

Coordinators Column

Dear all,

Making the right choice is not always easy. Whether it is in choosing the right partner, doing the right investments or finding new routes in life, only after a certain period you can say if you made the right decision and if things worked out as you expected. The ability to look into the future would be very helpful.

This is also the case in sustainable water use. There are a lot of alternatives to improve your water network, but what are the effects in terms of costs, water quality and other criteria? In this AquaFit4News, special attention is paid to a software tool that has been developed in the AquaFit4Use project and that can be very helpful in answering a lot of these questions. The tool can be the start of different types of water projects and was also the basis for many developments within this project.

We are very pleased that we can also present it in a special workshop at the IWA Conference on Water & Industry in Valladolid in the beginning of May this year. During this conference we will also present other results from AquaFit4Use.

I think it will turn out to be the right choice to meet there!

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WQMT: A software framework for model-based optimization of water networks in industry

In major water-consuming industries such as paper, food, textile and chemical, it is often noted that water is used in a less than efficient manner.

Typical examples are the use of water with a higher quality than is actually needed, or the absence of water re-use. The reasons for these inefficiencies may be the fact that the network is insufficiently understood, the lack of an economic driver for performing optimizations studies, or the lack of appropriate software solutions for representing and optimizing the water network. Taking into account the increasing cost and scarcity of water, a substantial saving can be obtained by performing water network optimization studies.

It can be noted that, currently, a large variety of software solutions for water networks are used by industries, ranging from generic spreadsheet applications, over traditional process simulators (e.g.



WinGEMS, IDEAS,...) to more specialized tools such as WaterPinch.

Such diversity is of course counter-productive for the intra-sectoral and cross-sectoral exchange of information.

Also, each of these tools has its own advantages and disadvantages. In order to remedy this situation, a novel framework for the representation, simulation and optimization of water networks is currently being developed in the AquaFit4Use project. The framework is named **WQMT (Water Quality Management Tool)**.

“AquaFit4Use has developed a novel framework for the representation, simulation and optimization of water networks: The Water Quality Management Tool”

participating partners





GOAL

The primary goal of the WQMT is to offer a framework that has the following characteristics:

Powerful

The framework should allow for a right balance between the level of detail of the representation of the water network (and hence the extent to which it mimics reality), and the computational power required to evaluate a large number of network alternatives during optimization.

Affordable

In order to enable any industrial organization (down to SME's) to perform optimization studies, software tools should be affordable, which is not always the case with currently available software products.

Integrated

In order to find the optimal solution, the models should deal with water quantity, water quality and economic costs (capital and operational).



Homogeneous

To avoid interoperability issues, homogeneous, self-contained software is required, which enables to perform the entire study without having to rely on an array of additional tools. The WQMT combines features separately found in other tools, and combines it with elements directly resulting from the methodology developed in the scope of the AquaFit4Use project.

User-friendly

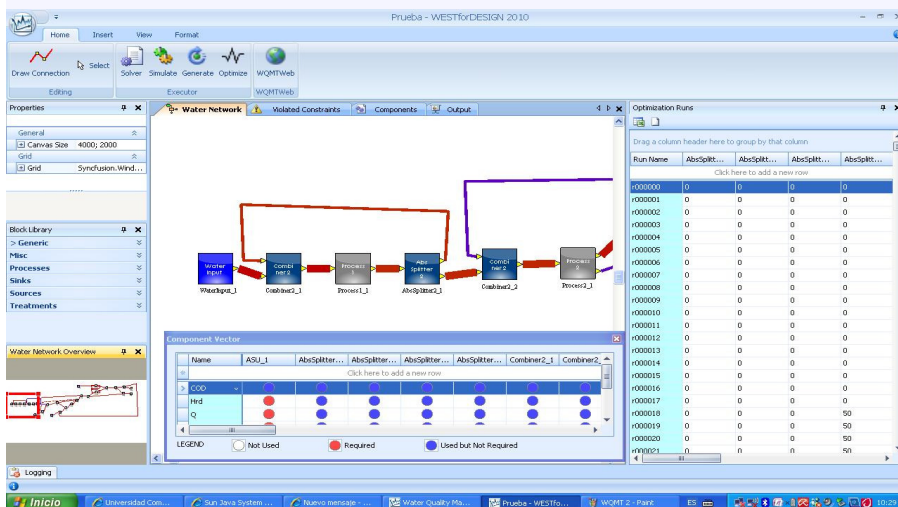
The tool should be easy to use, in order to enable non-modelling experts to use it successfully, and to obtain appropriate solutions with limited effort. A key factor to come to solutions quickly is the availability of a library of blocks that model typical network constituents and that can easily be re-used.

SOFTWARE ARCHITECTURE

The WQMT framework consist of two separate modules:

WQMTWeb

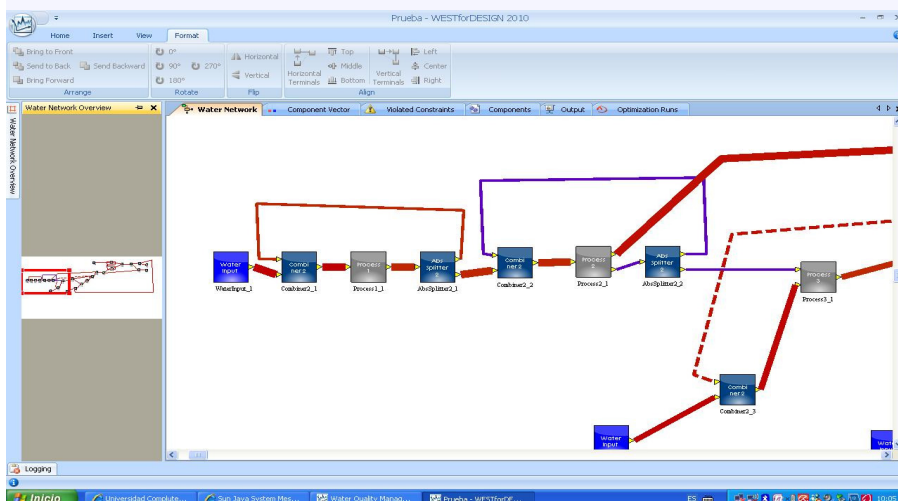
Is a (textual) web-based application that allows for managing a central database of network constituents (i.e. water sources, water sinks, industrial processes and treatment options) that are typical for the industrial sectors considered. The database also contains information on the components (e.g. COD, TSS, pH, ...) that are considered as important for the network evaluation, as well as the (concentration) ranges (lower bounds and upper bounds) applicable for a certain process or treatment. Most of the information in the database can optionally be tagged as being sector- and/or region-dependent.



WQMTWin

Is a (graphical) stand-alone Windows-based application that allows for visually creating/modeling water network representations, running simulations, and evaluating network alternatives in the scope of optimization studies.

The calculations are executed by Tornado (www.mostforwater.com), which is a generic framework for modeling and virtual experimentation with complex environmental systems that also serves as a back-end for the WEST® product suite.



Forthcoming events

Water treatment and purification: what role for renewable energy?

13-17 February 2011, Bou-Ismaïl, Tipaza, Algeria

WEX 2011 - Water & Energy Exchange

15-17 February 2011, Lisbon, Portugal

2nd International Conference on Environmental Science and Technology (ICEST 2011)

26-28 February 2011 Singapore, Singapore

Water Innovation, Technology and Sustainability (WITS)

17-19 March 2011 Sao Paulo, Brazil

Water treatment and reuse III and the water-energy nexus

20-25 March 2011, Cancun, Mexico

FILTECH 2011

22-24 March 2011, Wiesbaden, Germany

Futures of European Waters: How should policies be adapted

23-25 March 2011, Budapest, Hungary

15th International Water Technology Conference

31 March 2011 to 2 April 2011, Alexandria, Egypt

International Sustainable Development Research Conference,

8-10 May 2011
New York, United States

NANOTECH. Applications of Nanotechnology in the Water Sector 2011

15-18 May 2011
Monte Verita, Switzerland

WSSTP 4th Stakeholder Event "Water Efficient Europe"

17-18 May 2011
Brussels, Belgium

8th IWA Leading-Edge Conference on Water and Wastewater Technologies

6 - 10 June 2011
Amsterdam, The Netherlands

WATERMATEX. 8th International IWA Symposium on Systems Analysis & Integrated Assessment

20-22 June 2011
Donostia – San Sebastián, Spain

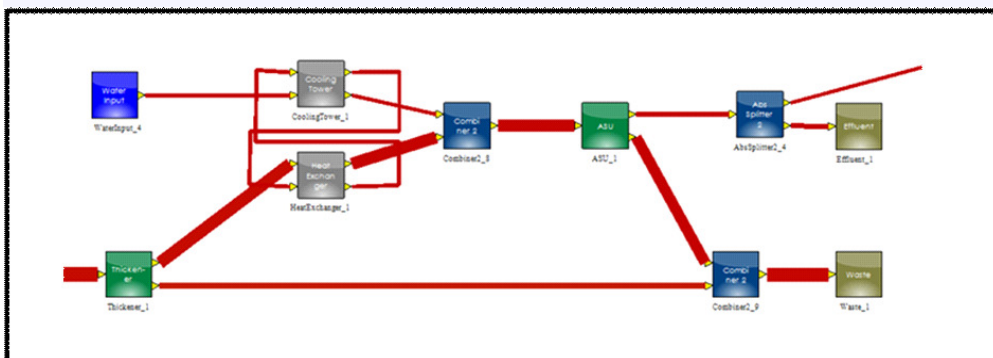
The 2011 World Water Week in Stockholm-Responding to Global Changes - Water in an Urbanising World.

21-27 August 2011
Stockholm, Sweden

SETTING UP AND SIMULATING NETWORK

When creating a model of your water network, the first step is selecting the block library (collection of available blocks) to be used in the project. From there the network is built up in a graphical way by dragging and dropping the required blocks representing the water sources, water consuming production processes, treatments and sinks. The flow between the different blocks is then made by connecting the different blocks. For each of these blocks the parameters (defining the behaviour of the block) need to be specified, e.g. the flow rate. The network blocks are modeled using non-linear steady-state models, using the Modelica language (www.modelica.org) and can be customized if needed.

Simulating the water network provides output in various ways, i.e. in table format (for the whole network or for each block separately), by visualization on the water network based on the line thickness and line color scheme.



OPTIMIZING THE WATER NETWORK

In the water network a number of alternative options can be foreseen, e.g. possible ways of recycling the water. The parameters that need to be changed for studying the alternative options are selected and provided with a number of values to be tried. Providing the values for the different parameters can be done in a manual way or by specifying an interval over which a number of values are linearly distributed.

The optimization results are gathered in a table ranking the scenarios for the different objective values (such as capital costs and operational costs). A simulation can be easily re-executed by selecting a certain scenario, in this way obtaining all the simulation results for this scenario.

Water and Industry 2011

IWA Specialist Conference Chemical Industries

Aquafit4use open session

Water Quality Management Tool Workshop

WATER & INDUSTRY 2011

May 1st - 4th 2011

Valladolid (Spain)





Water and Industry 2011-IWA Specialist Conference Chemical Industries 1st to 4th May 2011 in Valladolid (Spain)

In a global scenario of increasing energy prices and quests for sustainable human activities, the industrial waste treatment of the 21st century must undergo a severe revision of its current practices. These must aim at developing a new generation of energy-efficient and resource recovery processes, while complying with the ever stricter environmental regulations. **This event** of the IWA Chemical Industries Specialist Group **will address issues related to wastewater, gas and solid waste management in industry with a special focus on energy efficiency and sustainability.**

This conference is an opportunity to meet with professionals from academia, industry and public administrations. The event aims at providing a forum for environmental and chemical engineers, microbiologists, chemists and policy makers to present their most recent technological and scientific breakthroughs in the fields of management, characterization, minimization and abatement of industrial wastes.

Therefore, within **Aquafit4use** we cannot miss this opportunity of presenting our current results but also to open a debate for the exchange of information on the identified bottlenecks and limits of the concepts, scenarios and technologies based on the lab results and pilot experiences, to define alternative solutions and to open new perspectives for the research period, if necessary. For that reason we will have a dedicated **Aquafit4use session** in which the following presentations will be given:

- **AquaFit4Use: Sustainable Industrial Water Use in Practice.** W.G.J.M van Tongeren
- **Application of the WQMT to CHS case study.** M. de Gracia, B. Goyenechea, F.H.A. Claeys and I. Lizarralde
- **Membrane bioreactor technology compatibility with chemical wastewater.** H. De Wever, C. Huyskens, G.-H. Kristensen, U. Wegmann, S. Meul, P. Cassiers, P.J. van Staveren and G. Lengden
- **Industrial waste water re-use: Application of 3FM® (New high speed filtration system) as pre-treatment.** S. Mauchauffee, M.-P. Denieul, B. Desvarreux-Larpenteur and M. Coste
- **Reducing water footprint of cooling towers with CapDI.** T. Poots and E. Driessen
- **Finding economically the most efficient operating parameters of UV/H₂O₂ process: a case study – decolorization of C.I. Reactive Blue 268 solution.** N. Novak and A. Majcen Le Marechal
- **Chemical Precipitation Applied to Reduce Silica Content in Paper Mill Effluents.** D. Hermosilla, R. Ordóñez, L. Blanco, A. Blanco
- **Softening and removal of scaling compounds for industrial wastewater re-use.** E. Barbier, S. Mauchauffee, M.-P. Denieul, M. Coste and M. Engelhart
- **New Mathematical Model Library for Industrial Water Network Optimization.** I. Lizarralde, F.H.A. Claeys, R. Ordóñez, M. de Gracia, L. Sancho and P. Grau
- **Water quality monitoring: Evaluation of sensors.** Y. Ladegaillerie, J. Chabrol, M. Chardin, C. Lemoine, M. Maurel and A. Monsorez

Furthermore we will use this opportunity to organize an **AquaFit4Use-Workshop** that will be held during the conference with a theoretical and practical perspective. The workshop will focus on the Water Quality Management Tool. Do not miss this opportunity to **learn from each other**. The AquaFit4Use Workshop that was planned in collaboration with the University of Maribor on textile dyes cannot be organized this time due to the dense program of the conference.

Valladolid is about two hours by car from Madrid. The fastest option though is to take the high-speed train (AVE or ALVIA) which takes approximately 50 minutes. (<http://www.renfe.es/horarios/english/index.html>).

Additional information for the conference, including logistic, registration, program, etc., can be found in the web site <http://www.iqtma.uva.es/iwa2011/>



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Colophon

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