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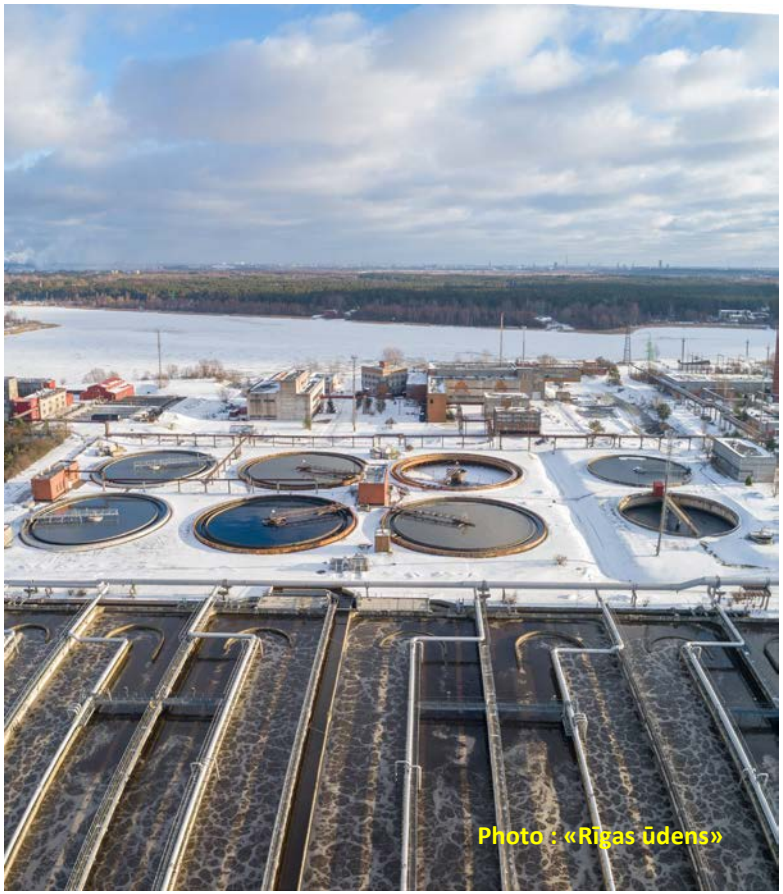
Proposal for deletion of JCP hot-spot No 42

Rīga WWTP

HELCOM PRESSURE 13-2020 online meeting, 16th October 2020

Rīga WWTP as a HELCOM hot-spot



At the end of 1991, the 1st phase of the new biological WWTP in Riga was completed:

- large reduction of inputs of organic matter to the Gulf of Rīga

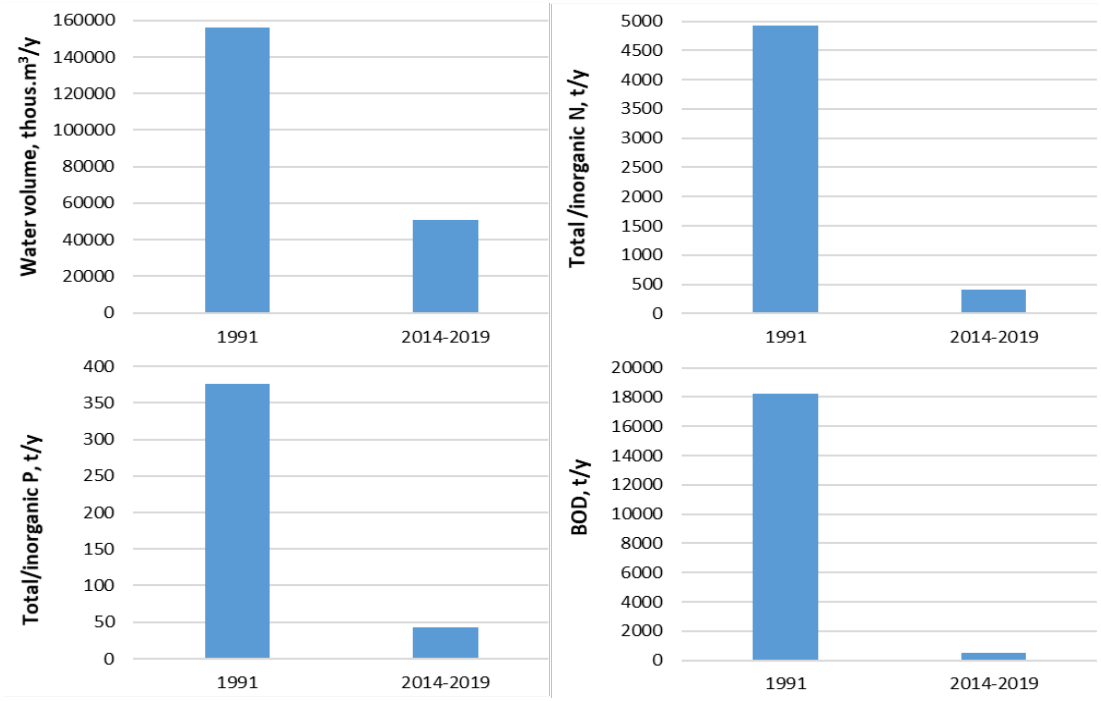
Remaining problems after the 1st phase completion:

- efficiency in removal of nutrients from wastewaters was not in line with HELCOM requirements;
- high share (40-50 %) of industrial wastewater was discharged without any pre-treatment → interruption of the processes of biological treatment;
- high concentration of heavy metals both in wastewater and sludge;
- connectivity and improvement of sewerage network itself to prevent releases of untreated and insufficiently treated wastewater;
- construction of sludge depository and composting fields.

Rīga WWTP as a HELCOM hot-spot

- Currently:
  - 200 000 m^3/day - treatment capacity;
  - 140 000 m^3/day treated in 2019;
  - ~ 660 000 inhabitants connected to the WWTP;
  - ~700 000 population equivalent;
  - direct discharge in the Gulf of Rīga.

STEP 1: pollutant loadings and water quality



Data sources:
Andrušaitis et.al., 1992;
National statistical database «2-Ūdens»

Since 1991, Rīga achieved a decrease of:

- ✓ Waste water volume – 3 x
- ✓ Nitrogen load – ~ 12 x
- ✓ Phosphorus load – ~ 9 x
- ✓ BOD load – ~39 x
- ✓ COD load – ~ 12 x

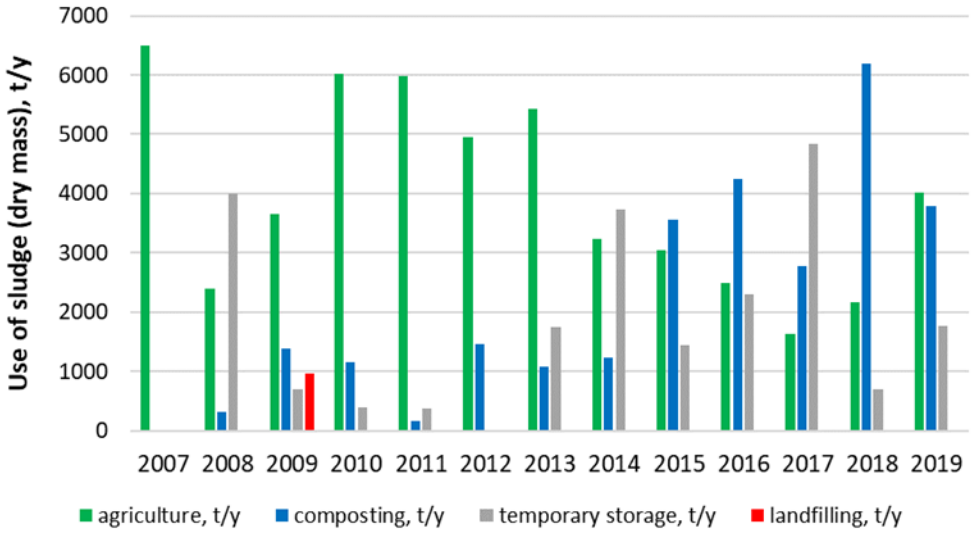
- ➢ Treated wastewater is discharged into the Gulf of Rīga.
- ➢ According to national monitoring data, the Gulf Rīga is in eutrophic state.
- ➢ Reasons: circulation of legacy pollution; riverine loads and point sources.

STEP 2: compliance with HELCOM recommendations and legislation

Parameter	2017	2018	2019	HELCOM Rec28E/5	UWWTD	B category permit
N_{tot}, mg/l	6.6	7.2	7.5	10.0	10.0	10.0
P_{tot}, mg/l	0.68	0.67	0.67	0.5	1.0	1.0
BOD_5, mg/l	9.0	8.7	8.6	15.0	25.0	25.0
COD, mg/l	38.6	44.5	41.1		125.0	125.0
Susp.solids, mg/l	8.2	8.5	9.1		<35.0	<35.0
Zn, mg/l	0.02	0.05	0.01			0.2
Cr, mg/l	0.003	0.003	0.002			0.05
Cu, mg/l	0.007	0.007	0.005			0.2
Ni, mg/l	0.008	0.006	0.005			0.05
Cd, mg/l	0.00012	0.00012	0.00011			0.02
Pb, mg/l	0.0010	0.0015	0.0007			0.05
As, mg/l	0.0002	0.0002	0.0004			0.02
Hg, mg/l	0.0001	0.0005	0.0001			0.02
Removal of N_{tot}, %	87	89	89	70-80 %	70-80 %	70-80 %
Removal of P_{tot}, %	91	92	92	90 %	80 %	80 %
Removal of BOD_5, %	97	97	97	80 %	70-90 %	70-90 %
Removal of COD, %	94	94	95		75 %	75 %
Removal of susp. solids, %	97	98	98		90 %	90 %

STEP 2: compliance with HELCOM recommendations and legislation

Sludge management



Wet sludge in Rīga WWTP is anaerobically fermented to produce biogas (6.65 mln Nm^3), which is used as a fuel in co-generation station.

Concentration of heavy metals are low and treated sludge can be used in agriculture, for preparation of compost and elsewhere.
Temporary stored sludge can be used in agriculture or compost production in the following years.

Nutrients and organic matter in sludge are reused.

STEP 3: site clean-up effects and monitoring program

- 2000 to 2007 – the 2nd stage of the project “Development of water services in Rīga” (EUR 20.7 mln)
- 2006 to 2009 – the 3rd stage of the project “Development of water services in Rīga” (EUR 81.2 mln)
- 2011 to 2015 – the 4th stage of the project “Development of water services in Rīga” (EUR 57.2 mln; focus on the expansion of water supply and sewerage systems)
- 2010 to 2014 – reconstruction works in Riga WWTP (EUR 11.5 mln; BioDenitro™ technology and automated processes were introduced).
- 2018 to 2023 – the 5th stage of the project “Development of water services in Rīga” (EUR 26 mln; focus on the expansion of sewerage systems)

- P sedimentation facilities, sludge dewatering storage, composting area were built.
- New connections to sewerage system were created.

- Reduction in concentrations of nutrients in wastewater.
- Compliance with HELCOM requirements for N_{tot} since 2014, and for P_{tot} since 2016.
- Appropriate sludge management.

STEP 3: site clean-up effects and monitoring program

Monitoring

- Influents and effluents are regularly monitored by the Wastewater Control Quality Group of the company „Rīgas ūdens”.
- Automated sampler and wastewater flow meter.
- The parameters to be analyzed are as follows:
  - 1x a week: suspended matter, COD, BOD5, Ptot, Ntot, surfactants (cationic), surfactants (non-ionic), N/NH4+, N/NO2-, N/NO3-, phosphates, oil products, phenols, formaldehyde, pH;
  - 1x a month: Zn, Cd, Cu, Ni, Cr, Pb, Hg, As.
- Pollutant loads and concentrations are reported to the national database of official statisical reports «2-Ūdens» («2- Water»).

SUMMARY

- Since 2000, ~ 200 million EUR invested.
- Significant reduction of pollution loads to the Gulf of Rīga.
- Efficiency of Rīga WWTP in removal of nutrients, organic matter and suspended solids are in line with national and international requirements.
- Concentrations of heavy metals in sludge and wastewater are low.
- Sludge is used for biogas production, compost preparation and as a fertilizer.
- Information on pollution loads is reported to HELCOM.


Photo: Rīgas ūdens

THANK YOU FOR YOUR ATTENTION!