2 October 2018

Briefing note

Water and the EU's Circular Economy

1. Introduction

In 2015, the European Commission published an Action Plan for the Circular Economy[1]. The accompanying Circular Economy Package with four legislative proposals was adopted in May 2018. EurEau strongly supports both the legislative elements and the action plan of the package. However, the Package lacks effective support measures for the European water sector, especially with regards to market access and financial support for innovative business models to recover materials and generate green energy in drinking water and waste water treatment.

EurEau members supply 500 million people with 44.7 billion m³ of clean drinking water annually, while 450 million people are connected to a waste water collection network and 435 million people are connected to one of over 18.000 waste water treatment plants.

2. EurEau supports new circular economy package

Waste Framework Directive

EurEau supports the revised Waste Framework Directive (Waste FD)[2] as adopted in 2018. It extends 'end-of-waste' criteria to all types of waste, giving Member States the possibility to include high-quality sludge-based materials and products (including composted sludge). However, the fact that this criterion remains a national decision will not facilitate the trade of good quality sludge products nor prevent them from ending in landfill or incineration.

Sewage sludge is the main residual product of waste water treatment plants (WWTP). Treated sewage sludge (biosolids) is a source of nutrients and organic carbon which can be used as a fertiliser when it meets stringent quality criteria. The Sewage Sludge Directive (86/278/EEC) (SSD) already gives a special status to sewage sludge by making it distinct from waste. This directive triggered source control measures in order to improve sludge quality. The SSD also helped reducing the demand for fertilisers by improving the recycling rate of sludge. According to the 9th implementation report on the Urban Waste Water Treatment Directive

[1] COM(2015) 614 - Closing the loop - An EU action plan for the Circular Economy.
[2] Directive (EU) 2018/851 of 30 May 2018 amending Directive 2008/98/EC on waste

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(91/271/EEC)[3], only 45% of sewage sludge is recycled in soil and agriculture today.

By excluding sewage sludge from the newly introduced municipal waste definition, the new Waste FD allows water service managers to keep all authorised routes available for sewage sludge that cannot satisfy the quality criteria for use in agriculture and that cannot be incinerated in a cost-effective way.

Fertiliser Regulation

EurEau welcomes the inclusion of the revision of the Fertiliser Regulation in the Circular Economy Package. It should open the door to using recovered phosphorus from sewage sludge as a component of fertiliser products. Phosphorus is an essential nutrient for plants, animals and humans and is therefore crucial for all life on our planet. The limited availability of phosphate rock as well as Europe's high import dependency prompted its addition to the revised list of Critical Raw Materials in May 2014[4] which was renewed in 2017[5]. Several Member States have already taken steps to encourage the more sustainable use of phosphorus while supporting its recycling.

However, the proposal presented by the European Commission on 18 March 2016[6] excludes sewage sludge as an input material for compost and digestates. This is a strong barrier to recycling nutrients in Europe and sends a negative signal as to the reuse of sewage sludge. Actions should be encouraged at EU level to maintain high confidence in the market and support the recycling of sewage sludge meeting stringent quality requirements.

Thanks to control at source measures or innovative processes combined with traceability mechanisms, sewage sludge may achieve quality levels that enable its use in end-products which comply with the characteristics of compost and digestate. **Thus, EurEau asks that the revised Fertiliser Regulation defines components of fertilising products by the quality of the end-product only without segregation of the input materials. Furthermore, future updates of the annexes must consider good quality sewage sludge as input material for compost and digestate.** EurEau has a detailed position on this topic[7].

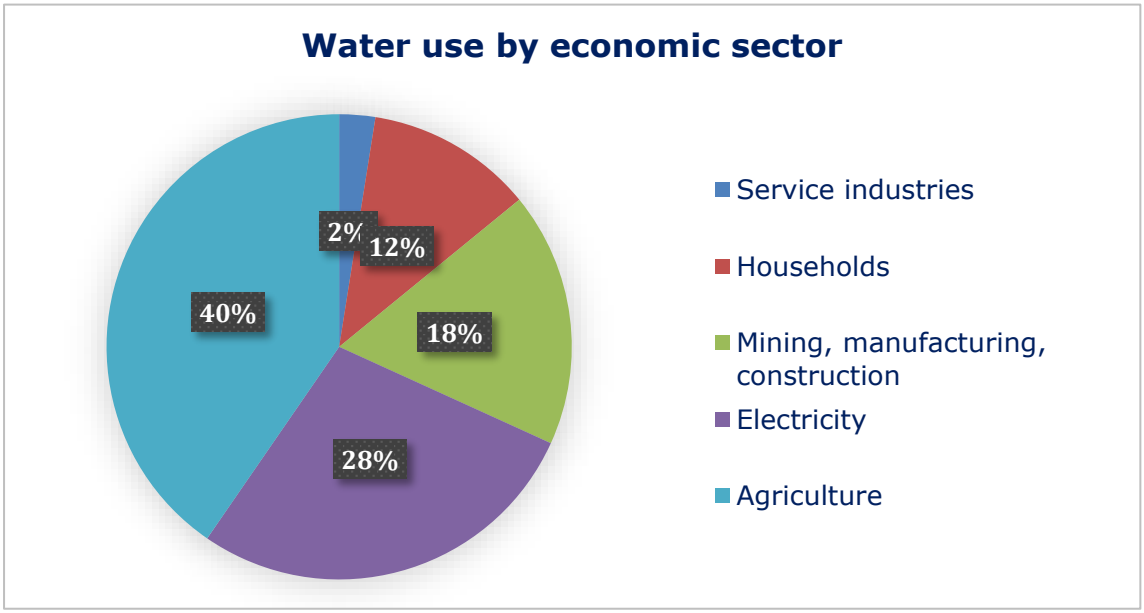
Water reuse – legal requirements and guidelines

Water never gets lost since it belongs to the water cycle. However, only 1% of the planet's water resources is available as fresh water, the remainder being trapped in the oceans and ice caps. Fresh water resources must therefore be used wisely and protected for use as drinking water now and for future generations. Protecting drinking water resources and public health must be the highest priority. Where water

[3] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52017DC0749&from=EN.
[4] COM(2014) 297 final: Communication from the Commission on the review of the list of critical raw materials for the EU and the implementation of the Raw Materials Initiative.
[5] COM(2017) 490 final: Communication from the Commission on The 2017 list of Critical Raw Materials for the EU.
[6] COM(2016) 157 final: Regulation laying down rules on the making available on the market of CE marked fertilizing products.
[7] http://www.eureau.org/resources/position-papers/121-fertiliser-regulation-january-2017/file.

resources are not available in sufficient quantities, alternatives such as water reuse can provide sustainable and efficient technical solutions. Water reuse is a well-established way to reduce costs and improve resource efficiency while promoting a sustainable economy and enhancing job creation. Furthermore, it can relieve pressure on water resources by allowing these waters to be allocated for drinking water use only. The provisions set out in the Water Framework Directive should be complied with.

Water reuse is already widely applied in agriculture, tourism and industry across European and other regions and is not solely confined to southern European countries.



EEA indicator on use of freshwater resources [8]

European requirements and sustainable water resource management

The availability of water resources differs significantly between EU Member States thanks to variations in climate and topography. A range of measures such as recycling grey water (ie: without faecal contamination), rain water harvesting, promoting the efficient use of water and economically sustainable leakage management are used in all EU countries to manage water resources.

Clearly, there should be no 'one size fits all' approach to water reuse. Where Member States deem it appropriate and necessary, water reuse should be possible, but there should be no obligation to do so. This is particularly true when it comes to the use of reclaimed water for the production of drinking water.

With this in mind, EurEau welcomes the Commission's proposal for a regulation on

[8] *Source:* *https://www.eea.europa.eu/signals/signals-2018-content-list/infographic/water-use-in-europe/view*

water reuse for irrigation in agriculture[9] and supports work on non-binding guidance for aquifer recharge. The draft regulation is a step towards the promotion of water reuse, especially through the setting of sound minimum requirements that need to be complied with according to the envisaged use of the reclaimed water and while ensuring economic feasibility. Combined with stringent authorisation and monitoring requirements, this will bring confidence to the market and consumers, and should lead to the development of large scale projects across Europe, where necessary. When setting the requirements, the protection of public health must have highest priority.

Water used for drinking purposes is abstracted from surface and ground waters influenced by a range of environmental and anthropogenic factors (including agriculture, amenity and urban influences). With regards to the future non-binding EU guidance on aquifer recharge, compliance with the relevant requirements of the Drinking Water Directive should be considered in order to guarantee the efficient and sustainable protection of drinking water resources – ideally by applying the Water Safety Plans approach to all stakeholders in the catchment area.

3. Towards a supportive framework

The reuse of secondary raw materials and green energy generation are important credentials of the Circular Economy. The recovery and reuse of nutrients and materials from waste water and from drinking water treatment should therefore be encouraged, for example by introducing a supportive fiscal framework. While this is clearly a national prerogative, the EU could provide guidance about how to respect state aid rules while promoting the circular economy in the water sector. Moreover, innovative business models and a level playing field are needed to improve cost-effectiveness, without adding unnecessary administrative burdens on water services.

Recovery and reuse should not have any detrimental effect on water quality. Sufficient fresh water of the right quality as a resource for drinking water is essential. Regarding end-of-waste criteria for nutrients coming from sewage sludge and materials recovered from drinking water treatment (calcium carbonate grains used in soil enhancement or construction material, lime slurry used in the paper industry as filler material or as coating pigment), the focus must be on the final product quality of the nutrient or material, rather than the input material, while complying with existing legislation.

Phosphorus recovery

Phosphorus recovery from sewage sludge is a growing activity across Europe. Technologies are now available to produce different qualities of recovered phosphorus but its access to the market is limited because of its low-quality-waste image[10]. In that sense, the draft revised Fertiliser Regulation is a big step in allowing

[9] COM(2018) 337: Proposal for a Regulation on minimum requirements for water reuse
[10] EurEau (2014): Phosphorus in Sewage Sludge (https://bit.ly/2K271vq)

recovered nutrients to enter the fertiliser market. However, the fertiliser industry is still reluctant to buy recovered products that are not offering exactly the properties they are looking for, not because of the poor quality but because they are not adapted to their industrial processes (different properties, not available 24/7, away from production sites). EU rules must overcome these industry obstacles in order to make the market accessible for recovered products. Otherwise, this significant circular economy potential might remain untapped.

Regulation on blending would be a strong incentive for the use of recovered phosphorus. Just as requirements for blending natural gas with biogas already exist, there should also be requirements of blending recovered phosphorous with mined fertilisers. Additionally, as in most cases the recovery of phosphorus is not yet economically viable, funding should be considered to support the development and use of the most promising solutions.

Resource recovery and renewable energy generation

We see examples of traditional waste water treatment plants moving to a new type of resource factory. Such a resource factory recovers phosphorus, cellulose, energy (biogas, heat pumps, new processes (i.e. anammox) etc) and can realise reclaimed water. All processes, equipment and components are optimised for the highest energy efficiency.

The water sector is traditionally energy intensive. The net annual electricity consumption for urban drinking water and waste water management represents about 5.5 % of the electricity consumed by households in one year in Europe[11]. Thus, the sector offers a substantial energy efficiency and renewable energy generation potential. In specific cases, operators may even achieve energy neutrality or become energy positive.

Different options exist to realise this potential. For example, waste water is a source of energy through many pathways. Digestion of sludge at the waste water treatment plant is producing biogas that can be used either for direct heating and/or cooling (buildings and processes), for electricity production with combined heat and power or as biofuel for garbage trucks and buses[12]. Thanks to its stable temperature over the year, waste water could be used for energy recovery through heat exchangers[13].

Finally, if it is not possible to recover the valuable nutrients contained in sewage sludge, its incineration still allows us to recover energy.

However, step changes will not happen automatically, mainly due to financial constraints and regulatory obstacles. As an example, in a number of Member States, WWTPs are not allowed to produce power in excess of their own needs. Regulations, mainly at national level, may thus be an obstacle to exploiting the potential of green energy generation and energy efficiency gains in WWTPs.

[11] EEA Technical report No 5/2014: Performance of water utilities beyond compliance
[12] Veolia brochure on water and the circular economy.(http://bit.ly/1LauK93)
[13] AgentschapNL & UVW - Wastewater management roadmap towards 2030 (http://bit.ly/1tfHLrY)

In such cases, regulations should change in order to ensure and strengthen synergies between the circular economy and sustainable energy sources. The latter certainly includes energy produced by WWTPs such as biogas. The current Renewable Energy Directive helped develop the production of biogas from sewage sludge. **Member States must include these alternative sources in their national lists of renewable energy sources and incentivise the feeding of energy generated by WWTPs in municipal grids.** This would not only contribute to reaching the 2030 renewable energy target of the EU, but also foster innovation in the water sector.

The source control approach: the key for the Circular Economy

The use of fewer harmful substances will result in cleaner groundwater, rivers, lakes, coasts and seas – and a better quality of the residual products obtained from the treatment of waste water.

An effective source control approach facilitates the possible reuse of water and nutrients, like nitrogen and phosphorus, from waste water and sludge. In fact, the effectiveness of controlling the input of harmful substances into waste water will drive the capacity of sewage sludge and waste water to fulfil the appropriate chemical quality criteria for reuse. In that sense, source control is the key prerequisite to enhancing the circular economy, creating jobs, and achieve truly sustainable societies.

4. Water in the circular economy: a concrete reality

EurEau members are already implementing actions to make water and waste water services more resource efficient. The Netherlands are currently designing their water services to be entirely integrated in the Circular Economy by 2030 where "the regional water authorities and municipalities will be converting waste into clean raw materials, clean energy and clean water"[14].

The scope is wide, taking into account for example bioplastic production from waste water, energy production through biogas, heat recovery from sewers, treated waste water use for irrigation and other innovative solutions. Residue from drinking water treatment are also considered as a source of secondary raw materials. Calcite is produced by drinking water softening and reused in construction, agriculture and the mineral-resources industry[15].

Similar initiatives are supported in other countries and successful solutions are available. For example, the waste water treatment plant of Brussels (Belgium) has been operating the first industrial prototype for bioplastic production from municipal waste water since 2011[16]. Aquafin (Belgium) is operating one of the first full-scale

[14] AgentschapNL & UVW - Wastewater management roadmap towards 2030 (http://bit.ly/1tfHLrY).
[15] J.P. van der Hoek, A. Struker & J.E.M. de Danschutter (2015): Amsterdam as a sustainable European metropolis: integration of water, energy and material flows, Urban Water Journal, DOI: 10.1080/1573062X.2015.1076858.
[16] Aquiris - Bioplastic production in Brussels (http://bit.ly/1D9jBj1).

processes[17] to produce struvite, a phosphorus and nitrogen crystal, out of digested sewage sludge. The waste water treatment plant of Aarhus (Denmark) is already producing struvite from their digestors' rejected water. This crystal is then sold in local supermarkets as fertiliser. In Oslo (Norway), the Bekkelaget waste water treatment plant produces biogas out of sewage sludge which is refined and used as biofuel for rubbish trucks and buses[18]. Nosedo waste water treatment plant, in Milan (Italy) heats and cools its offices through heat exchange from waste water. They have a project to heat and cool a residential area in their neighbourhood in the next few years. Examples of water reuse or energy savings through biogas production from sewage sludge treatment are more and more present in municipal water services.

All these show that water is ready to be part of the circular economy. **With a view to ensuring a wider uptake of such initiatives, the EU and national/regional governments must develop an enabling regulatory framework and facilitate market access for recovered nutrients, green energy and recycled products.**

[17] Aquafin – Nuresys (http://bit.ly/1CyfyyB).
[18] Oslo Kommune – the sewage adventure (http://bit.ly/1y4NaPz).