

AQUA PUBLICA EUROPEA THEMATIC WORKSHOP

Towards a sustainable approach to sludge management: legal frameworks and technological solutions

Edinburgh, UK

June 2019



EUROPEAN ASSOCIATION
OF PUBLIC WATER OPERATORS
10 YEARS OF COLLABORATION
FOR THE GENERAL INTEREST

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Event report

ABOUT AQUA PUBLICA EUROPEA

Aqua Publica Europea is the European Association of Public Water Operators

For the past ten years, it has united publicly owned water and sanitation services and other stakeholders working to promote public water management at European and international levels. Aqua Publica gathers over 60 members serving more than 70 million people, in an operator-led association that looks for efficient solutions that serve the public rather than corporate interests. In 2019, Aqua Publica Europea celebrates its tenth anniversary.

OUR MEMBERS



Towards a sustainable approach to sludge management: legal frameworks and technological solutions

On **27 June 2019**, the members of Aqua Publica Europea met during a thematic session, hosted in **Edinburgh (UK)** by the **Scottish Government**, to address the **growing concerns regarding the management of the sludge resulting from the process of waste water or drinking water treatment**, especially in the context of a global move towards circularity.

Whilst the **opportunities exist to benefit from the materials, nutrients and energy that can be recovered from sludge**, the discussions, from expert and technical levels, highlighted **emerging challenges, including complex legal frameworks, closing or unstable market outlets for bioresources and negative perceptions**.

The meeting was the occasion for **public water operators to confront a diversity of national and local situations and to present their solutions based on their geographical, legal and technological specificities**.

The morning closed with the conclusion that there is a **collective responsibility in ensuring a sustainable future** and operators face similar issues when dealing with sludge: **whilst innovation and technology are key instruments in this process, a coherent set enabling conditions – on regulation, market and public acceptance – is necessary to allow to take the full advantage of sludge and its benefits**.



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AQUA PUBLICA EUROPEA MEMBERS

Marco Blazina, Environmental Protection and Wastewater Treatment Manager
MM, Italy

MM Spa provides the city of Milan with water supply and waste water treatment services. Its infrastructure includes 31 pumping stations, more than 500 wells, 2.228 km of aqueduct network and 1.500 km of sewerage as well as 2 wastewater treatment plants.

Franck Perru, Technical Regulation Manager

SDEA – Syndicat des Eaux et de l'Assainissement Alsace-Moselle, France
SDEA unites 668 municipalities and 1.020.000 inhabitants. It has 7.023 km wastewater pipe grid (90% unitary) and 109 wastewater treatment plants. Sludge production reaches 13.500 dry tons/year and disposal relies on agricultural valorisation. There is one active methanisation plant and one project.

Frederik Looten, External Relations Director
De Watergroep, Belgium

De Watergroep serves 3.2 million inhabitants in Flanders (Belgium), as one of six public water companies. Water resources are both groundwater (75%) and surface water (25%), with an annual production of 130 millionm³ (2017 figure)

Diego Macchiella, General Manager
Viveracqua, Italy

Viveracqua is the consortium of water operators in the Veneto region which creates stable collaboration, provides joint solutions, maintains efficiency and connects with the territory to achieve a large, competitive capacity. On sludge, over 160 treatment plants generate about 310,000 tons per year of dehydrated sludge.

Aoife Kyne, Sludge Management Specialist
Irish Water, Ireland

Irish Water is the national water utility providing water and waste water services throughout Ireland. Regarding waste water, it serves 5,4 population equivalent (domestic and non-domestic population) served, with 1.100 waste water treatments plants, 2.066 waste water pump stations in the sewer network and 26.000 km of waste water sewer.

Mark Williams, Head of Environmental Science and Regulation
Scottish Water, UK

Scottish Water manages water in Scotland and provides water supply and waste water services to 2.5 million households. Scottish Water operates over 1800 waste water treatment works and is responsible for over 32,000 miles of sewer pipes across the whole of Scotland.

EXPERTS

Professor Roberto Canziani
Polytecnic University of Milan

Caroline Whalley
European Environment Agency

AN EVENT HOSTED BY



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Context

In the European Union, recent data suggests that **the treatment of waste water produces over 8.5 million tons of dry solid matter of sludge every year**¹; a figure that is likely to increase in the coming years as a result of growing compliance with EU legislation and stricter requirements. The underlying opportunities are multiple: **sludge contains essential nutrients such as phosphorus, it can be used as a fertiliser or to make construction materials, it can produce energy**. Sludge is thus an excellent **biological resource** that has the potential to **contribute greatly to the transition towards a circular society**. Still, without coherent legal frameworks and enabling conditions, waste water operators may be prevented from handling sludge in a circular manner.

The thematic session was opened by representatives from the **European Environment Agency**, the **Polytechnic University of Milan** and **Mr. Marco Blazina, from the Milanese water operator and coordinator of Aqua Publica's new working group on Sludge & the Circular Economy**, to provide a complete overview of the context around sludge management: where we are now, where we are going and the issues we may face in this journey.

Professor **Roberto Canziani** first introduced the range of options available to water operators to recover materials and energy from sludge:

Material recovery:

- **Nutrients and organic carbon** can be recovered from aerobic (compost) and anaerobic digestion (fermentation of the sludge in a closed environment, without oxygen);
- **Construction materials and phosphorus** can be recovered from ashes resulting from incineration;
- **Liquid and solid fuels** can be recovered from wet thermal processes.

Energy recovery:

- Biogas can be produced with anaerobic digestion
- Energy can be recovered from incineration or co-combustion (burning of sludge together with other materials)

Developing sustainable solutions to **turn sludge into a bioresource, and contributing to the shift towards a circular society, is the ambition of the public water operator**. Yet, it is a costly endeavour that requires an **effective enabling environment** to deliver the expected benefits. The main hurdles and several necessary conditions have therefore been outlined during the thematic session as the **question of sludge is a collective responsibility where the operator, the authorities and local actors need to act together to create a positive framework for concrete circular solutions**.

¹ European Commission, *Ninth Report on the implementation status and the programmes for implementation of Council Directive 91/271/EEC concerning urban waste water treatment*, 14 December 2017, available at: <https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:52017DC0749>

One size does not fit all: the conditions that influence the operator's decision-making

A diversity of parameters influence the water operators' capacity to manage sludge, and these are highly dependent on national and local contexts.

Disparate opportunities rooted in national and local experiences

The thematic session was the opportunity to review the existing frameworks in different countries: Scotland, Italy, Belgium, France, Ireland, Hungary, Greece and has showcased the **wide diversity of situations which goes far beyond technological options**. The future of treated waste water is a particularly sensitive topic from the point of view of our societies. **Efforts to legislate the use of sludge have resulted in various outcomes; local experiences have shaped public perception differently; outlets (or market opportunities) evolve based on their own contextual practices.**

Geographical conditions that influence practices

At an even lower level, the options available to water operators depend greatly on the **location of treatment plants themselves**, and in particular whether they serve urban or rural areas. Size of the plant, scale of the activity, human presence, environmental surroundings and local rules all affect decision-making. Therefore, the geographical element needs to be considered both by water operators and authorities: different solutions fit different contexts. **It also means that any overarching decision that affects the sector should be carefully assessed and provide sufficient flexibility to support existing efforts.**

On the ground

Italy

In Milan, where the city is home to over 3.2 million people, the local operator, MM does not have any anaerobic digestion treatment in its waste water treatment plants as they are close to the city to avoid affecting the population with odours, or the city skyline. This is why MM is studying with the University of Venice innovative techniques for semi-dry digestion, similar to pilot project launched in Austria.

Ireland

Ireland, because of its low density population geography, has a high number of small treatment plants distant from each other. Because of this, Irish Water is making efforts to centralise the recovery processes to improve efficiency.

France

SDEA, the French Alsace Region operator, considered the option of mass methanisation to create biogas by combining sludge from its several small treatment plants but their solution is hampered by the relatively long distance between plants that increases transport costs and environmental impact.



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A legal framework at the service of a circular management of sludge

A **solid legislative framework for sludge management is the opportunity to streamline practices, increase predictability for investments and support product confidence.** The adoption of adequate rules, which spell out high quality standards would mean more **trust for the end-users**, whilst a **defined allocation of responsibility** would allow to bridge gaps towards the creation of a well-functioning value chain for bioresources. Finally, addressing the question of bioresources at a legislative level, by taking into account **technological developments, sustainability considerations, financial implications** and the need to **reverse negative perceptions**, would allow to create an **up-to-date framework that effectively supports public water operators** who cannot choose to overlook a product that will continue to exist and need to be dealt with.

However, today, there is a **lack of uniformity across the EU regarding rules on sludge management.** Whilst the **EU Sewage Sludge Directive (86/278/EEC)**² was adopted to encourage the reuse of sewage sludge in agriculture, its provisions are over thirty years old (adopted in 1986). Further, as countries may also go beyond the Union legislation in their national laws, the evolution has led to many different situations, which explains the **high variability amongst EU countries of the proportion of sludge reuse in agriculture.**

Beyond sludge legislation, other **legal texts may push in different directions:** for instance, whilst the Urban Waste Water Treatment Directive (91/271/EEC)³ requires to reuse sludge whenever possible (art. 14), the revised Fertilisers Regulation (2019/1009/EU)⁴ excludes sewage sludge from its scope which prevents fertilisers deriving from sludge from receiving the EU quality certification label and consequently hampers the trust in these materials. There is also an **absence of clear provisions to reach the end-of-waste**, which prevents sludge from being considered as a product or resource (and, therefore, from being subjected to the product legislation), thus limiting the possibility of re-enter the economic cycle.

² Council Directive 86/278/EEC of 12 June 1986 on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture, available at <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31986L0278>

³ Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment, available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31991L0271>

⁴ Regulation (EU) 2019/1009 of the European Parliament and of the Council of 5 June 2019 laying down rules on the making available on the market of EU fertilising products, available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1562150540021&uri=CELEX:32019R1009>

⁵ Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste, available at : https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.150.01.0109.01.ENG

⁶ In Germany, for plants bigger than 100,000 p.e. as of 2029 and bigger than 50,000 p.e. as of 2032. Verordnung zur Neuordnung der Klärschlammverwertung of 27 September 2017: <https://www.bmu.de/en/law/sewage-sludge-ordinance/>

⁷ Ordinance on the Avoidance and the Disposal of Waste, 4 December 2015: <https://www.admin.ch/opc/en/classified-compilation/20141858/index.html>

The **variability of legal frameworks results in numerous consequences for the water operators**, as the different case studies have highlighted: from laws that change suddenly or are affected by external considerations, several situations jeopardise legal certainty.

On the ground

Italy

As explained by MM, in the Italian Lombardy Region, in 2018, a court judgement led to the prohibition to use sludge in agriculture within 6 months. This radical change forced water operators to find new solutions in emergency conditions, without adequate planning and time to develop sustainable solutions.

Scotland

In Scotland, bioresources are largely reused in agriculture. This is not however accidental, but the result of a long term engagement of Scottish Water and institutions to develop assurance schemes together with the farming sector, which certify the conformity of the sludge with agreed quality standards going

France

The legal context may also affect treatment methods as in France, where the interpretation of the recently revised EU Waste Framework Directive¹ may lead to an interdiction to combine the treatment of municipal bio-waste with sewage sludge and therefore effectively prevent the composting sectors from reusing sludge in agriculture.

Germany/Switzerland

In Germany⁶ and in Switzerland⁷, incineration is becoming the only legally allowed option, with a view to boost the recovery of phosphorus in the future.

The **legal framework should incentivise efficient and flexible management of sludge by both recognising the value of bioresources and allowing solutions to be adapted at national and local level**. It is further essential that decisions taken are **science and evidence-based**. With the technology already available, a stable legal framework will foster investments and increase trust towards products resulting from sludge treatment.

The **current review of the Urban Waste Water Treatment Directive is an opportunity to fully seize the question of sludge management and recognise its value**.

In addition, a **clear legislation on end-of-waste** will define when recovered materials from sludge should be considered as products and therefore get an easier access to the market.



Photo : Milano Nosedo Waste Water Treatment Plant, Italy - MM



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A reliable market for recovered products to close the loop

Water operators are able to **recover from sludge high quality fertilisers and soil improvers to be used in agriculture**, they can also **provide materials to the cement industry and produce energy**.

The **concept of circular economy involves that waste products may re-acquire economic value and therefore re-enter the economic cycle and close the production loop**. Adoption of adequate regulatory conditions would support the demand for recovered resources or secondary raw materials, thus creating the conditions **for a stable market that allow for sound investment planning and resource mobilisation**. The shift towards a real economic circularity for bioresources is also important to avoid that the costs of related investments are borne only by domestic water users through their water bills, which may have two potential consequences: on the one hand, impairment of the affordability of water, and on the other hand, a distorted market where some industries benefit disproportionately from the economic value of recovered products.

Also, whilst good technological solutions exist to make the most out of the bioresources, the receiving market for the product may be influenced by external elements beyond (the lack of) regulatory conditions, from incidents to question of image.

On the ground

Ireland

In Ireland, 98% of the sludge produced is currently used in agriculture. Whilst it may showcase a trusting relation with the farming sector, there is nevertheless growing pressure from the food industry to develop quality assurance schemes to certify the quality of sludge. Irish Water is committed to this objective but adequate institutional support is needed to strengthen the process and avoid sudden and disruptive changes in the current regime.

Belgium

In Flanders, De Watergroep, treating sludge from drinking water, used to work with the Dutch cement industry until other companies' inadequate practices resulted in a complete and sudden shut off of this market outlet. De Watergroep is looking for other solutions but has negatively affected by the sudden changes in the market.
beyond regulatory obligations.



Within a circular economy framework, sludge use is market-driven: the industries, on the demand side, decide whether and how much material they would like to have and this would trigger the adequate level of investments needed for the technological shift. However, the above examples show that different factors – from regulatory conditions to perceptions – may determinate market failure or discontinuity, resulting in water operators remaining with resources that, nevertheless, need to be disposed of. The mission of public water operators – by definition, not-for-profit entities - is to provide the **best quality of drinking water and waste water services at the lowest cost for the users;** therefore, ensuring effective circularity is a means not to seeking new, profitable commercial opportunities but rather to **avoid unjustified costs on domestic water users.**

A change in mind-set needs to be **encouraged for a functioning and stable demand for high quality products, based on actual needs, and that contributes to a truly circular economy.**

Voluntary schemes could be considered efficient, as they support the collaboration between both parties but more can be done to foster a sustainable system. In this context, **perception in one of the key elements.**



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Reversing public opinion through more awareness on the benefits of bioresources

The **fight against climate change is the single most pressing issue of our time**. The world is realising that we cannot continue the path that has been defined whereby we live in a linear system where we produce, consume and throw away. At the same time, the move to net-zero gas emissions is a recognised objective in the European Union. As the world is running out of materials, it is **essential to make sure that we can keep or recover as much as possible**. Environment and sustainability are, today, a claimed priority at political and social levels: from international agreements to youth demonstrations for the future and the elections of a greener than ever European Parliament, people, politicians, citizens want to commit to sustainability.

However, today, **this mind-set has not reached the question of sludge**, which suffers from a widespread negative image. Bioresources have not been made into a public conversation as an opportunity, although the reuse of sludge as agricultural fertiliser or soil improver or as ashes to extract phosphorus means preserving precious natural resources. Further, there is often opposition, from different levels, to the installation of treatment plants in certain areas, affected by ideas that they would impair the well-being and safety of the community. Beyond, **skewed perception of the products recovered from bioresources affects the trust in them**, on the basis of perceived low quality or pollution. Often, though, these perceptions are results of **factors external to the actual quality of the product**, as was explained by operators with first-hand experience with the issue.

On the ground

France

In France, treatment plant managers face a long-lasting controversy resulting from practices dating back 50 years when there was direct disposal of sludge in zones, in the Paris area, that are now entirely polluted. Since then, practices have been transformed completely but the opinion remains affected by this history.

Italy

Localised contamination events of drinking water also contribute to deteriorate the public perception on sludge, as it has been the case in the Italian Veneto Region with PFAS pollution as a link is made, albeit incorrectly, between the pollution in drinking water and the final quality of the sludge.

Italy

In order to bring evidence into the discussion, MM (Milan) has launched a pilot project to evaluate the effects on human health and on the environment of agricultural reuse, incineration and co-combustion with urban waste.

Therefore, it is crucial, in a context of a **circular and sustainable society** to bring the question of **bioresources within the debate**. This requires **political courage** to bring an unpopular topic, with little political value, to the table of discussion and contribute to building the trust necessary.

It is paramount to **foster dialogue between the different actors within the communities** - water operators, authorities, citizens – to create an **understanding of the real implications and benefits of the use of bioresources**, raise awareness of the consequences of doing nothing and to seek **solutions together**.

Further, the discussion needs to rely **on science-based evidence**, which is the only way to assess the implications of sludge objectively. Pilot projects and research are a key instruments to be used to support political decisions.

Finally, **supporting and promoting a legal framework that guarantees product quality is essential in this process towards increased confidence**.



Photo : Seafield waste water treatment works, Scotland - Aqua Publica Europea

Conclusion

Public water operators are dedicated to the move towards a more sustainable management of sludge. This commitment does not stem from profit-seeking objectives but the awareness of their public responsibility and the need to find sustainable and economically efficient solutions to a collective problem. As the reality is that we can reduce the amount of sludge but not eliminate it entirely, **it is paramount to address the issue at technical but also societal level to ensure that innovation can be met with an enabling environment to thrive and produce its full benefits.**

The responsibility in this matter is collective. Ms. Caroline Whalley from the European Environment Agency emphasised this point by stating that **all stakeholders can work together to get a coherent picture.** Politicians, water operators, industry, end-users and civil society need to come together to build a functioning circular production and treatment system.

Several interlinked conditions are necessary: an adequate legal framework, a functioning and stable receiving market for products and a shift in the perception.

All these elements can build on each other: public awareness drives the development of sound legislation increases trust which, in turn, supports the market as well as acceptance. Further, **any solution that integrate these aspects needs to be conscious of the highly geographical characteristics of the process.** There must be **flexibility** to ensure that solutions can be adapted nationally and locally to fit different contexts, with different experience and capacity, can allow for future adaptation or integration of different approaches.

Finally, **public water operators are committed to provide the efforts on their end.** However, they require **all actors to take on their share of responsibility**, especially as there are costs related to the deployment of solutions. With the established 'cost-recovery principle', water utilities are obligated to recover their costs in their tariffing. Concretely, this means that dedicating more financial resources to sludge management risks affecting domestic users' bills, with implications for affordability, if sustainable solutions for sludge disposal are not supported adequately.

To avoid creating an unfair situation, **it is of utmost importance that everyone starts working together** and share the responsibility with the water operator who, at the end of the day, remains with the product and has no options but to dispose of it.

The question we need to ask ourselves is whether we, as a society, want to commit to a sustainable use or continue ignoring the issue.

Aqua Publica Europea



Aqua Publica Europea is the European Association of Public Water Operators

In 2019, **Aqua Publica Europea, the European Association of Public Water Operators, celebrates its tenth anniversary** and with it ten years of working to establish strong collaboration both with the utilities who provide us with indispensable water services and with EU and international institutions to inform decision-making that meets the public interest.

Back in 2009, a handful of operators from Belgium, France, Italy and Switzerland, realised that public utilities had **many values in common**. They joined their efforts to formalise a **shared vision for water management** with the creation of Aqua Publica Europea and its founding charter based on the view that **water is a common good that needs to be managed for the general interest by efficient public services**. Since then, this vision gathered growing support and 65 operators have endorsed it.

With members **providing water supply and sanitation services to over 70 million people in Europe**, Aqua Publica is **now looking at the future**. Many challenges and new opportunities will affect water operators in the years to come, from climate change and population growth to technological progress. At the same time, the **EU also focuses on strengthening the management of this precious resource** through an ongoing wide review of its water policy, including cornerstone pieces such as the Drinking Water Directive or the Water Framework Directive, and tabling new legislation.

In this unique context, **collaboration between all actors is crucial** to secure sustainable and responsible management of a finite yet essential resource for both ours and future generations. Aqua Publica Europea's role will continue to be **to support public water operators' efforts by representing their voice** on key issues and provide a **platform for peer-to-peer exchanges for continuous improvement**, notably with the landmark Water Erasmus initiative.

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AQUA PUBLICA EUROPEA

Boulevard de l'Impératrice 17/19, 1000 Brussels, Belgium

info@aquapublica.eu | +32 2.518.86.55

www.aquapublica.eu | @APE_EU