous substances pollution in the Danube River Basin by Measuring, Modelling-based Management and Capacity building" (DTP3-299-2.1), Deltares, 2021.*

Table 11: Summary overview of quantified emission sources for the investigated substances

Substance	Atmospheric deposition	Agriculture	Road Traffic	Built environment	Households	Industry	Mining	Navigation	Natural background
Cadmium	x	x	x		x	x			
Lead	x	x	x	x	x	x			
Copper	x	x	x	x	x	x			
Arsenic	x		x		x	x			
Nickel	x	x	x		x	x			
Mercury	x	x			x	x			
Zinc	x	x	x	x	x	x		x	
Benzo[*a*]pyrene	x		x		x			x	
PFOS					x				
PFOA					x				
Bisphenol A					x				
Nonylphenol			x		x	x			
4-tert-octylphenol					x	x			
Metolachlor		x			x				
Tebuconazole		x			x				
Carbamezepine					x				
Diclofenac					x				

Table 12: Summary overview of quality of emission source quantification per substances group

Substance	Atmospheric deposition	Agriculture	Road traffic	Built environment	Households	Industry	Mining	Navigation	Natural background
Metals	x	x	xx	x	xx	xx	-	x	x
Benzo[*a*]pyrene (PAH)	xx		xx	-	xx	-		x	
PFAS	-		-	-	xx	-			
Industrial chemicals	-		xx	-	xx	x			
Pesticides		x		-	x				
Pharmaceuticals		-			x				

xx: quantification is considered adequate

x: quantification is considered preliminary

- : quantification is lacking

Grey cells are considered irrelevant

Table 13: Long-term average, basin-wide surface water emissions of selected hazardous substances according to pathways (in kg/year)

Compound	Symbol	Atmosphere	Agriculture	Households	Industry	Navigation	Runoff	Mixed sewers	Urban runoff	Soils	Total
Cadmium	Cd	251.8	0.0	22.2	1,210.1	0.0	321.2	825.9	44.0	23,312.4	**25,987.6**
Lead	Pb	6,373.7	0.0	407.1	14,064.0	0.0	6,469.1	9,777.0	2,688.9	1,160,873.9	**1,200,653.7**
Copper	Cu	15,945.0	0.0	2,819.0	74,855.0	0.0	26,401.0	75,160.6	8,179.9	1,182,312.0	**1,385,672.5**
Arsenic	As	2,093.1	0.0	121.9	2,696.3	0.0	1,441.1	5,823.9	262.3	464,101.3	**476,539.9**
Nickel	Ni	3,744.8	0.0	301.3	21,305.0	0.0	4,094.3	15,754.3	1,603.2	1,222,800.0	**1,269,602.9**
Mercury	Hg	150.8	0.0	17.8	343.7	0.0	151.5	543.8	15.9	4,707.0	**5,930.5**
Zinc	Zn	118,880.0	0.0	9,624.5	216,600.0	6,873.7	139,160.0	594,363.0	253,321.5	2,396,827.0	**3,735,649.7**
Benzo[a]pyrene	BaP	296.8	0.0	2.5	0.0	182.6	156.5	82.9	96.6	1,287.4	**2,105.2**
PFOS	PFOS	0.0	0.0	1.2	0.0	0.0	0.0	102.4	0.0	0.0	**103.6**
PFOA	PFOA	0.0	0.0	3.6	0.0	0.0	0.0	302.0	0.0	0.0	**305.6**
Bisphenol A	BPA	0.0	0.0	43.3	0.0	0.0	0.0	2,490.3	0.0	0.0	**2,533.5**
Metolachlor	Met	0.0	78.3	1.4	0.0	0.0	19.4	119.8	0.0	20.5	**239.5**
Tebuconazole	Teb	0.0	1,855.5	0.2	0.0	0.0	100.4	17.8	0.0	0.0	**1,973.9**
Carbamezepine	Car	0.0	0.0	26.8	0.0	0.0	0.0	2,247.1	0.0	0.0	**2,273.8**
Diclofenac	Dic	0.0	0.0	107.0	0.0	0.0	0.0	5,160.0	0.0	0.0	**5,267.0**
Nonylphenol	NP	0.0	0.0	17.7	130.3	0.0	0.0	371.2	167.3	0.0	**686.4**
4-tert-octylphenol	4tO	0.0	0.0	5.8	3.4	0.0	0.0	486.9	0.0	0.0	**496.0**

Data on Accident Hazard Sites were collected directly from the countries. Data on Tailings Management Facilities were collected by the Danube TMF project and confirmed by the Danube countries (except SI and RS, for these countries data are preliminary). The data served the assessments of the accident hazard of operating industrial sites and the hazard and risk of the tailings ponds. Summarizing tables of the data submitted are presented in the followings.

Detailed technical information on Accident Hazard Sites is available: Inventory of Potential Accidental Risk Spots in the Danube River Basin, Technical report, ICPDR (2001), http://www.icpdr.org/main/issues/accidental-pollution.

Detailed technical information on Tailings Management Facilities is available: Safety of the Tailings Management Facilities in the Danube River Basin, Technical Report, UBA (2020), https://www.umweltbundesamt.de/sites/default/files/medien/5750/publikationen/2020_11_30_texte_185-2020_danube_river_basin_0.pdf.

Table 14: Number of AHS, summed stored volume of substances and total WHI of the Danube countries

Country	All sites			Sites with WHI >5		
	Number of facilities	WHC3_EQ (kg)	WHI	Number of facilities	WHC3_EQ (kg)	WHI
DE*	139	2,350,971,458.2	9.4	116	2,350,218,706.7	9.4
AT	46	16,453,577.5	7.2	13	15,979,341.8	7.2
CZ	46	601,873,734.0	8.8	19	601,309,932.1	8.8
SK	39	2,049,505,525.5	9.3	36	2,049,412,299.1	9.3
HU	316	502,003,733.6	8.7	46	498,958,095.3	8.7
SI	49	389,769,201.2	8.6	24	389,340,667.2	8.6
HR	26	40,258,531.1	7.6	16	39,956,198.2	7.6
BA	18	115,405,091.6	8.1	5	115,211,872.3	8.1
ME	0	0.0	0.0	0	0.0	0.0
RS	23	1,172,820,772.0	9.1	18	1,172,779,395.1	9.1
BG	33	54,750,997.7	7.7	23	54,683,826.9	7.7
RO	234	4,438,144,124.4	9.6	139	4,436,127,001.8	9.6
MD	24	64,709,018.6	7.8	14	64,521,156.2	7.8
UA	17	3,061,676.6	6.5	4	2,995,794.5	6.5
Basin	**1,010**	**11,799,727,442.1**	**10.1**	**473**	**11,791,494,287.2**	**10.1**

WHC3_EQ: Water Hazard Class 3 Equivalent, WHI: Water Hazard Index

* Data are available only from Bavaria

Table 15: Number of AHS, summed stored volume of substances and total WHI of the industrial sectors (sites with WHI > 5)

Industrial sector	Sites with WHI >5		
	Number of facilities	WHC3_EQ (kg)	WHI
Energy sector	215	7,915,321,370.2	9.9
Production and processing of metals	38	24,277,359.4	7.4
Mineral industry	11	148,065,547.5	8.2
Chemical industry	108	1,813,031,621.8	9.3
Waste and wastewater management	10	21,148,458.0	7.3
Paper and wood production processing	3	1,892,872.0	6.3
Intensive livestock production and aquaculture	1	398,107.2	5.6
Animal and vegetable products from the food and beverage sector	3	1,959,638.9	6.3
Transportation and storage	58	1,793,571,367.0	9.3
Other activities	26	71,827,945.1	7.9
Basin	**473**	**11,791,494,287.2**	**10.1**

Table 16: Total number of TMFs, summed tailings volume, weighted average tailings toxicity and average hazard and risk factors for the Danube countries

Country	Number of TMFs	Number of active TMFs	Tailings volume (million m^3)	Weighted Toxicity (WHC)	THI_Cap	THI_Tox	THI_Man	THI_Seism	THI_Flood	THI_Nat	THI_Dam	THI	TEI_Pop	TEI_Env	TEI	TRI
DE																
AT																
CZ	10	5	28.559	2.24	6.18	1.60	1.80	0.00	0.30	0.30	1.00	10.88	3.80	2.00	5.80	16.68
SK	60	26	128.006	1.40	5.75	1.70	1.50	0.43	0.72	1.15	1.00	11.10	3.45	1.98	5.43	16.53
HU	39	3	99.814	1.51	5.46	1.87	0.23	0.41	0.23	0.64	1.00	9.20	4.31	2.31	6.62	15.82
SI	30	8	53.836	1.56	4.88	1.70	0.80	0.87	0.13	1.00	1.00	9.38	3.37	2.37	5.73	15.11
HR																
BA	6	5	46.915	1.71	6.39	2.00	2.50	1.00	0.00	1.00	1.00	12.89	3.00	2.17	5.17	18.06
ME	4	2	13.780	1.59	6.30	2.50	1.50	1.00	0.00	1.00	1.00	12.30	4.25	2.00	6.25	18.55
RS	31	20	754.400	2.25	6.67	2.55	2.71	1.00	0.29	1.29	1.00	14.22	2.48	2.03	4.52	18.73
BG	3	0	1.643	2.88	5.36	2.67	0.00	1.00	0.00	1.00	1.00	10.03	3.67	2.00	5.67	15.69
RO	152	27	468.714	1.77	6.03	1.75	0.53	0.63	0.17	0.80	1.00	10.11	3.49	2.13	5.61	15.72
MD																
UA																
Basin	**335**	**96**	**1,595.667**	**1.95**	**5.88**	**1.84**	**0.98**	**0.62**	**0.28**	**0.90**	**1.00**	**10.60**	**3.48**	**2.13**	**5.61**	**16.21**

WHC: Water Hazard Class, THI_Cap: Capacity Index, THI_Tox: Toxicity Index, THI_Man: Management Index, THI_Flood: Flood Hazard Index, THI_Seism: Seismic Hazard Index, THI_Nat: Natural Hazard Index, THI_Dam: Dam Stability Index, THI: Tailings Hazard Index, TEI_Pop: Population Exposure Index, TEI_Env: Environmental Exposure Index, TEI: Tailings Exposure Index, TRI: Tailings Risk Index

Preliminary data for Slovenia and Serbia, official approval is pending.

No relevance for Germany, Austria, Croatia, Moldova and Ukraine.