

DANUBE RIVER BASIN MANAGEMENT PLAN

UPDATE 2021

ANNEX 3

Urban Wastewater Emission Inventory

ICPDR **IKSD**

International Commission
for the Protection
of the Danube River
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Urban wastewater discharge data were collected from the countries in line with the reporting requirements of the UWWTD (non-EU countries used the same template). The data served the assessments of the point source organic substance and nutrient emissions via urban wastewater discharges for the reference year 2018. Summarizing tables of the data submitted are presented in the followings.

Table 1: Number of agglomerations according to collection and treatment systems (dominant technological level) and countries

Collection and treatment system	DE	AT	CZ	SK	HU	SI	HR	BA	ME	RS	BG	RO	MD	UA	Basin
NP-removal	460	528	133	143	405	92	9	0	1	3	34	163	0	0	1,971
P-removal	76	0	19	60	12	0	0	0	0	0	1	1	0	0	169
N-removal	9	73	19	3	8	0	0	0	0	0	0	2	0	0	114
Secondary treatment	108	3	24	46	96	35	15	3	2	23	9	125	2	11	502
Primary treatment	0	0	0	2	28	0	7	0	0	2	0	9	3	2	53
Collected but not treated	0	0	0	3	0	4	27	25	1	94	18	39	2	15	228
Addressed through IAS	0	0	6	87	65	6	56	0	0	0	19	13	0	0	252
Addressed through local systems	0	0	0	0	0	0	0	108	0	213	0	0	0	0	321
Not collected	0	0	0	1	1	1	22	33	3	7	42	1,497	137	282	2,026
Total	653	604	201	345	615	138	136	169	7	342	123	1,849	144	310	5,636

Table 2: Summed Population Equivalents (PE) according to collection and treatment systems of the agglomerations (dominant technological level) and countries

Collection and treatment system	DE	AT	CZ	SK	HU	SI	HR	BA	ME	RS	BG	RO	MD	UA	Basin
NP-removal	11,693,316	13,549,068	2,143,176	3,165,720	10,117,479	849,708	405,156	0	32,000	193,836	2,517,870	11,617,809	0	0	56,285,138
P-removal	274,643	0	69,792	207,130	371,334	0	0	0	0	0	19,924	13,496	0	0	956,319
N-removal	40,124	286,792	234,671	68,020	41,444	0	0	0	0	0	0	41,052	0	0	712,103
Secondary treatment	370,946	5,499	126,575	200,590	2,403,988	427,329	1,338,200	385,500	12,400	647,809	329,410	1,393,149	20,800	615,848	8,278,043
Primary treatment	0	0	0	7,210	373,231	0	153,140	0	0	45,641	0	419,482	45,900	31,291	1,075,895
Collected but not treated	0	0	0	17,520	0	16,739	523,966	723,784	10,100	4,142,979	122,698	237,644	20,300	127,970	5,943,700
Addressed through IAS	0	0	45,332	331,840	302,079	16,063	282,396	0	0	0	108,005	75,204	0	0	1,160,919
Addressed through local systems	0	0	0	0	0	0	0	778,121	0	1,013,710	0	0	0	0	1,791,831
Not collected	0	0	0	3,600	48,307	3,507	105,379	682,821	89,400	52,955	150,128	6,175,603	495,279	1,154,537	8,961,516
Total	12,379,029	13,841,359	2,619,546	4,001,630	13,657,862	1,313,346	2,808,237	2,570,226	143,900	6,096,930	3,248,035	19,973,439	582,279	1,929,646	85,165,464

Table 3: Summed Population Equivalents (PE) according to collection types and countries

Collection type	DE	AT	CZ	SK	HU	SI	HR	BA	ME	RS	BG	RO	MD	UA	Basin
Collected by sewer	12,365,946	13,754,871	2,464,455	3,451,348	11,648,962	1,203,004	1,987,107	981,528	83,382	4,283,162	2,864,871	12,438,567	81,976	648,924	68,258,102
Collected by IAS	13,083	86,488	155,091	529,408	1,457,217	97,977	557,685	0	0	0	217,253	372,860	0	0	3,487,062
Collected by local systems	0	0	0	0	0	0	0	1,063,387	0	1,674,254	0	0	12,893	0	2,750,534
Not collected	0	0	0	20,874	551,683	12,365	263,445	525,311	60,518	139,514	165,911	7,162,012	487,410	1,280,722	10,669,765
Total	12,379,029	13,841,359	2,619,546	4,001,630	13,657,862	1,313,346	2,808,237	2,570,226	143,900	6,096,930	3,248,035	19,973,439	582,279	1,929,646	85,165,464

Table 4: Number of centralized treatment facilities according to treatment types and countries

Centralized treatment type	DE	AT	CZ	SK	HU	SI	HR	BA	ME	RS	BG	RO	MD	UA	Basin
NP-removal	460	528	116	93	422	56	11	0	2	3	31	165	0	0	1,887
P-removal	9	73	19	4	32	0	0	0	0	0	0	5	0	0	142
N-removal	76	0	19	78	13	0	0	0	0	0	1	4	0	0	191
Secondary treatment	108	3	26	79	99	36	26	11	2	34	10	435	7	12	888
Primary treatment	0	0	0	2	33	0	9	1	0	9	3	35	6	2	100
Collected but not treated	0	0	0	12	0	11	98	73	3	283	87	143	20	21	751
Total	653	604	180	268	599	103	144	85	7	329	132	787	33	35	3,959

Table 5: Summed Population Equivalents (PE) connected to centralized systems according to treatment types and countries

Centralized treatment type	DE	AT	CZ	SK	HU	SI	HR	BA	ME	RS	BG	RO	MD	UA	Basin
NP-removal	11,680,565	13,463,297	2,052,729	2,987,006	8,899,229	797,711	279,824	0	46,720	136,157	2,349,878	10,016,325	0	0	52,709,443
P-removal	40,118	286,086	225,277	70,589	87,990	0	0	0	0	0	0	29,421	0	0	739,481
N-removal	274,343	0	63,691	173,525	349,930	0	0	0	0	0	18,529	16,063	0	0	896,082
Secondary treatment	370,920	5,488	122,757	184,438	1,982,913	388,470	1,085,013	339,040	9,160	554,213	319,311	1,331,622	34,547	536,949	7,264,840
Primary treatment	0	0	0	4,857	328,900	0	109,694	4,797	0	44,817	5,103	602,597	31,050	23,521	1,155,336
Collected but not treated	0	0	0	30,933	0	16,823	512,575	637,691	27,502	3,547,975	172,050	442,538	16,379	88,454	5,492,920
Total	12,365,946	13,754,871	2,464,455	3,451,348	11,648,962	1,203,004	1,987,107	981,528	83,382	4,283,162	2,864,871	12,438,567	81,976	648,924	68,258,102

Table 6: Biochemical Oxygen Demand (BOD) discharges of centralized systems according to treatment types and countries (t/year)

Centralized treatment type	DE	AT	CZ	SK	HU	SI	HR	BA	ME	RS	BG	RO	MD	UA	Basin
NP-removal	3,351.0	4,118.5	494.2	1,169.5	4,939.4	464.3	288.0	0.0	762.1	256.2	2,834.9	26,489.3	0.0	0.0	45,167.4
P-removal	27.6	129.4	39.6	59.3	132.2	0.0	0.0	0.0	0.0	0.0	0.0	34.8	0.0	0.0	422.9
N-removal	108.5	0.0	24.0	142.4	90.4	0.0	0.0	0.0	0.0	0.0	21.4	23.3	0.0	0.0	409.9
Secondary treatment	248.9	6.4	33.7	393.9	1,535.3	447.4	6,965.9	5,994.8	45.1	3,693.4	748.7	4,398.8	446.9	1,065.1	26,024.3
Primary treatment	0.0	0.0	0.0	18.3	265.9	0.0	1,869.0	105.1	0.0	597.9	112.9	3,983.9	796.8	300.5	8,050.3
Collected but not treated	0.0	0.0	0.0	176.7	0.0	368.3	10,834.9	14,047.4	166.6	63,763.0	6,285.5	8,483.0	443.4	1,597.4	106,166.3
Total	3,736.0	4,254.3	591.5	1,960.2	6,963.1	1,280.0	19,957.8	20,147.3	973.8	68,310.5	10,003.3	43,413.0	1,687.1	2,963.0	186,241.1

Table 7: Chemical Oxygen Demand (COD) discharges of centralized systems according to treatment types and countries (t/year)

Centralized treatment type	DE	AT	CZ	SK	HU	SI	HR	BA	ME	RS	BG	RO	MD	UA	Basin
NP-removal	24,197.0	28,925.9	3,710.5	6,009.5	17,435.9	2,759.5	1,583.8	0.0	1,524.2	469.6	10,394.7	67,381.6	0.0	0.0	164,392.3
P-removal	144.6	576.3	333.3	259.6	449.6	0.0	0.0	0.0	0.0	0.0	0.0	133.0	0.0	0.0	1,896.4
N-removal	603.7	0.0	155.8	513.0	535.7	0.0	0.0	0.0	0.0	0.0	78.4	78.1	0.0	0.0	1,964.6
Secondary treatment	1,232.3	20.0	183.3	3,664.7	4,601.1	1,755.8	10,676.2	10,990.5	82.0	6,694.0	2,745.1	10,213.2	633.1	3,644.4	57,135.6
Primary treatment	0.0	0.0	0.0	59.9	914.4	0.0	3,212.3	192.7	0.0	1,096.2	207.0	11,376.7	1,289.1	510.8	18,859.2
Collected but not treated	0.0	0.0	0.0	365.2	0.0	767.4	19,864.1	25,753.6	333.1	116,898.8	11,590.0	20,299.3	732.1	2,715.6	199,319.1
Total	26,177.5	29,522.1	4,382.9	10,871.8	23,936.8	5,282.7	35,336.4	36,936.8	1,939.4	125,158.7	25,015.1	109,481.9	2,654.2	6,870.9	443,567.1

Table 8: Total Nitrogen (TN) discharges of centralized systems according to treatment types and countries (t/year)

Centralized treatment type	DE	AT	CZ	SK	HU	SI	HR	BA	ME	RS	BG	RO	MD	UA	Basin
NP-removal	9,892.0	8,473.3	1,366.6	2,475.9	5,519.7	588.9	253.4	0.0	111.8	83.1	1,701.0	10,532.1	0.0	0.0	40,997.8
P-removal	54.6	339.3	134.7	81.1	102.6	0.0	0.0	0.0	0.0	0.0	0.0	18.6	0.0	0.0	731.0
N-removal	191.9	0.0	62.2	64.5	234.9	0.0	0.0	0.0	0.0	0.0	12.8	22.5	0.0	0.0	588.8
Secondary treatment	473.5	7.1	80.2	328.1	1,283.4	685.3	2,194.7	921.5	10.8	1,070.3	898.4	1,596.5	141.4	1,185.1	10,876.1
Primary treatment	0.0	0.0	0.0	4.6	221.3	0.0	311.8	17.5	0.0	114.7	16.9	1,693.6	134.3	56.4	2,571.2
Collected but not treated	0.0	0.0	0.0	17.8	0.0	54.0	1,589.1	2,181.7	24.4	9,351.9	948.3	2,294.6	68.2	233.2	16,763.3
Total	10,612.0	8,819.7	1,643.8	2,972.0	7,361.9	1,328.2	4,349.0	3,120.7	147.0	10,620.0	3,577.4	16,157.8	343.9	1,474.7	72,528.1

Table 9: Total Phosphorus (TP) discharges of centralized systems according to treatment types and countries (t/year)

Centralized treatment type	DE	AT	CZ	SK	HU	SI	HR	BA	ME	RS	BG	RO	MD	UA	Basin
NP-removal	582.8	550.6	97.8	184.4	601.0	82.6	39.4	0.0	22.9	7.9	141.7	1,103.1	0.0	0.0	3,414.1
P-removal	6.4	18.3	7.8	4.8	14.7	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.0	0.0	53.7
N-removal	50.5	0.0	13.8	15.5	36.5	0.0	0.0	0.0	0.0	0.0	7.5	2.2	0.0	0.0	126.0
Secondary treatment	72.9	1.1	9.3	36.6	554.9	124.1	628.4	202.6	2.6	254.8	131.0	243.3	48.9	205.7	2,516.1
Primary treatment	0.0	0.0	0.0	0.7	32.6	0.0	71.8	3.5	0.0	25.2	2.8	156.6	37.3	11.6	342.0
Collected but not treated	0.0	0.0	0.0	2.6	0.0	9.2	370.2	471.5	5.0	1,912.9	158.1	279.5	19.2	47.9	3,276.1
Total	712.7	570.1	128.7	244.5	1,239.6	215.9	1,109.8	677.7	30.4	2,200.7	441.1	1,786.3	105.4	265.2	9,728.1

Table 10: Summed basin-wide Population Equivalents (PE) according to collection types and future scenarios

Scenario	Sewer	IAS	Local system & Not collected
Reference	68,258,102	3,487,062	13,420,300
Baseline	75,417,050	4,624,307	5,124,107
Vision I	80,103,651	5,061,813	0
Vision II	76,599,420	8,566,044	0

Table 11: Summed basin-wide Population Equivalents (PE) connected to centralized systems according to treatment types and future scenarios

Scenario	Tertiary	Secondary	Primary	Collected but not treated
Reference	54,345,005	7,264,840	1,155,336	5,492,920
Baseline	62,618,034	9,110,206	81,666	3,607,143
Vision I	70,435,042	9,668,609	0	0
Vision II	68,874,889	7,724,531	0	0

Table 12: Summed basin-wide surface water and soil emissions according to future scenarios (t/year)

Scenario	BOD		COD		TN		TP	
	Water	Soil	Water	Soil	Water	Soil	Water	Soil
Reference	186,241	295,225	443,567	543,667	72,528	46,959	9,728	7,726
Baseline	162,850	114,030	436,199	212,377	82,664	21,911	10,121	3,351
Vision I	97,762	2,003	339,904	7,343	79,578	6,076	8,581	611
Vision II	96,531	3,515	335,389	12,887	75,336	10,990	8,125	1,124

Table 13: Relative changes of surface water emissions via urban wastewater discharges according to countries and future scenarios as compared to the reference status (%)

Country	Baseline				Vision I				Vision II			
	BOD	COD	TN	TP	BOD	COD	TN	TP	BOD	COD	TN	TP
DE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AT	0.0	0.0	-0.6	-0.2	0.0	0.0	-0.6	-0.2	0.0	0.0	-0.6	-0.2
CZ	0.0	0.0	-1.7	-0.9	0.0	0.0	-1.7	-0.9	0.0	0.0	-1.7	-0.9
SK	-8.7	-24.4	-2.5	-3.0	2.7	-19.8	-6.8	5.8	1.6	-20.5	-9.5	2.2
HU	10.8	12.9	2.6	-18.0	10.8	12.9	2.6	-18.0	10.4	12.5	1.8	-18.3
SI	-18.2	-7.3	-25.1	-38.5	-7.4	4.6	7.7	-31.5	-7.5	4.6	7.6	-31.5
HR	-80.2	-64.3	-55.5	-77.6	-80.2	-64.3	-55.5	-77.6	-80.4	-64.7	-57.2	-78.1
BA	-2.0	-1.6	-0.2	-0.9	-83.9	-67.8	-24.0	-60.1	-84.3	-68.7	-31.9	-63.5
ME	0.0	0.0	0.0	0.0	-92.2	-85.7	-54.4	-70.3	-92.6	-86.4	-62.4	-74.3
RS	-15.9	-13.8	-0.6	-5.0	-90.3	-81.8	-55.2	-73.0	-90.4	-82.0	-57.6	-74.3
BG	-48.9	-34.5	-22.6	-34.4	-48.9	-34.5	-22.6	-34.4	-49.1	-34.8	-25.0	-36.6
RO	21.4	38.8	84.1	103.6	25.2	44.2	89.9	108.0	23.4	41.7	73.3	91.5
MD	-68.0	-56.6	-17.6	-42.3	24.4	144.4	352.0	125.6	19.7	133.6	270.6	96.6
UA	9.7	11.8	14.2	12.0	-6.0	48.5	82.7	44.9	-10.4	41.5	51.2	25.9
Basin	-12.6	-1.7	14.0	4.0	-47.5	-23.4	9.7	-11.8	-48.2	-24.4	3.9	-16.5

Table 14: Relative changes of soil emissions via urban wastewater discharges according to countries and future scenarios as compared to the reference status (%)

Country	Baseline				Vision I				Vision II			
	BOD	COD	TN	TP	BOD	COD	TN	TP	BOD	COD	TN	TP
DE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CZ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SK	-64.9	-47.9	-6.6	-10.6	-65.2	-48.4	-6.9	-10.6	-61.5	-42.9	3.5	-0.3
HU	-95.6	-91.6	-52.6	-66.4	-95.6	-91.6	-52.6	-66.4	-95.0	-90.4	-47.4	-63.4
SI	-85.5	-74.4	-16.1	-26.2	-83.1	-70.3	-3.4	-15.5	-82.5	-69.1	0.7	-11.7
HR	-96.2	-92.7	-55.6	-69.4	-96.2	-92.7	-55.6	-69.4	-95.6	-91.5	-49.8	-65.9
BA	-1.7	-1.7	-1.7	-1.7	-99.9	-99.8	-98.1	-98.9	-99.6	-99.3	-93.3	-96.3
ME	0.0	0.0	0.0	0.0	-99.9	-99.8	-97.4	-98.4	-99.6	-99.2	-91.3	-94.7
RS	0.0	0.0	0.0	0.0	-99.9	-99.7	-97.1	-98.3	-99.7	-99.4	-92.7	-95.4
BG	-97.5	-95.2	-65.1	-77.3	-97.5	-95.2	-65.1	-77.3	-96.9	-93.9	-53.1	-68.5
RO	-99.6	-99.3	-92.4	-95.4	-99.6	-99.3	-92.5	-95.5	-99.0	-98.1	-78.8	-86.9
MD	-2.4	-2.4	-2.4	-2.4	-99.7	-99.4	-92.3	-95.1	-98.9	-97.8	-74.2	-83.6
UA	-6.3	-6.3	-6.3	-6.3	-99.8	-99.6	-94.8	-96.7	-99.3	-98.6	-83.4	-89.4
Basin	-61.4	-60.9	-53.3	-56.6	-99.3	-98.6	-87.1	-92.1	-98.8	-97.6	-76.6	-85.5