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EEB position for a revised Urban Waste Water Directive

Summary

The Urban Wastewater Treatment Directive (UWWTD) entered into force in 1991 to protect human and environmental health by collecting and treating municipal wastewater. Since the introduction of the UWWTD, the proportion of the wastewater collected, and the level of wastewater treatment has increased in the EU. In 2017, most EU member states collected and treated urban wastewater from at least 80% of the population, but there are still cases where the connection level is lower, primarily in southern and eastern Europe.[1] The UWWTP primarily aims to protect the environment from adverse effects of urban waste water discharges by setting limits on oxygen consuming substances which apply as from 2 000 person equi›valent agglomerations, more stringent requirements apply for discharges to sensitive areas or agglomerations above 10 000 person equivalents, in those cases nutrients loads (nitrogen and/or phosphorous) have to be reduced. The load of biochemical oxygen demand (BOD), nitrogen and phosphorus from treated wastewater decreased by 61%, 32% and 44% respectively from 1991 until 2014.[2]

However, the Directive has not been revised since its introduction 30 years ago. The European Commission 2019 fitness check concluded that the UWWTD is overall fit for purpose but needs an update to address remaining pressures from untreated wastewater, substances of concern and to adapt to climate change.[3]

The UWWTD is limited to mainly focus on removal of nutrient and organic pollution (to prevent eutrophication and microbial contamination of pathogens) and does not address other pollutants of concern, including microplastics and pharmaceuticals that are an increasing source of concern. Additionally, not all municipal wastewater ends up in the wastewater treatment plants (WWTPs). Sewer overflows go

[1] European Environmental Agency (EEA), 2020, Indicator Assessment: Urban waste water treatment in Europe
[2] European Commission (EC), 2019, Evaluation of the Council Directive 91/271/EEC of 21 May 1991, concerning urban waste-water treatment (EC 2019)
[3] https://ec.europa.eu/environment/water/water-urbanwaste/evaluation/index_en.htm

untreated to receiving waters, an issue that is predicted to increase due to climate change. On the other hand, not only household wastewater enters the WWTPs, industrial wastewater and urban run-off also reach the sewers resulting in the WWTPs receiving pollutants they are not regulated nor equipped to treat.

The UWWTD needs to be updated to address these issues in order to contribute to the biodiversity, climate neutrality, resource-efficient and pollution-free objectives of the European Green Deal. This policy paper covers the following eight topics and provides suggestions for how they can be addressed.

1. **Climate change adaptation**
2. **Remaining sources of pollution**
3. **Eutrophication and nutrient management**
4. **Sensitive areas and receiving waters**
5. **Energy and climate footprint of WWTPs**
6. **Contaminants of concern and source control**
7. **Affordability of water services**
8. **Circular economy**

Issue 1: Climate change adaptation

Large parts of the urban landscape have been converted to hard surfaces. Since the mid-1950s, the area of EU cities has grown by 78% resulting in a sealed surface area of average of 200 m^2 per citizen in 2006.[4] As cities have drained wet areas and paved over permeable areas, it has become increasingly difficult for rainwater to infiltrate into the ground. Climate change is heavily felt through water with the occurrence of droughts and intense rain events predicted to increase which will put sewage systems and waste water treatment plants (WWTPs) under even more pressure with risk for flooding that put people and the environment at risk.

Municipalities need to adapt to a changing climate to handle drought and storm events. Inaction now can prove costly in the future as flooding incurs large costs. Storm water events needs to be planned for and measures needs to be taken to handle them in an integrated manner. ***Integrated Storm Water Management Plans should be set up and include the sewer network as well as urban space.*** Such plans have already been adopted in e.g. Copenhagen and Paris and are also recommended by HELCOM.[5] They could include measures such as disconnecting roof and road runoff from the sewer systems.

Nature-based solutions, such as dams and green roofs should be at the heart of climate change adaptation efforts to retaining water and reduce the loads to sewers during heavy rains. This should be favoured before reactive actions such as construction of underground stormwater basins that are expensive and take a lot of space without fulfilling any other function. Cement is also one of the materials with the heaviest CO2 footprint and its use should be minimised. Permeable surfaces in green areas allow rainwater to infiltrate and recharge soil and aquifers helping cities to be more resilient to drought. Additionally, blue-green areas prevent heat islands, an important measure in a hotter climate. The Ecological City Plan in Berlin achieved a

[4] European Commission, 2013, Hard surfaces, hidden costs: Searching for alternatives to land take and soil sealing
[5] The Baltic Marine Environment Protection Commission (HELCOM), 2021, Recommendation 23/5-Rev.1 Reduction of discharges from urban areas by the proper management of storm water systems

reduction of peak runoff and stormwater flow ranging from 39% up to 100% through 19 projects, including unsealing of surface pavements, artificial water bodies and stormwater infiltration.[6]

Article 10 of the UWWTD requires Member States to ensure that waste water treatment plants perform under normal local climatic conditions. This should be expanded to require climate change adaptation for the WWTPs as well as for the collection systems. ***Climate change adaptation and integrated storm water management should be incorporated under Article 10 of the UWWTD.*** This should also address the prevention of contamination runoffs from likely flooding or runoff waters at industrial sites where harmful chemicals are used or produced, with adequate buffer and storage requirements upstream.

Blue-green solutions for storm water in Malmö

The city of Malmö started applying blue-green solutions in the outer parts of the city in the 1990s to deal with storm water. Storm-water management is now regulated through an agreement between the water utility VA YD and the municipality of Malmö. Basic principles include limiting pollution of storm runoff, prioritization of open solutions for storm water in new developments and that storm handling systems should remove pollution in the urban run-off on the way to the recipient. Several projects have been designed and implemented including the regeneration of the Augustenborg area with a sustainable urban drainage system including water channels and retention ponds. Rainwater from hard surfaces is flowing through trenches, ditches, ponds and wetlands, decreasing the load to sewers. Additionally, green roofs are being installed on new developments (since 1998) and have been retrofitted on existing buildings. The total annual runoff is now 20% less than conventional systems and the area has proven performing better than other parts of Malmö during heavy rains. The project has also had a social impact through promoting public participation: tenant turnover has decreased while employment and election participation has increased.

Issue 2: Remaining sources of pollution (untreated wastewater)

Sewer overflows and urban run-off

Sewer systems are designed to overflow directly to receiving waters during heavy rains to prevent flooding of urban areas and to protect wastewater treatment plants. Similarly, municipal wastewater treatment plants are designed to bypass peak loads following heavy rains. Such overflows represent a pressure on the receiving waters as they dispose raw sewage but also plastic trash into rivers and canals and further to the sea.

The goal of the UWWTD is to protect health and the environment from negative impacts of untreated municipal wastewater due to its pollution load. This should be understood as all wastewater created by an

[6] Grüne Liga, 2019, Factsheet Stormwater management

agglomeration, and not only what is reaching the WWTPs. ***The environmental permits for wastewater discharges should include the collection systems, and the emission limit values should include overflows, by-passes and exceptional situations.*** This approach is used in the Finnish Environmental Protection Act (527/2014).

The UWWTD should include an **obligation to anticipate, monitor and publicly report overflows (cause, amount, load, duration, location and impacts).** In order to do so it also needs to be updated with ***a definition of what constitutes an overflow.*** While it might not be suitable to set EU-wide targets neither for the number or the volume of sewer overflows due to regional climatic differences, targets based on load should be considered. Default overflows under normal rain events are in breach with the UWWTD as clarified by the Court of Justice Decision [Case C-301/10] and should prompt the authorities to take actions.

Sewer systems and urban run-off are pathways of pollution and reduction at source, both of volume and contamination, is essential to decrease the load to receiving waters. This includes snow and snow melt that can contain contaminants, in particular after having been removed from roads. Urban run-off carry pollution, in particular metals, PAHs, and oil, but also nutrients and plastics that either ends up in UWWTPs or is discharged straight to water bodies. The former bringing pollution that the WWTPs are not equipped to treat and the latter directly pollutes receiving waters.

Management should not rely on dilution rates in receiving waters as these pathways typically contain tyre wear, microplastics and other recalcitrant substances that accumulate in the environment. It is unacceptable that untreated sewage is still regularly discharged into receiving waters in many places. ***A minimum treatment of sewer overflows as well as for urban run-off should be required before discharge to receiving waters (unless the water can be proven not to be contaminated)***.

Sewer overflows in Brussels

The Flemish standards limits overflows to 7 days a year. During 2020 there were 21 days when the Brussels sewers Sainctelette overflow was activated and a mix of raw sewage and stormwater was discharged to the Brussels canal and 79 days when the overflows opened to the stream Senne. The Senne is a smaller stream but receives sewer overflows 10 times the volume that is discharged to the canal. Apart from affecting the aquatic health of the Senne, plastic trash is being washed from the sewers to the watercourse and finally to the sea. Although the Brussels WWTPs treat 125 million m3 wastewater yearly another 10 million m3 is directly discharged to the canal or the Senne via sewer overflows although the status of the receiving waters is far from good.

Source: Canal it Up, https://www.canalitup.org/en/sainctelette-sewage-overflow/

Small agglomerations and individual systems

Agglomerations smaller than 2 000 p.e. and individual systems still represent a source of pollution. Discharges from non-connected dwellings were reported as significant pressure on 11% of EU's surface water bodies[7] and 8% of groundwater area[8].

However, individual systems do not have to constitute a pressure on water if operated correctly and can be appropriate also for smaller agglomerations. Collection of sewage in sparsely populated areas is inefficient and costly and does not necessarily provide better environmental effects. Dry toilets (composting toilets) reduce the consumption of drinking water for flushing. Individual or shared composting toilet facilities can promote the circular economy by returning human faeces to the soil without complex, expensive and energy-intensive collection, pumping and treatment systems. ***Measures should focus on providing guidance on appropriate technologies and use of individual systems.*** Specifications for composting human faeces can make the risk to health or environment very low and WHO has developed such guidelines for the safe use of wastewater, excreta and greywater.[9]

The revised UWWTD could also include better monitoring and control of individual systems and smaller agglomerations, in particular in regard to protection of drinking water sources.

The use of nature-based solutions should be promoted throughout the UWWTD. Plants can be used for the purification of grey water and to close the water cycle locally by recycling water from shower or washing machines for irrigation of e.g. gardens. The city of San Francisco is promoting this practice and have set up manuals and training programs for their residents.[10]

Sewer leakage

Sewer leakage can negatively affect groundwater as it infiltrates to the ground. In a study from Germany, sewage leakage accounted for 9.8% and 17.2% of the total nitrate and phosphate loads emitted to the environment from urban waste-water systems.[11] These numbers are predicted to increase as collecting systems age if no remediation is done. The OECD study on financial needs for the European water sector showed that large investments (an increase of more than 25% of current spending for all countries but Germany) are needed in order to comply with the current UWWTD, but these projections does not take into account the costs for sewer maintenance.[12] This clearly shows the need for financing of the water sector where cost recovery and full polluters pay principles should be implemented, in particular the European Commission should deliver on its intention to implement Extended Producer Responsibility (EPR) for waste water.

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[7] European Commission 2019
[8] EEA, 2018, European waters: Assessment of status and pressures 2018 (EEA 2018)
[9] WHO, 2013, Guidelines for the safe use of wastewater, excreta and greywater
[10] San Francisco Public Utilities, Graywater / Laundry to Landscape
[11] Nguyen & Venohr, *Environ Sci Pollut Res* (2021) https://doi.org/10.1007/s11356-021-12440-9
[12] OECD, 2020, Financing Water Supply, Sanitation and Flood Protection : Challenges in EU Member States and Policy Options (OECD 2020)

Issue 3: Eutrophication and nutrient management

Global nitrogen and phosphorus flows exceed the sustainable levels and nutrient enrichment continues to be a main impact on surface waters, closely associated with our current food production system. Several studies have concluded that although current EU policies can reduce nitrogen and phosphorus load to water, the goals of the Water Framework Directive cannot be met without agriculture.[13]

A number of Member States already set stricter emission limits of nitrogen, phosphorus and BOD than the minimum requirements of the UWWTD[14], which indicates there is room to tighten emission limits (in particular for phosphorus) for UWWTPs of a certain size. However, treatment comes at a cost.

Even if there are energy savings to be made by innovative processes for nitrogen removal, the most efficient way to decrease the treatment cost is to reduce the load to the plant. Protein consumption is strongly linked to the nutrient load in urban wastewater.[15] In Helsinki, the nitrogen load increased by 50% between 1999 and 2019, largely attributed to excessive protein consumption.[16] Nutrient loads to sewers can be reduced by promoting sustainable protein intake and expanding the ban of phosphate in detergents to further categories.

Reducing the nutrient load

A study from the Swedish Institute for the Marine Environment estimated that a 25% lower intake of protein-rich food could reduce the load of phosphorus to Swedish coastal waters by 200 tonnes, and nitrogen by 9000 tonnes per year due to reduced land area needed for production and lowering the load to sewage systems. This would surpass the reductions target for nitrogen and almost cover the reduction target for phosphorus set to 1 866 tonnes and 194 tonnes yearly in the Baltic Sea Action Plan in 2010.

Source: Swedish Institute for the Marine Environment. 2016, 2016:3 Changes in four societal drivers and their potential to reduce Swedish nutrient inputs into the sea

[13] Grizetti et al., Global Environmental Change **69** (2021) https://doi.org/10.1016/j.gloenvcha.2021.102281
Pistocchi et al., 2019, Water quality in Europe: effects of the Urban Wastewater Treatment Directive, doi:10.2760/303163
[14] European Commission 2019
[15] Puijenbroek et al Journal of Environmental Management **231**, 446-456 (2019) https://doi.org/10.1016/j.jenvman.2018.10.048
Wang *et al. Nat Commun* **10,** 2627 (2019). https://doi.org/10.1038/s41467-019-10445-0
[16] Helsinki Region Environmental Services (HSY) https://www.hsy.fi/en/nitrogen/

Issue 4: Sensitive areas and receiving waters

Article 5 of the UWWTD allows the Member States to determine if receiving water bodies are sensitive, or less sensitive, and whether more stringent treatment is needed. A quarter of the EU's area has been designated "less sensitive"[17], but there are different interpretations between Member States on how sensitive areas are defined. ***An EU-wide definition of sensitive areas should be introduced and aligned with the Nitrates Directive, the Water Framework Directive and the Marine Strategy Framework Directive.***

The current definition of sensitive areas only considers the risk of eutrophication. To better protect aquatic ecosystems and set the UWWTD on track to fulfil the goals of EU water legislation, the provisions of discharges to sensitive areas should be wider-reaching. ***Article 5 should be expanded to go beyond eutrophication and require Member States to include advanced treatment to address substances of concern and include limit values for WFD priority substances.*** The emission limits for phosphorus to phosphorus-sensitive waters, such as the Baltic Sea, should also be made stricter.

Issue 5: Energy and climate footprint of WWTPs

Wastewater treatment plants are using considerable amounts of energy, and the electricity use can make up a large part of municipalities energy bills. ***The wastewater sector should be brought under legislation to become climate neutral in line with the EU climate ambition. Energy reduction targets should be introduced reach this.***

Wastewater contains carbon, heat and kinetic energy that can be captured and converted to energy to cover the WWTP's energy needs. ***The energy embedded in wastewater should be used to move wastewater treatment towards energy neutrality.*** There are already several municipal WWTPs in Europe that are self-sufficient on energy or even energy-positive thanks to utilisation of biogas. The Danish Marselisborg plant has an energy self-sufficiency of > 130% and uses the surplus energy for pumping and district heating.[18]

The most direct way to reduce the energy need is to reduce the load to the plant, both in terms of nutrients and volume of water to the WWTPs. The latter can be achieved by progressively divert road and roof run-off from sewers. Source separation and water efficient toilets should be encouraged in new developments. Concentrated flows are more energy efficient to treat and also facilitate recycling of nutrients.[19]

The UWWTD should promote energy efficiency and introduce energy and climate audits should. The energy consumption can be reduced using energy efficient treatment systems, energy management systems such as ISO 50001, use of renewable energy and/or energy-generating treatment systems.

Aeration for removal of organic matter and nitrogen is the most energy-intensive step of wastewater treatment. Innovative technologies, such as ***the UWWTD should encourage the uptake of innovative***

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[17] European Commission, 2020, Tenth report on the implementation status and programmes for implementation (as required by Article 17 of Council Directive 91/271/EEC, concerning urban waste water treatment)

[18] Aarhus Vand https://www.aarhusvand.dk/en/international/solutions/marselisborg-wwtp---turning-wastewater-into-green-energy2/

[19] See for example the project 'Three pipes out' in Helsingborg, Sweden

technologies for energy and resource reduction. Anoxic ammonium removal (anammox) can reduce the energy use by up to 60%[20]

The estimated efficiency gains by improving just to "average level of efficiency" of the UWWTP are evaluated by the European Commission to be in the order of 5 500 GWh annually and at least 13 000 GWh per year if upgraded to state-of-the-art standards. This translates to cost savings for municipalities in the order of 2.73 billion €/yr (assuming average electricity price of 0.21€/KWh). Integrating the energy efficiency first principle, with conditional support schemes, could help the uptake of performance improvements.

To make UWWTPs not only energy and carbon neutral, but climate neutral, fugitive emissions of greenhouse gases (methane, carbon dioxide and nitrous oxide) from the treatment process must be addressed as they can contribute to a significant part of the climate footprint of a wastewater treatment plant. ***Greenhouse gas emissions should be monitored and quantified, and efforts should be put to reduce the emissions to achieve overall zero GHG emissions.***

Issue 6: Contaminants of concern and source control

Urban waste water is a fingerprint of our society. What we consume is reflected in the composition of the wastewater. Discharges from wastewater treatment plants still represent a main reason for surface water bodies to fail good chemical status and were reported to contaminate over 13 000 water bodies with polyaromatic hydrocarbons (PAHs), mercury, cadmium, lead and nickel in the second RBMPS.[21] The load to the WWTPs mirrors what we eat, what medicines we take, the household products we use but also what is washed out from streets or discharged by industries and agriculture, ultimately ending up in water.

UWWTPs are not equipped to deal with all kinds of pollution. Climate change with increased drought and intense rain events are likely to increase the problem due to higher concentrations in streams during low flows, and through increased occurrences of sewer overflows that discharge untreated sewage to receiving waters unless actions is taken. ***The precautionary principle and pollution prevention at source must be the first steps to address this issue over end-of-pipe solutions that the UWWTP represent.*** Where it is clear that the main pathway of pollutants to the water comes though specific sources, the policy measures should first deal with cutting the pollution at the sources, rather than from treating the problem once it has entered the water path. However, in order to protect receiving waters and to meet the objectives of EU water legislation:

- The link with the WFD should be clarified and where receiving water bodies do not meet good chemical status (set in the Water Framework Directive) due to emissions from WWTPs, maximum allowable concentration (MAC) (set under the EQS Directive) should be met at the discharge point, applicable to all contributing sources upstream as well
- The monitoring and reporting under the PRTR should be improved by adding recalcitrant pollutants to the list of substances subject to monitoring by WWTPs, the UWWTP database should allow filtering of monitoring and compliance data per type of pollutant, input flows, limits set, abatement techniques used, removal efficiencies etc so to enable comparability and benchmarking

[20] Lotti, 2016, Doctoral thesis Developing Anammox for mainstream municipal wastewater treatment https://repository.tudelft.nl/islandora/object/uuid%3A3d1b9efb-557d-4f9f-8140-08dd03b2c739
[21] EEA 2018

- An obligation for WWTP operators to monitor and report the ecological status of water downstream of the UWWTP discharge point should be introduced. Frequency of monitoring reports could also be improved, the latest data in the Urban WWTP database is already 3 years old[22], reporting on the treatment techniques seems not to enable a filter per type of treatments implemented (see link to the Swiss indicators).

Micropollutants can be removed by activated carbon and ozonation, a reduction of 80% is achievable for many substances.[23] However, advanced treatment comes at a cost and negative cross media effect such as energy consumption. Therefore, the upgrade of plants should be focused on where it has the most impact to reduce the load for downstream water use, to protect aquatic ecosystems, sensitive waters and drinking waters. A prioritisation of further efforts in end of pipe treatment measures could be based on the following:

- Size of the WWTP
- Origin of waste water treated e.g. from domestic sources where the presence of problematic substances is expected or catchment areas prone to diffuse emission from agriculture
- WWTPs that have an impact on sources of drinking water
- WWTPs where the effluent has a low dilution
- WWTPs that have an impact on valuable ecosystems (e.g. Natura 2000) sites or discharge to other sensitive receptors

Such provisions have already been introduced in Switzerland where the Swiss Waters Protection Ordinance[24] requires an 80% removal of organic substances that can pollute waters even in low concentration from plants with more than 80 000 p.e., and plants over a certain size that discharge into lakes (to protect drinking water) or into watercourses with low dilution.

As the amount of substances in wastewater is large ***the revised UWWTD could include a set of indicator substances as well as a reduction target for those***. In Switzerland a set of 12 indicator substances is used that are non-easily biodegradable and therefore would require dedicated waste water treatment such as with activated carbon and ozonation[25]**.** There is currently no EU-wide EQS for active pharmaceutical ingredients, but such are being drafted as part of the ongoing revisions of the lists of pollutants under the EQSD and GWD. The UWWTD should be proactive and already set emission limits for at least the candidate substances for the said directives and the Swiss Water Protection legislation could provide a useful starting point. ***Additionally, bioassays in the effluent should be used to assess the mixture or cocktail effects of substances in wastewater.***

Pharmaceuticals and pharmaceutical residues

Pharmaceuticals and pharmaceutical residues harm aquatic life, even in low concentrations and through cocktail effects from low doses of multiple substances resulting in antimicrobial resistance, tissue damage, changed behaviour and impacts on reproduction in fish. With an ageing population, the use of pharmaceuticals is predicted to increase. The impact of wastewater effluent on receiving water quality can vary greatly depending on the regional situation. The largest impact is felt where population density is high

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[22] EEA Urban Waste Water Treatment map

[23] German Federal Environment Agency (UBA), 2018, Recommendations for reducing micropollutants in waters

[24] https://www.fedlex.admin.ch/eli/cc/1998/2863_2863_2863/en#fn-d100820e4315

[25] source EAWAG: Amisulpride, Benzotriazole, Candesartan, Carbamazepine, Citalopram, Clarithomycin, Diclofenac, Hydrochlorothiazide, Irbesartan, Metoprolol, Methylbenzotriazole, Venlafaxine

and where the wastewater effluent constitutes a main part of the receiving water body. In Switzerland UWWTP fulfilling the criteria are to be upgraded with an adequate treatment steps so to treat recalcitrant pollutants (see the 12 indicator substances). Those pharmaceuticals should be subject to emission limits[26].

Reduction of the load should also be promoted through transparency and information about environmental impacts. Such efforts should include information on the environmental effects of different substances should be included in information to prescribing doctors. Such environmental classification of medicines, including the environmental risk, degradation potential and bioaccumulation has been in place in Sweden since 2005.27 Substitution of medicines with the same effect but with less environmental impact, such as replacing diclofenac with naproxen28 and efforts to reduce over-prescription of antibiotics and other medicines is paramount. The pharmaceutical industry should also pay its fair tribute to addressing the waste water treatment upgrade costs (see above link with the Swiss Water protection law and EPR section)

Industrial discharges

The current UWWTD does not regulate which industrial sectors may discharge wastewater to UWWTPs but states that industrial wastewater entering urban WWTPs is pre-treated so that discharges from the UWWTP "do not adversely affect the environment, or prevent receiving waters from complying with other Community Directives". The UWWTD does not set any definition of when a treatment plant is an urban WWTP covered by the UWWTD. This means industry can indirectly discharge effluent to receiving water bodies via an UWWTP and take advantage of the less stringent discharge values set for such urban plants[29]. As the current UWWTD is only targeting nutrient and organic load, it leaves unregulated substances such as metals or industrial chemicals. Many EU BREFs on large industrial activities do not set any BAT-AELs for indirect emissions.

The provisions under Annex C, paragraph 1 should be strictly applied and could be strengthened further by implementing:

- Authorization for industry not addressed by the Industrial Emissions Directive (IED) to discharge to sewers should be subject to public enquiry by the competent authority before permits are issued
- Article 15(4) derogations under Directive 2010/75/EU for indirect discharge of Priority Substances or Priority Hazardous Substances by a point source should not be granted with regards to the provisions under UWWTD
- the emission limit of Priority Substances / Priority Hazardous Substances emitted to sewers of point sources under Directive 2010/75/EU should be aligned to the set Maximum Allowable Concentration levels set under the EQS, and at least brought to the strict BAT-AEL level
- Permit limits should be based on the whole effluent assessment approach and consider other contributing emitters to the receiving environment
- for indirect discharges to sewers, the upstream operator should demonstrate bioeliminability/biodegradability and inhibitory potential effects of >80% after 7 days (for adapted sludge), determined in accordance to EN ISO 9888 (should be mandatory and renewed whenever a change in the inventory is made)

[26] see proposal from UBA https://www.umweltbundesamt.de/en/bg-micropoll

[27] Läkemedelsindustriföreningen (the trade association for the research-based pharmaceutical industry in Sweden) https://www.fass.se/LIF/menydokument?userType=0&menyrubrikId=11137

[28] Näslund et al., Aquatic Toxicology **227** (2020), Naproxen affects multiple organs in fish but is still an environmentally better alternative to diclofenac, https://doi.org/10.1016/j.aquatox.2020.105583

[29] For more details see EEB, 2021, Wasted ink on waste water? Of missed opportunities and untapped potential in the CWW BREF

- Where the inventory of waste water streams of industrial facilities highlights the presence of recalcitrant pollutants in the waste water discharged to downstream UWWTP, the upstream operator is required to install pre-treatment at the source so to prevent those pollutants to be discharged to the UWWTP
- Where the input of the waste water streams is likely to be contaminated with recalcitrant pollutants, it is expected by the operator to have further treatment steps installed.

Source control measures should also tackle more adequately the “diffuse emissions” for high load emitting sources of problematic in the water streams. One particular example to highlight is mercury emission form coal combustion but this is also relevant for agriculture (fertilisers, pesticides, pharma).

Proper controls are beyond the site boundaries of the UWWTP i.e. stack emissions from the coal power plants. For this situation proper synergies and policy coherence is key, the UWWTP provisions could foresee additional obligations laid upon Member States in regards to upstream pollution measures (e.g. requirement to phase out coal combustion, application of technical feasible performance levels) and or effort sharing schemes (e.g. extended polluter pays cost recovery on those operators) or adapted support schemes conditionalities for those Member States that still allow those source pathways to operate.

Industrial discharges

The UWWTD allows for UWWTP to receive industrial waste water (Art. 1, Art. 2 (1)) and sets general conditions on its pre-treatment (Annex I, C). However, it does not set any maximum share of industrial waste waters, effectively allowing any plant receiving only a bucketful of truly urban waste water to operate under the UWWTD instead of more specific industrial regimes under the IED.

One pathological case is that of Dow Olefinverbund in Schkopau (DE); the plant (400 000 p.eq.) receives water from a large chemical complex, and urban water from only ca. 40 000 citizens. It used to operate as an industrial WWTP (CWW BREF) but became an UWWTP in 2018. Luckily there appear to be no negative environmental consequences, thanks to a good operating permit.

Plastics and microplastic

Reflecting the wide use of plastics, microplastics can reach the sewers via different routes, including urban run-off carrying particles from tyre wear or with household wastewater containing plastic shredding from clothes and synthetic wet wipe. In many EU countries tyre wear represents the biggest source of microplastics to the environment with a total of 1.3 million tonnes of tyre-wear particles generated yearly. Plastic trash from streets can also be carried with urban run-off. Apart from harming the environment, plastic particles also contain toxic chemicals, such as PAHs in tyres.

Microplastics must be tackled at source as they are extremely difficult to remove from wastewater or sludge. While microplastics to some extent can be removed at the WWTP, removal from the water phase means they end up in the sludge fraction, which only shifts the issue as half of Europe’s sludge is returned to land. Upstream measures should be promoted over end of pipe measures at WWTP, and include:

- better design and production of textiles to reduce plastic shredding[30]
- biodegradability criteria of wet wipes

To monitor the load of microplastics to receiving waters, and to evaluate the result of upstream measures wastewater and sludge should be monitored for the presence of microplastics. Thresholds for microplastics should be introduced, in particular for sludge that is reused in agriculture, but a definition of microplastics as well as methodology must be developed.

Hazardous substances (in household products) / to be achieved by other legislation

Apart from pharmaceuticals, urban wastewater treatment plants also receive other substances, such as solvents, substances with long lifespan including nonylphenol, brominated, flame retardants, poly-aromatic substances (PAH), PCB, hexaclorobensene (HSB) and dioxines. Many of these are used in industry or are present in household products.

- Substances that are of "no essential use" and that may end up in the water compartment should be prohibited through Ecodesign requirements and source measures such as REACH restrictions or substitution efforts e.g. Pesticides Regulation
- Where the origin of the substances fulfil and 'essential use' the potential for containment at source shold be explored e.g. separate collection of waste water from hospitals (X-ray agents, pharmaceuticals) dedicated substitution obligation and leach controls e.g. for pesticides. Stricter controls and sanctions need to be put in place. The operators that manufacture those substances shall also be held accountable for the remediation costs (see polluter pays section)
- Phase out of dental amalgam by 2025 as the most cost-effective way to prevent mercury pollution from this source[31].
- The REACH regulation should list all substances meeting the properties of Art 57 to the REACH candidate list. Where those substances have a potential hazard to the aquatic environment and made be released through imported products / articles it shall prepare a restriction dossier. This should include the following groups:
    - Substitution of mineral oil-based anti-foaming agents (e.g. by biodegradable substances)
    - Substitution of complexing agents containing phosphorus (e.g. triphosphates) or nitrogen (e.g. amino polycarboxylic acids such as EDTA, or DTPA or NTA)
    - Substitution of alkylphenols and alkylphenol ethoxylates
    - Substitution of PFAS, BFRs, phthalates as a group
- Banning of synthetic fibre in wet wipes

[30] For more details see Wardrobe Change, 2021 Recommendations for the EU Strategy for Sustainable Textiles
[31] For more details see EEB Submission to EU mercury regulation

Issue 7: Affordability of water services - EPR and polluters pays principle

Waste water collection and treatment account for ca 60% of the water bill.[32] While water supply and sanitation generally is affordable in the EU (defined by OECD as below 3% of household disposable income), this is not the case for the poorest 5-10% of the population in a number of member states.[33] Source control and polluter pays principle is crucial to keep treatment costs at a minimum and keep water services affordable.

Still, 10 million people in the EU lack access to sanitation facilities[34]. ***Right to access to sanitation should be introduced in the revised UWWTD, in line with the European Green Deal ambition to leave no one behind.*** The UN has acknowledged the Human Right to Water and Sanitation and has set SDG6 which aims to give access to clean water and sanitation for all by 2030.

Producers should make financial contributions to the needed upgrades through extended producer responsibility schemes. While collection systems exist for unused medicines the European Commission's Strategic Approach to Pharmaceuticals in the Environment did not fully explore the EPR options for advanced wastewater treatment. ***Where a WWTP needs to be upgraded to advanced treatment to deal with pharmaceuticals, the additional costs should be recovered from the pharmaceutical industry.*** This could be achieved by effort-sharing allocated on a pro rata basis of the sales volumes and based on emission factors. Alternatively, the pharmaceutical industry could bear the cost for de-pollution of pharmaceuticals in an environment fund.

Issue 8: Circular economy (recovery and reuse of resources)

Wastewater needs to be treated to not present a risk to health and environment, but it also contains components that should be recovered and reused, including carbon, energy, nutrients and water. ***The UWWTD should promote the reuse and recovery of these resources.***

Almost 10 million tonnes sludge dry solids are produced by wastewater treatment every year (30-35 million tonnes of dewatered sludge).[35] Full compliance with the UWWTD and more stringent treatment requirements will increase sludge volumes further (still 46 million p.e. that yet not undergoing secondary treatment). While the use of sewage sludge is handled under the Sewage Sludge Directive, it is closely linked to the UWWTD as the latter influences the quality of the sludge. For example, the majority of the metal load to UWWTPs end up in the sludge (and not in the water phase). Upstream measures, such as stricter control of industrial discharges are necessary to restrict the pollution load to the plants and ensure high quality of sludge.

The revised UWWTD should encourage reuse of treated wastewater for agriculture, urban or industrial use in line with the recent regulation on water reuse.

[32] European Commission 2019
[33] OECD (2020)
[34] European Commission, 2020
[35] EurEau, 2021, Briefing Note, Waste water treatment – sludge management

Recovery and reuse of nutrients

Human excreta contain carbon and nutrient (primarily nitrogen, phosphorus and potassium). Modern sanitation with water closets and sewers leading wastewater to treatment plants both concentrates (by collecting excreta from large numbers of people) and dilutes (by mixing it with water from flushing) the excreta. A 2001 study estimated that if all the nutrients from human excreta were captured, nearly 30 million tonnes nitrogen, 5 million tonnes phosphorus and 12 million tonnes potassium could be recovered globally, representing about a third of the global fertiliser demand.

Source: Ellen Macarthur Foundation, 2012, Urban Biocycles

Conclusions

Urban wastewater is a fingerprint of our society and reflects production and consumption patterns. Urban wastewater treatment is an end-of-pipe solution that comes at a resource and energy cost and cannot be a remedy for poor upstream work. Yet, emission limit values are needed to protect the environment and human health and to make the UWWTD work towards achieving the goals of the Water Framework Directive and other water legislation. In particular, sewer overflows and contaminants of concern need to be urgently addressed.

Reduction of pollution upstream will not only relieve receiving waters, but also increase the potential to close the loop of nutrients and water. However, it is clear that the UWWTD alone cannot protect our waters without addressing the way food and products are produced.

The revision of the UWWTD provides an opportunity to climate-proof the Directive, both in terms of including provisions for climate-adapted urban water systems based on nature-based solutions, but also by putting WWTPs on the path to become climate neutral through energy efficiency, reduction of greenhouse emissions and self-sustainable on energy.

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With the support of the LIFE Programme of the European Union. *This communication reflects the author's view and does not commit the donors.*

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