

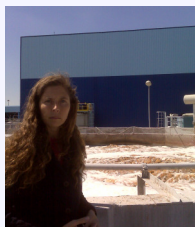


**WATER
STEWARDSHIP
STANDARD**

The additional value of research

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Sometimes you need to predict the potential size of an opportunity. Sometimes it's about imagining how you could solve a problem. In research it is difficult to predict results and furthermore the added value of those results.



On the other hand our focus is on making research sustainable to assure that our answers create lasting value. This means that research must go beyond each specific project and collaboration between organisations and networking is more and more important each day to really get an additional value of research.

Do you understand what I mean?

The work presented in this newsletter is a clear example of the integration of projects to reach a final aim, the collaboration between AquaFit4Use partners and the collaboration between AquaFit4Use and other European organisations.

The work carried out is complementary to AquaFit4Use but also it was an important input for some workpackages. However this work is in the back and it is not well known since it is not included in any specific deliverable. Therefore this newsletter is a good opportunity to present it.

Collaboration of AquaFit4Use partners and the European Water Partnership

ASSESSMENT OF SUSTAINABLE WATER MANAGEMENT IN INDUSTRY

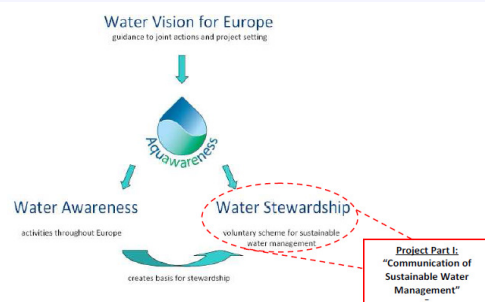


As a response to Europe's water challenge of achieving **Sustainable Water Management in Europe by 2030**, according to the **Water Vision for Europe**, the European Water Partnership (**EWP**) initiated the **Aquaawareness Program as a strategy** to move Europe towards a resource efficient and sustainable water culture, targeting political decision makers, key stakeholders and European inhabitants. To reach this challenge, in December 2008, the EWP launched the **Stewardship Program**. The aim of this project is to provide a tool to communicate and award responsible water users through the development of a common framework for assessing, implementing and communicating Sustainable Water Management (SWM).

This SWM tool is based on a voluntary system consisting of:

- An objective assessment of the water management of an operator, and
- A transparent, open, dynamic and representative **Sustainable Water Management Standard** on which the assessment is based and realized on.

The criteria mentioned in this standard are set up and agreed by a group of leading stakeholders in SWM. The SWM Standard is based upon the principles of the Water Vision for Europe, takes into account already existing standards on good water management and applies on agriculture, industry, public and private water users on an operational as well as on a regional level.



Therefore, respecting the SWM Standard means on long-term to implement and monitor sustainable practices of water management on operational level which contributes to:

- Securing the natural resource and long-term availability of water as a crucial ingredient or auxiliary of production.
- Raising the efficiency of water use and therefore raise the economic benefit.
- Generating public acceptance of production sites and business sectors.
- Creating competitive advantage for practical leaders of SWM and positive incentives for implementing water governance measures.

The current problem is how to objectively assess the sustainable water use. These assessments are usually based on indicators. Performance indicators can be used in both policy planning processes and communication plans. Indicators are simpler, more readily and understandable forms of information than complex statistics or other type of data and they should be:

- Theoretically well founded: clear, easily understandable and transparent.
- Technically measurable.
- Standardized for easy comparison between different companies or processes.
- Independent of each other. This makes it easy to change them or the way they are calculated according to the characteristics of the process.
- They should cover environmental, economic and social aspects.

participating partners

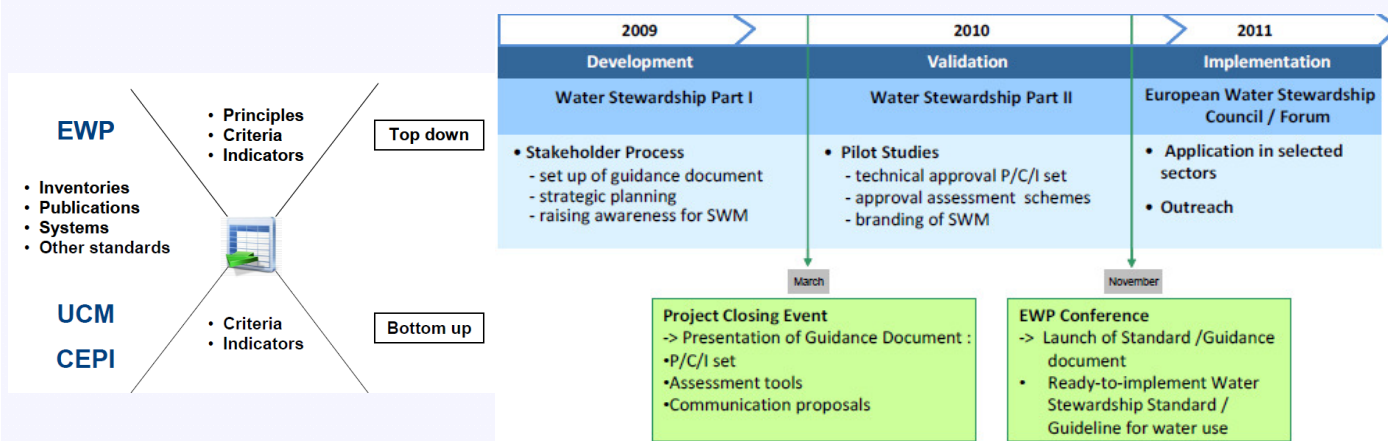


Collaboration of AquaFit4Use partners and the European Water Partnership

All of these aspects have been taken into account during the selection of the indicators that will be used to determine the sustainable use of water in industry. Indicators have been selected with two different approaches. EWP has followed a top-down approach (from the principles, different criteria were defined as well as their main indicators) while Universidad Complutense of Madrid has followed a bottom-up approach considering: sustainability reports from leading companies in its sector; certification systems and assessment tools whose use is widely extended in Europe (among others we can emphasize EMAS, ISO14001, Eco-Label and Global Reporting Initiative); scientific papers and European Institutions official websites (e.g. EUROPA, the portal site of the European Union (<http://europa.eu>)).

In this way UCM has first defined a table with all indicators used in the different sources. From it the most common and relevant indicators have been selected. Second, indicators have been grouped by criteria, which constitute a more comprehensive information unit. Third, all the criteria were integrated into the four following principles defined by the EWP within the frame of the project "Communication of SWM":

1. **Achieve and maintain sustainable water abstraction.**
2. **Restore and maintain good water quality.**
3. **Restore and preserve water-cycle related high-importance ecosystems.**
4. **Achieve equitable and transparent water governance.**



During the last months of 2010 the implementation of the Water Stewardship Standard version 1.0 has been tested for the first time in 3 pilot studies. Those pilot studies were performed to:

- Further develop the Water Stewardship Standard scheme with focus on its applicability on-site and its appropriateness of contents.
- Evaluate the on-site performance of the pilot organization according to the currently available draft evaluation scheme.

Pilot studies characteristics:

BASF SE, Ludwigshafen/Rhine, Germany

- Chemical production site (250 production units).
- The Rhine river basin is not considered as water scarce.

Coca-Cola Erfrischungsgetränke AG (CCE AG), Genshagen, Germany

- Bottling factory (processing and bottling of soft drinks).
- The Elbe river basin is not considered as water scarce.

HOLMEN Paper Madrid S.L., Madrid, Spain

- Paper Mill (100% newsprint recovered paper).
- The Tagus river basin is considered as water scarce.



The outcomes and feedback from BASF, Coca-Cola and the HOLMEN Paper Mill are crucial for the further development of the Water Stewardship scheme. At the moment a **second round of pilots are planned, if you are interested please contact the EWP (www.ewp.eu)**.

Sustainable water management at Holmen Paper Madrid

Motivation

- Spain is a semi-arid country with a high water stress. In 2005/06 Madrid suffered one of its worst drought periods ever.
- Holmen Paper Madrid (HPM) is a paper company using 0,9% of the total water consumption in the Madrid Community what corresponds to the 17,3% of the total industrial water consumption of Madrid.
- Due to the location of the mill, HPM consumes drinking water.
- HPM's water consumption is equivalent to the consumption of a city of 62,000 inhabitants.



Upcoming events

1-4 May 2011

[Water and Industry](#)

Valladolid—Spain

23-27 May 2011

[Ozone and UV](#)

Paris—France

24-27 May 2011

[Green Week](#)

Brussels—Belgium

28-30 May 2011

[Ozone and UV](#)

Paris—France

28-30 May 2011

[Water Technology Conference](#)

Alexandria—Egypt

20-22 June 2011

[Watermatex 2011](#)

San Sebastian—Spain

29-31 July 2011

[Simultech](#)

San Sebastian—Spain

29-30 September 2011

[SIMS](#)

Vasteras—Sweden

4-7 October 2011

[IWA](#)

Aachen—Germany

Sustainable water management at Holmen Paper

Process description, water use and water consumption

- In 2010 HPM produced around 470,000 tons of newsprint and light coated magazine paper from 100% recovered paper. Paper products are formed from a low consistency water suspension (approximately 1%) that consists of fibres, fillers and chemicals. This suspension is pumped through a head-box that spreads it on a plastic wire. High dilution is necessary to create sufficient turbulence flow conditions to control the homogeneous distribution of fibres on the wire and through the subsequent drainage processes.
- The quality of the water entering the circuit of the paper machine is critical, as it defines the majority of chemical processes that will take place during the formation of the paper sheet, influencing the efficiency of the retention and drainage chemical system, determining the level of white water recirculation and the level of retention on the wire of the raw materials and additives used.
- Water is mainly used as dispersion and transporting medium for the fibrous raw materials and additives throughout the stages of the production process, which go from pulping to forming. Water is also used as a heat exchanger fluid, as a sealant in the vacuum systems, for the production of steam, as a lubricant agent, etc.
- Water consumption is dependent on both the raw materials and the final product. HPM is using less than 8 m³/T which is lower than the reference for newsprint in the BREF document (10-20 m³/T).

What has been studied?

For minimizing the water consumption HPM together with the Cellulose and Paper Research Group of the Chemical Engineering Department of UCM, have been working during the last 8 years in:

- Optimum water management.
- Closure of water circuits for boilers and sealing.
- Good separation of the different water loops: loop 1, loop 2 and paper machine loop.
- Optimization of the clarification steps in process waters. Optimization of DAF units using an advanced flocculation methodology to optimise and monitor coagulation and flocculation processes. This method allows the optimization of the dosage of the chemicals employed for removal of anionic trash. Moreover an UF process has been included to remove of substances from white waters.
- Optimization of gravity tables. The FBRM methodology enables the optimization of coagulation and flocculation of deinking and biological sludge to remove anionic trash from the process water.



To replace the fresh water used in the mill new water sources have been explored:

- Reuse of HPM effluent after an advanced water treatment

The effluent can not be re-used directly in the process because the contamination load is quite high and these waters would produce run ability problems in the paper machine and/or paper defects. Nevertheless they could be reused as fresh water after an advanced treatment. **Within AquaFit4Use** HPM and UCM have carried out different pilot trials to find the best combination of advance treatments (eg anaerobic + MBR/UF + RO + disinfection). Results from pilot plants have determined the current bottlenecks which have been defined as new research tasks within the project (e.g. silica removal before RO).

- Use of reclaimed water

To replace the fresh water by reclaimed water from a municipal/industrial wastewater treatment plant, the health risks must be considered, so the reclamation process selected must focus primarily on pathogen removal (bacteria, helminths, protozoa and enteric viruses). Salts must also be removed to avoid clogging of equipments and scaling problems. Pilot plant experiments have been carried out in collaboration between HPM, UCM and Canal de Isabel II (main Water utility of Madrid) to assess the feasibility and to select the most appropriate technologies. Membrane processes, placed in series (MF or UF + RO), can produce a high quality water in a manner that it is less influenced by variations in feed water characteristics than other treatment processes. Finally, the membrane effluent is further disinfected by ultraviolet radiation (UV). The studies have compared three multi-barrier membrane systems (MF/UF + RO + UV) at pilot plant scale to produce water with the suitable quality to substitute the fresh water.

Although the performance of each system was very different versus inlet water quality, the percentages of salt rejection were always maintained above 99%, the removal of microorganisms were below the detection limit and the values of the COD in the permeate were also always below the detection limit.

Within AquaFit4Use the evaluation of the two new potential water sources has been carried out and, at this moment, **a reclaimed water plant is being built by the Canal Isabel II with a capacity of 12.500 m³/d.**





Sustainable water management at Holmen Paper

Sustainable water use program and timetable (past and future)

- Optimisation of water management.
- Closure of technical water circuits.
- Separation of loops.
- Optimisation of internal process water kidneys.
- Technical and economical feasibility of effluent treatment.
- Technical and economical feasibility of using reclaimed water.
- Optimum closure of the different water loops.
- Use of reclaimed water as fresh water from 2011.

Main achievements

- Reduction of water consumption from 14 to less than 8 m³/t.
- Implementation of all the best available technologies.
- Implementation and adaptation of emerging technologies.
- Stop using high quality potable water as process water.

What else can be done?

- Further optimisation of internal treatments of process water or kidneys (final evaluation of UF during 2011, new focus on A-MBR and new membranes).
- Optimisation of the new treatments.
- Treatment of concentrates.
- Further monitoring of water quality.
- Reduction of energy consumption.

Bottlenecks

- The quality of the recovered paper is decreasing, what affects the process by releasing more contaminants into the process water. Recalcitrant contaminants accumulate in the process water limiting the closure of the water circuits. It is necessary to develop new methods for both quantify the presence of those contaminants and remove them from the process.
- As **stated within AquaFit4Use** chemicals to remove dissolved and colloidal material (the limit is around 20-30%).
- Defining the optimal closure of water circuits. Total closure is not the optimum solution and we must find the equilibrium between the product quality, the runnability of the paper machine and the quality of the process water.
- High investment and running costs of the treatments.
- High energy consumption of the advance treatments.
- Membrane fouling.
- Treatments for the concentrates.
- Stability of water quality from the different sources.
- Quality of reclaimed water when the effluent comes from a municipal and industrial wastewater treatment plant.

Others

- It will be the first paper mill in Europe using reclaimed water as fresh water.
- It is one of the paper mills in Europe producing newsprint and coated paper with less water per ton of product.

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general AquaFit4Use information



Project title AquaFit4use—Water in industry, Fit-for-use Sustainable Water Use in Chemical, Paper, Textile and Food Industry
Acronym AquaFit4use
Participants 34
Start date 1 June 2008
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Total EC funding 9.650.000 euro

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Colophon

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