

A R&D platform dedicated to the development of the wastewater REUSE in France and in the Mediterranean basin : NOWMMA

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INTRODUCTION

Reuse of treated wastewater constitutes an alternative resource in water, which is still not enough exploited in France. However, this approach avoids the rejection of water from the water treatment plant toward the aquatic field. It also constitutes after treatment, an additional and local supply for varied uses as the green spaces and cultivated land irrigation, the supply of fountains or the washing of vehicles and highways.

I. AIMS OF THE PROJECT

Introduced in 2001, in the context of the call for proposals Eco-industry transmitted by the Ministry of Industry and Commerce, the research project NOWMMA - New process for Optimizing Wastewater reuse from Mauguio to the Mediterranean Area in support of the French reuse directive—is led by a consortium of nine partners, including private companies which operate locally and laboratories. Figure 1 as below.



Figure 1: Logo of Project Partners NOWMMA, and the regional agency, which supports it

The NOWMMA project has the aim to develop a complete pathway of wastewater reuse in France, in answering to the regional authorities and to the international level demands, notably amongst the Mediterranean basin. Every stage, from the treatment processes until the water delivering are analysed. The project provides modular pathways allowing satisfying the local constraints as the variable quality of the wastewater which will be treated, and the regulations. The control of the sanitary, environmental and technologic hazards constitutes an essential approach of this study.

II. THE INDUSTRIAL DEMONSTRATOR

The pilot demonstrator is currently operational at Mauguio (34) –figure 2 as below. It is composed of two sections: one treatment unity and one delivery unity.

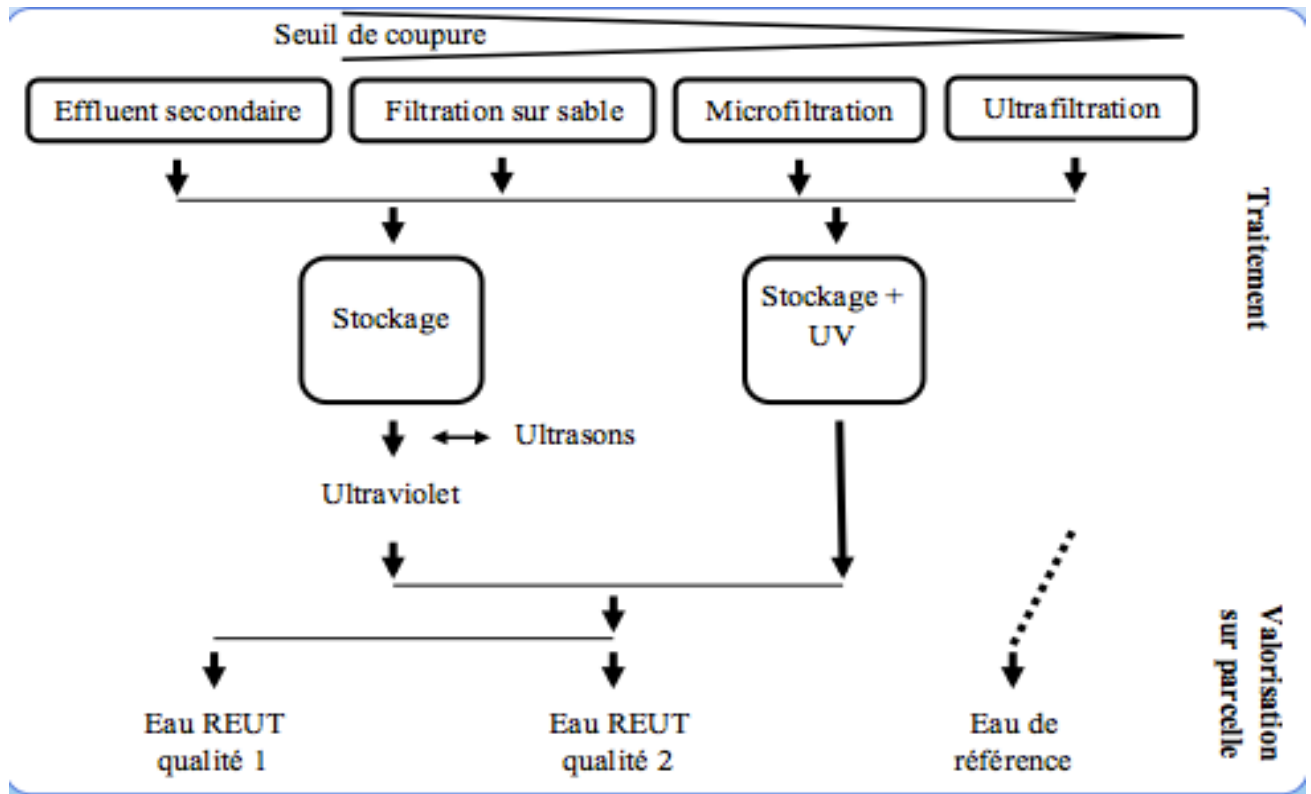


Figure 2: Principle illustration of the treated wastewater reuse pathways

The treatment unity includes a filtration stage, a storage stage and a disinfection stage with ultraviolet radiation. Different technologies can be used in series in order to create a multitude of pathways. Three innovations are notably tested:

- The micro-filtration technology with variable porosity permits to take advantage of a melt blown layer to ensure an average porosity at the micrometre scale in filtration and of an average porosity at the millimetre scale in backwash.
- The associated ultrasound to the ultra-violet rays will permit to ensure the destabilization of the bacterial floc. In order to increase the efficiency of UV and disinfection.
- The associated storage to the ultra-violet rays with low intensity will permit to maintain the quality of water during the delay period between the production and the use. This technology could be an interesting solution for water with a low technologic risk.

The delivery unity consists in a reference plot to turf, which the irrigation is controlled in a well-reasoned manner. - Figure 3 as below - This plot is subdivided in three blocks supplied by three distinct water qualities: two water qualities are from the treatment unity and one another is a referenced water quality typically used in the region for farming application. On each block are tested different irrigation posts by spraying, dropping buried or not.



Figure 3: Experimental platform, laid to grass, during irrigation by treated wastewater reuse

The group of pathways is informed on-line, automated and remotely managed. The water quality is monitored from a physical chemistry and a microbiological standpoint in self-monitoring. An analysis campaign within accredited laboratories took place from July to August 2014 and 2015 in order to prove the pilot aptitude to reply to the regulations on parameters as COT, ARN phages, and BASR spores.

III. RESEARCH AXIS

More than the demonstrator approach, the NOWMMA project, permit to go into scientific knowledge in depth in the water management field. Several barriers have been identified and are subjected to some researches within partner's laboratories.

The analysis means are still limited concerning the quick responses – still higher than 24h- or are still expensive. A pre-concentration technology on nanoparticles is tested and new methods on slabs are compared. Other approaches are assessed as the spectrophotometry or the ATPmetry.

New photo-catalytic processes are also tested in order to maximize the ultra-violet rays, while ensuring an effective disinfection. Some assays on a reactor at the laboratory scale allow to better proportion the equipment and to reduce the intensity of ultra-violet rays for the same efficiency.

The mineral and biologic clogging of the conducts for the transport and the upgrading of treated wastewater is modelled to foresee the required treatment on the networks and to prevent the revivification. This establishment of a model can be directly compared with the analytic results performed on the plot in taking off the conducts sections and also in a test bed allowing to have a good command of the different factors, load, speed of the fluid, diameter of the conduct etc.

To finish, the spraying phenomenon is modelled in order to assess the contamination risk in the application frame in irrigation and in washing of highways. A monitoring by colorimetry and a viral tracer will allow adjusting the recommendation to have a good command of the dispersion risks.

CONCLUSION

The demonstrator pilot permits to test the different stages of the treated wastewater reuse promotion and to propose a product with define outlines: treatment and delivery technology analytics monitoring, exploitation guide, economic and environmental assessment, and social acceptability. It also permits to predict risks management inherent to the reuse as the human health risk, the sanitary risks for plants, and the technologic risks. The irrigation aspects by spraying, dripping and the reuse in urban areas are studied.

Over time, the expected results will permit to propose:

- An adjustable and exportable pathway to the whole Mediterranean basin with a expertise acquired by all the partners.
- A group of products quickly marketable in the three next year following the project, accompanied with their “business model” and with a “roadmap”, which will be considered as a decision support
- An interaction with the regulations in France, Europe with the development of ISO norms for the wastewater reuse.

This project held by SAUR and supported by the Pole EAU, could permit results concerning the network and the employment, with a positive socio-economic impact guarantee by the accompanying of the Transfert LR.