

REUSE OF TREATED WASTEWATER: ASSET OR HANDICAP IN ADDRESSING WATER CHALLENGES?

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Introduction

The reuse of treated wastewater (or “REUT” in French) involves mobilizing water from the output of a wastewater treatment plant, further treating it in addition to the treatment it has already undergone, and using it for a variety of purposes. In doing so, it substitutes for the use of other water resources, thereby reducing pressure on these resources. While this practice is not new, it remains anecdotal in France, where less than 1% of treated wastewater is reused, which is low compared to our Italian or Spanish neighbors, where reuse percentages are in the double digits, particularly for agricultural uses (Ait-Mouheb et al., 2018). It is important to recall that agriculture is the largest consumer of water (MTECT, 2024). Noting a significant contrast in the practices and regulations among member states, and as the effects of climate change increase, Europe addressed this issue as early as 2018 and proposed in 2020 the text “Regulation (EU) 2020/741 of the European Parliament and of the Council of 25 May 2020 on minimum requirements for water reuse,” which regulates the use of treated wastewater in agriculture. It should be emphasized that this text is not a directive but has the status of a regulation. In other words, except for a few points left to the discretion of member states, which may require the establishment of implementing decrees, it is binding as is under the hierarchy of norms and applies to all member states, replacing their existing national regulations regarding the use of treated wastewater in agriculture. Although a regulation does not require national actions to be taken, it goes without saying that national law must be aligned with the provisions of this regulation, and more generally with any European regulation. This Regulation is in force since the 26th of June 2023.

At the French level, the water plan launched in early 2023 (MTECT, 2023) rekindles interest in REUT, particularly aiming to develop 1,000 reuse projects by 2027. This reflects a political will to promote the practice, even though project proponents face numerous challenges (Condom et al., 2013). To support these expected developments and expand the fields of application of existing texts, several decrees and orders have been recently issued. Alongside measures aimed at promoting water conservation within the framework of the water plan, those related to REUT could be seen as “promising.” However, some texts may be published in relative haste, consolidating or even potentially creating conditions under which their implementation could prove counterproductive.

This article presents a preliminary inventory of regulatory points that we believe raise questions, whether regarding their relevance to current urgency, certain factual inconsistencies, or ambiguities that would require further clarification.

Following the Water Plan: A “Tremor” Stifled by Intrinsic and Persistent Difficulties

In response to the water plan, France has established several texts aimed at regulating reuse practices, with the goal of increasing the number of operational projects to 1,000 by 2027. While the update in 2023 of the CEREMA study from 2018 reports a significant increase in the number of recently launched projects (136 projects in development during surveys conducted in 2022, compared to only 29 in 2017), the study also highlights ongoing difficulties corroborated by a rising number of projects that fail (47 in 2022; 30 in 2017) [LOMBARD et al., 2023].

From a regulatory perspective, no fewer than eight texts have been issued over the course of 11 months, between August 29, 2023, and July 12, 2024. These texts address various forms of reuse of treated wastewater, ranging from the reuse of treated wastewater for agricultural purposes to the reuse of gray water or rainwater for domestic uses. Thus, water reuse practices are governed by provisions of the Environmental Code and the Public Health Code, which have been introduced through decrees. Four decrees have been promulgated, three modifying the Public Health Code and one modifying the Environmental Code. More specifically, two pertain to the reuse of water in the food processing industry, one addresses the reuse of treated wastewater and rainwater for non-domestic uses, and the last one covers domestic uses of these same waters. These decrees have been supplemented by orders that specify expected quality levels based on usage, particular application modalities, and the contents of authorization application files.

Numerous “types of water” are mentioned in the aforementioned texts. In total, no fewer than thirteen types of water are defined. Together with the high number of texts mentioned above, issued from different ministries, the proliferation of water types poses a clear problem of complexity. Furthermore, one must navigate skillfully among the different texts to find the correct definitions. These definitions come from both the Public Health Code and the Environmental Code, as well as an order. What is particularly curious is the designation of one type of water, which is defined twice with differing definitions. Specifically, this concerns raw water, which is defined in two different ways by two articles of the same code: the Public Health Code. Under Article R.1322-76, raw water is described as “water directed to a treatment unit for further treatment, following initial treatment by a wastewater treatment plant,” whereas under Article R.1322-90, it refers to “water from the natural environment as follows:

- « a) Rainwater, from atmospheric precipitation, exclusively collected downstream of areas inaccessible to individuals except during maintenance or servicing operations;
- « b) Freshwater, referenced in Articles L. 214-1 to L. 214-6 of the Environmental Code;
- « c) Water from wells and boreholes for domestic use, referenced in Article L. 2224-9 of the General Code of Local Authorities.”

These definitional discrepancies, beyond creating some legal incoherence, can have significant consequences. For example, the second definition describes rainwater as raw water “from the natural environment.” This is an undeniable fact: rainwater indeed comes from the natural environment. However, it raises the question of the classification of rainwater: can it therefore be considered suitable for potable water production? As mentioned later in this article, potable water is defined cumulatively by quality criteria as well as by its source: water can only be classified as potable if it comes from the natural environment. Thus, this definition may have a number of consequences that are not insignificant.

Use of Recycled Water and Reused Water in the Food Processing Industries

Last July, four texts were promulgated addressing the reuse of water in the food processing industries and the reuse of non-potable water for certain domestic uses. Several observations can be made regarding these texts: the decree and order concerning reuse in the food processing industries followed a decree that modified the Public Health Code earlier in January. The publication of a new decree modifying provisions created just six months prior gives the impression of a tentative and risky approach. Indeed, it is rare to see modifications made to

provisions established in the previous six months. A similar situation occurred in August 2023, when decree 2023-835 repealed decree 2022-336 issued in March of the previous year. Moreover, an error has crept into the drafting of the order or the codification of the Public Health Code. This concerns the scope within which treated wastewater can be reused. Specifically, Article R. 1322-82 of the Public Health Code states that the use of recycled treated wastewater “is possible within the production facility of this water and in other facilities of the same company in the food sector from which it originates,” whereas the order of July 8, 2024, regarding reused water in food sector enterprises, based on Article R. 1322-77, states that treated wastewater can be used “within the production facility of this water and in other establishments in the food sector.” Disputes may arise from this discrepancy between the Public Health Code and its implementing order.

Regarding non-potable water, a decree codifying the Public Health Code and an order were published on July 12, 2024. These texts specify the conditions for implementing the reuse of water unsuitable for human consumption for certain domestic uses. A wide range of uses is covered: laundry, indoor floor cleaning, waste disposal, feeding decorative fountains not intended for human consumption, cleaning outdoor surfaces, including vehicle washing when done at home, watering vegetable gardens, and irrigating green spaces at the building scale. Depending on the type of water considered, the applicable regime varies. The use may be subject to a declaration or authorization regime, or none at all, and may have quality requirements or none whatsoever. In this case, the applicability of this text seems entirely illusory. Many individuals had installed rainwater reuse systems under the 2008 regulation or used unregistered artisanal systems, and it seems unlikely that there would be the necessary oversight capacity to enforce this regulation on a large scale.

Regulatory Inconsistencies

According to some specialists, the authorization mechanism instilled by the article R. 211-123 of the Environmental Code might be insufficiently justified (FEVRIER, 2023). In its current understanding, reuse is primarily defined by comparing the utility of water discharged by a treatment plant in a reuse scenario versus a non-reuse scenario. Traditionally, treatment plants discharge into nearby rivers or, if not possible, into the sea. However, the wording of the texts encourages the preservation of rivers, particularly during low water periods. Thus, in continental areas, reuse is often disregarded due to this provision. A case-by-case study would likely be prudent to examine the benefits that reuse could provide at the expense of the watercourse. Some rivers, whose flow depends almost entirely on the discharge from a treatment plant, may not have a “fundamental” reason to continue existing if one or more reuse projects are genuinely relevant and timely. Therefore, it would be advisable to study the possibilities on a case-by-case basis, without immediately disqualifying reuse under these conditions, even though it may seem inappropriate at first glance.

One of the pressing issues concerning reuse is also the disproportion that exists between so-called “direct” reuse—regulated reuse—and “indirect” reuse. Indirect reuse occurs de facto through withdrawal downstream of a treatment plant's discharge into a watercourse. There is, in fact, no regulation on this subject, at least from a qualitative standpoint. The only constraints are related to the quantities withdrawn, which may or may not be subject to declaration. Thus, a farmer has the option to irrigate their land with water drawn from a neighboring river that is not subject to any quality standards. In contrast, for direct reuse, one must demonstrate compliance with certain quality thresholds across several parameters defined by regulation, not to mention the burdens associated with monitoring water quality and the length of the authorization application process. Therefore, for water withdrawn at the treatment plant's outlet for direct reuse—sometimes only a few dozen meters downstream from a withdrawal point for indirect reuse—there is binding legislation that does not apply to indirect reuse.

Finally, in parliamentary questions, there is one relating to the valorization of water recovered during cheese production. The response was as follows: “Recycled water [...] even if it meets potable water criteria cannot be legally classified as water intended for human consumption, as it does not come from the natural environment” (MASA, 2024). What justification can be provided for this claim? To what extent could water that meets the quality criteria for potable water not be classified as potable? Moreover, this argument seems somewhat outdated in light of the new provisions regarding reused water in the food processing industries. Indeed, quality

requirements for certain uses in the food processing sector directly reference the order defining potable water criteria (the order of January 11, 2007) and go even further by demanding compliance with the limit values of this order as well as “parameters identified through hazard analysis [...]”. This means that the water must meet potable water criteria in addition to other criteria deemed relevant. Thus, the water would have a “more than potable” quality but still could not be considered water intended for human consumption because it does not come from the natural environment. Furthermore, the decree of July 8, 2024, modified the Public Health Code, particularly Article R. 1322-77, authorizing the use of “recycled wastewater from raw materials and recycled process water as an ingredient in final food products.” Therefore, it is permissible to use recycled water as an ingredient in food products intended for human consumption, yet it cannot be regarded as water intended for human consumption. This represents, if not an unresolved anomaly, a major inconsistency.

Conclusion

In conclusion, it seems pertinent to note that we are witnessing a strong political commitment to the development of unconventional water reuse. Legislation is evolving very quickly, albeit with some inconsistencies and without resolving certain anomalies that hinder the development of a legal framework for “water resource management” in a much broader sense. Reuse remains a technique considered on a small scale, particularly in specific contexts of severe seasonal shortages. Current global changes are disrupting water management, and reuse does not emerge as a miracle tool for water management—not at least in its current form.

To favour circularity, a number of avenues could be explored. It would probably be interesting to look at the quality of the surface waters. In the actual situation, these waters aren't subject to any quality requirements, and many -if not all- inconsistencies come from this disproportion. Could water be defined by its future use instead of its source? We have the knowledge to treat any kind of water to turn it into any quality required. Can we manage such treatment at admissible costs? Turning wastewater into drinkable water would definitely erase this problem, but at what cost would it be? Will we be able to characterize surface waters? Is it a solution to regulate the quality of surface waters?

The underlying question remains: why not consider water based on its final use rather than its origin?

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