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Water reclamation and reuse: implementation and management issues

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Abstract

In the framework of the international project "Integrated Concepts for Water Reuse" (Aquarec), an independent task-force composed by water and wastewater utilities professionals, consultants and researchers was assigned the task and produced a manual of management practices for water reuse schemes. This paper aims to give an overview of water reuse activities around the world and to outline the specific characteristics of every sectoral use. The paper shows that consolidated experience exists with technology and management practices and that effective and practicable management practices should include a combination of structural, non-structural and managerial techniques. Finally, some critical factors that influence to a large extent the project's potential sustainability are delineated.

Keywords: Best practice; Implementation; Water reclamation; Water recycling; Water reuse

1. Why a manual of management practices for water reuse projects

Over the last three decades the European Union and its Member States have successively implemented measures to ensure a sustainable water management process. An important initiative of which is the Water Framework Directive (WFD) [1].

It is expected that the promotion of an integrated approach to water resources management,

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as it is spelled out in the WFD, will favour municipal wastewater reclamation and reuse on a larger scale, for both augmenting water supply and decreasing the impact of human activities on the environment. Hochstrat et al. estimated that in the time span between 2000 (when the WFD was issued) and 2025, the direct utilisation of treated municipal wastewater in Europe could more than double, passing from the current 750 Mm^3/y to 1,540–4,000 Mm^3/y [2].

To fully benefit of this growth potential, there is no doubt that the water industry needs to work out approved standards of practice:

1. Regulatory and industry practice evolved from the traditional command and control approach towards a more integrated and flexible approach, not prescribing the means to achieve the desired environmental and health protection outcome (e.g. [1,3]), but prescribing the adoption of a Best Practices framework (on top of the local permit requirements) (e.g. [4, 5]).
2. Contrary to the situation in North America, Japan and Australia, water reuse solutions are not accepted by the European water industry as normal practice. Usually, reuse options are overlooked or are inadequately considered in traditional business-as-usual water resources management plans.
3. Despite the fact that a lot of information is available regarding water reclamation and reuse, this information is not easily accessible and sometimes is contradictory. Updated and credible data is needed to underpin the decisions that promote Best Practice which depend on the overall reuse strategy and the type of treatment under consideration.

The establishment of a standard of practice would have a double positive effect:

1. It can help water professionals interpreting existing environmental regulation and formulate acceptable alternatives to address water resources management issues.
2. It can provide the comfort for local authorities and operators that they are following best practice and taking the right decision.

A better examination of where and how conventional and non conventional approaches to the implementation and operation of reuse schemes will ultimately lead to better overall water quality — and often save money — providing sustainable benefits for the society as a whole.

2. The Aquarec manual on water reuse management practices

The Aquarec manual on management practices aims at promoting the wide application of the knowledge acquired in the field to enable the efficient implementation of water reuse across the European Union and Australia.

The manual intends to share knowledge about practices, or combination of practices, that have proved to be effective and practicable to implement and operate.

The manual applies to a wide range of non-potable water reuse activities and builds upon five major milestones:

1. Inventory of case practices across seven world regions
2. Conventional literature review on management practices
3. Enquiry to managers of medium- to large-scale facilities to determine where present-day practice lies in relation to what is seen as “best practice”
4. International workshop of water reuse professionals to discuss specific data gaps
5. Extensive peer review of the draft documents to include the insight and know-how of a larger number of professionals from water reuse utilities, manufacturers, consultants and research institutions.

The manual is targeted at the operators enter-