



**Meso-level eco-efficiency indicators to assess  
technologies and their uptake in water use sectors**

Collaborative project, Grant Agreement No: 282882

**Deliverable 6.4  
Results of the 2<sup>nd</sup> targeted event**

**Industry Links**

**(EcoWater at the AquaTech Water Technologies Fair,  
5-8 November 2013)**

May, 2014

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## Abstract – Summary

This document reports on the event organized by the EcoWater Project in Amsterdam in November 2013, addressing an industrial audience. The key objectives of the EcoWater side event were to present the EcoWater project to the water industry, communicating concepts and discussing results so far, and to develop contacts with industry.

Due to the fact that a project alone is rarely able to attract a large external audience, EcoWater sought to develop a significant contribution to, and presence in, a major water technologies fair; the AquaTech Amsterdam Fair was selected for the purpose.

The EcoWater project sought to develop three initiatives during AquaTech:

1. A booth in the Dutch pavilion of the fair;
2. AquaStages;
3. A breakfast event.

The EcoWater Project has put significant effort into connecting to the world of technology providers, and this outreach activity has been quite successful. The Project team seized the opportunity to connect to a significant number of industry organizations through the Project booth and AquaStages, and these contacts have been kept informed on the subsequent EcoWater developments.

The AquaTech Exhibition was held concurrently with the IWW (International Water Week) Conference, where EcoWater participants took the opportunity to present the project; two papers were presented:

1. [Eco-efficient Innovation in Industrial Water-service Systems: Analysing Options, Drivers and Barriers](#) by Les Levidow, Palle Lindgaard-Jorgensen, Åsa Nilsson, Sara Alongi Skenhall
2. [Meso-level Eco-efficiency Indicators to Assess Technologies in Urban Water-use Sectors](#) by Olga Steiger

Overall, the EcoWater Industry Event achieved significant outreach and can be considered successful; it enabled both the dissemination of Project methods and outputs to a wider audience, and the development of new linkages to the industry community. It also provided valuable feedback towards the further enhancement of the EcoWater Tools for improving their usability and applicability in an industrial setting.

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## 1 Introduction

The EcoWater (EU FP7 Project) develops indicators, methodologies and analytical tools to assess eco-efficiency of water use by different sectors at the meso-level. Eco-efficiency looks at how more value can be achieved with less environmental pressure, while the meso-level refers to the level of analysis, in this case the water system, where interdependent dynamics occur among heterogeneous actors. Several dissemination events are foreseen within the project, including an event targeting industry which is the subject matter of this report.

Due to the fact that a project alone is rarely able to attract a large external audience, EcoWater sought to develop a significant contribution to, and presence in, a major water technologies fair. Taking the project's progress and requirements into account, the AquaTech Amsterdam Fair (5-8 November 2013) was selected for the purpose. AquaTech is described as the world's leading trade exhibition for process, drinking and waste water; according to information provided in their website on the 2013 fair: *"The 24<sup>th</sup> edition of AquaTech Amsterdam was a major success attracting 750+ exhibitors and some 18,500 international visitors. The show has strengthened its position as the ultimate platform for industry leaders and water professionals to network and find the latest innovations, services, and technologies. With the co-located International Water Week and the Industrial Leaders Forum, Amsterdam was truly the place to be for every water professional"*.

(<http://www.aquatechtrade.com/amsterdamen/Pages/default.aspx>)

The EcoWater project developed a side event to the AquaTech Amsterdam Fair including three initiatives/activities:

1. A booth in the Dutch pavilion of the fair.
2. AquaStages (3 in total – presentations made in a space allowing an open audience).
3. A breakfast event.

The key objectives of the EcoWater side event were to:

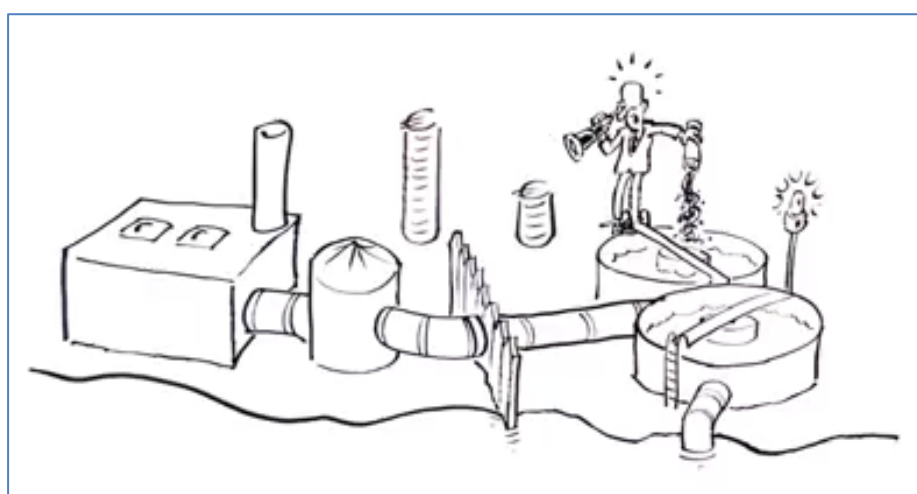
1. Present the EcoWater project to the water industry, communicating concepts and discussing results so far;
2. Develop contacts and links with industry.

This document provides a short summary of inputs developed by EcoWater (Section 2). The three initiatives and their impact are described in Section 3 followed by some overall concluding remarks in Section 4.

## 2 Inputs developed / distributed

Several products were developed to showcase the EcoWater Project in the AquaTech conference:

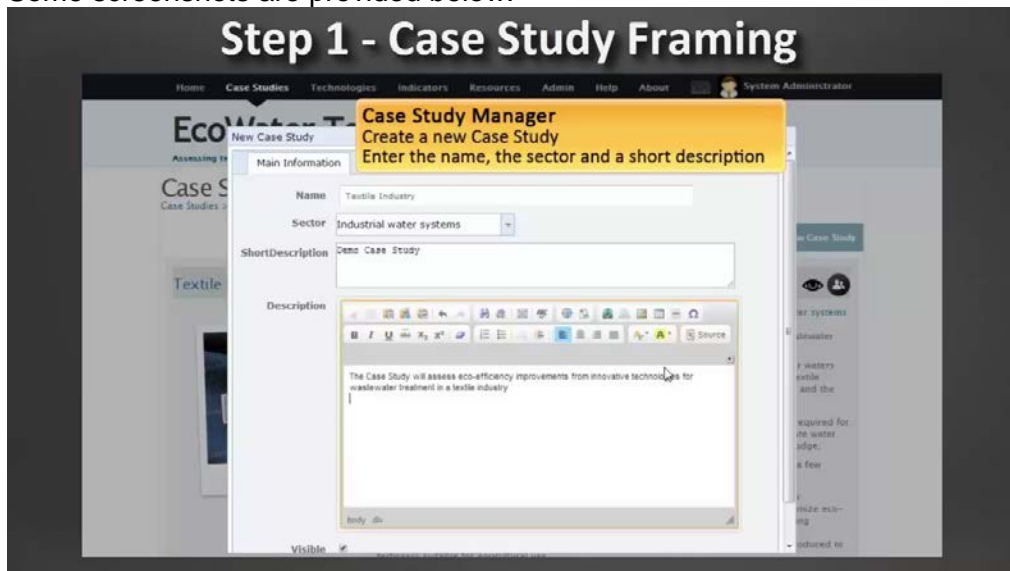
1. A short (3'20") animation was developed, which can be viewed on the main page of the project's website: <http://environ.chemeng.ntua.gr/ecowater/>. This animation follows a story line explaining that increasing the eco-efficiency at a micro-level may render poorer results compared to a more systemic, meso-level approach for which EcoWater developed the analytical framework. The screenshots below depict (a) The added resources that a wastewater treatment plant may need to purchase due to a newly installed digester at an industry; (b) successful negotiation between several partners to jointly invest in an improved waste water treatment plant.










The animation was developed by Utrecht Based 'Creative beards' in collaboration with artist Maarten Wolterink.

2. Demonstration videos were prepared in order to showcase the various software tools developed by the Project: SEAT, EVAT and web-based toolbox. The demonstration videos can be downloaded from the Project website at <http://environ.chemeng.ntua.gr/ecoWater/Default.aspx?t=299>. Some screenshots are provided below.



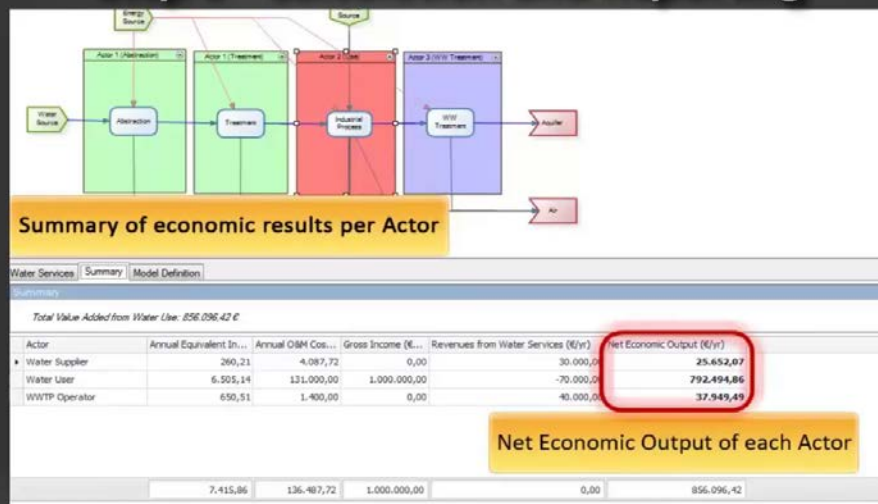
## Step 3 - Identification of Technologies

Drag a column and drop it here to group by that column

Name	Sectors	Stages	Cost	Notes
 Absorption Refrigerator A simple and reliable alternative to the conventional vapour compressor refrigerator (VCR), which could be operated as either a refrigeration cycle or a heat pump, at -30 or lower evaporation temperatures.	Industrial water systems	Water		
 Advanced Phosphorus Recovery Advanced technologies for phosphorus recovery from urban wastewater.	Urban water supply systems	Wastewater Treatment	\$2.5 million (capacity: 100,000 gal/day) [4].	Operation and maintenance costs are covered by the revenues of the fertilizer production [4].
 Biological Phosphorus Elimination Enhanced biological phosphorus removal (EBPR) is a wastewater treatment configuration applied to activated sludge systems for the removal of phosphate.	Urban water supply systems Industrial water systems	Wastewater Treatment		
 Biological Production Shifting from traditional agricultural production methods to modern biological production methods by using natural agricultural enhancers.	Agricultural systems	Water Use		
 Carbon Filtration A water purification technology for the removal of organic constituents, through chemical adsorption and of residual disinfectants.	Industrial water systems		9,000-18,000€ (capacity: 200 l/h; CS=8) [3]	3-6 €/l (activated carbon cost) [5]

**Technology Inventory**  
Search for technologies to be implemented

## Step 5 - Calculation and Reporting



3. A set of presentations was developed for the AquaStages and for the breakfast event. These presentations are available on the website <http://environ.chemeng.ntua.gr/ecoWater/Default.aspx?t=287>
4. Finally, case study leaflets and two posters were also produced for the conference, and published as a booklet. The booklet can be downloaded at: <http://environ.chemeng.ntua.gr/ecoWater/Default.aspx?t=171>.
5. The EcoWater project flyers were also distributed at the event.

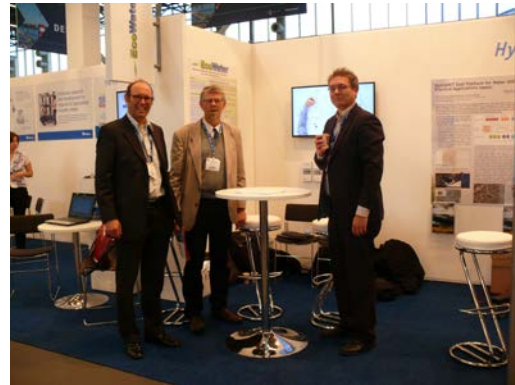


### 3 Summary / conclusions per initiative

#### 3.1 Exhibition booth



Two visitors discussing with George Arampatzis and Thanos Angelis-Dimakis, NTUA.



Christoph Hugi, FHNW, Palle Lindgaard-Jørgensen, DHI, Michiel Blind, Deltares, all from the Ecowater project.

Over the course of the AquaTech exhibition, which attracted more than 18,500 international visitors, the EcoWater Project actively engaged with a large number of attendees. Annex 1 provides a table indicating the companies whose representatives visited the EcoWater booth, interacting with the EcoWater team, and/or followed the project Aquastages. Evidently, in a meeting where technology providers and clients do business, systemic eco-innovation can be considered a niche.

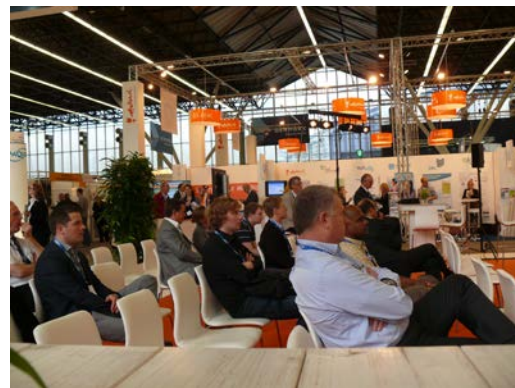
Visitors very much appreciated the EcoWater animation, and understood the essential ideas presented, while several showed interest in the tools developed.

#### 3.2 AquaStages

AquaStages are open presentation spaces inside the AquaTech exhibition. They contain a podium and several screens. People can come inside and sit in to follow the presentations, but they can also pass-by, following the presentations from outside the designated space.



Impression of an AquaStage – Palle Lindgaard-Jørgensen, DHI, presenting



Impression of an AquaStage – the open space is clearly visible



AquaStage - Palle Lindgaard-Jørgensen, DHI presenting



AquaStage – George Arampatzis, NTUA demonstrating the EcoWater tools

Two AquaStages were programmed and announced in the official AquaTech programme. In the end three AquaStages were given. The number in the audience varied. A complete list of registered participants is provided in Annex 1.

The programme of the AquaStages consisted of the following:

Introduction – presenting the agenda of the Aqua Stage event: Eco-efficient technologies in industrial water value chains	<i>Palle Lindgaard-Jørgensen, DHI</i>
Animation on the need for meso-scale eco-efficiency	<i>Animation</i>
How to assess the Eco-Efficiency of industrial processes and technologies (demo - movie)	<i>George Arampatzis NTUA</i>
How can industries and technology developers use the results of EcoWater? What can EcoWater offer to them today?	<i>Michiel Blind, Deltares</i>
Questions and feed-back from participants	<i>Facilitation: Palle Lindgaard-Jørgensen, DHI</i>

For convenience, the presentations are provided in Annex 2. All other material can be found on <http://environ.chemeng.ntua.gr/ecoWater/Default.aspx?t=287>

The AquaStages prompted some discussion and clarifying questions. Some notable comments were:

- "Tools are relevant- when and how will they be available?"  
Senior Business Adviser, CEMIS
- "The tool may be able to help us invest in the right technologies"  
Analyst, Finance in Motion
- "Can you test how our technology will perform in your case studies?"  
Business Development Manager, BWT HOH

The question on how an additional technology can be included in the technology database of the EcoWater toolbox was asked several times during the AquaStages.

### 3.3 A breakfast event

The EcoWater team considers that technology providers may use the project's results to enhance business cases for technologies, and, as such, technology providers are an important target group. As the technology providers could be busy staffing their own stand during the AquaTech exhibition, the team followed the suggestion of the AquaTech organization to organize a breakfast side event. Such an event would allow those technology providers too busy during the exhibitions opening hours to get informed and discuss the potential of meso-level eco-efficiency assessment.

The breakfast was announced in the official programme, at the booth, during the AquaStages and by directly addressing other industries at their own booth. Several contacts voiced that they considered attending; however, in the end the event did not attract sufficient participants and was regrettably cancelled.

## 4 Concluding remarks

The EcoWater Project has put significant effort into connecting to the world of technology providers. This outreach activity has been quite successful. Understandably, only a small portion of the 18000+ participants of the AquaTech Amsterdam exhibition, one of the largest of its kind focusing on water technologies, were interested in meso-level eco-efficiency assessment. Nonetheless, the Project team seized the opportunity to connect to a significant number of industry organizations through the Project booth and AquaStages. These contacts have been kept informed on the subsequent EcoWater developments through the EcoWater newsletter.

The AquaTech Exhibition was held concurrently with the IWW (International Water Week) Conference, which also took place in the exhibition premises. The EcoWater consortium took this opportunity to present the project to the Conference audience, and to that end, two papers were presented:

1. [Eco-efficient Innovation in Industrial Water-service Systems: Analysing Options, Drivers and Barriers](#) by Les Levidow, Palle Lindgaard-Jorgensen, Åsa Nilsson, Sara Alongi Skenhall
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## Annex 1: Visitors of the booth and the AquaStages

Company	Website	Booth	AquaStage
+GF+	<a href="http://www.piping.georgfischer.com">www.piping.georgfischer.com</a>	Y	
AMS	<a href="http://www.amsmembrane.com">www.amsmembrane.com</a>	Y	
AQUAFIDES GmbH	<a href="http://www.aquafides.at">www.aquafides.at</a>	Y	
AquaVer	<a href="http://www.aquaver.eu">www.aquaver.eu</a>	Y	
BASF / inge GmbH	<a href="http://www.inge.ag">www.inge.ag</a>	Y	
Beijing Liquid Filter	<a href="http://www.lkft.com.cn">www.lkft.com.cn</a>	Y	
Bi-TEC	<a href="http://bi-tec.ru/">http://bi-tec.ru/</a>		Y2
BlueTech	<a href="http://www.bluetechresearch.com">www.bluetechresearch.com</a>	Y	
Bosman	<a href="http://www.bosman-water.nl">www.bosman-water.nl</a>	Y	
BWT SEPARTEC OY	<a href="http://www.bwt.dk/">www.bwt.dk/</a>		Y2
CABOT	<a href="http://www.cabotcorp.com">www.cabotcorp.com</a>	Y	
CDE Global Ltd.	<a href="http://www.cdeglobal.com">www.cdeglobal.com</a>	Y	
Cytec industries Pte Ltd	<a href="https://www.cytec.com/">https://www.cytec.com/</a>		Y2
Delta	<a href="http://www.deltawatersystems.com">www.deltawatersystems.com</a>	Y	
EcoBrix	<a href="http://www.ecobrix.nl">www.ecobrix.nl</a>	Y	Y
EKOTON	<a href="http://www.ekoton.com">www.ekoton.com</a>	Y	
Elgressy	<a href="http://www.elgressy.com/">www.elgressy.com/</a>		Y
EMTEC	<a href="http://www.ematewater.com">www.ematewater.com</a>	Y	
ENVIROCHEMIE	<a href="http://www.envirochemie.com">www.envirochemie.com</a>	Y	
Esli Ltd.	<a href="http://www.esli.com.tr">www.esli.com.tr</a>	Y	
Euroidea	<a href="http://www.euroidea.com.cn/">http://www.euroidea.com.cn/</a>		Y
Evers e.K.	<a href="http://www.evers.de">www.evers.de</a>	Y	
Everyvalve Ltd	<a href="http://www.everyvalve.com/">www.everyvalve.com/</a>		Y
Fenghua Group	<a href="http://www.gxfenghua.com">www.gxfenghua.com</a>	Y	
Fimars	<a href="http://www.fimars.com">www.fimars.com</a>	Y	
FinanceInMotion	<a href="http://www.finance-in-motion.com">www.finance-in-motion.com</a>	Y	
GEA	<a href="http://www.gea.com">www.gea.com</a>	Y	
General Cable	<a href="http://www.nsw.com">www.nsw.com</a>	Y	
Gundfos BioBooster A	<a href="http://www.grundfos.com/">www.grundfos.com/</a>		Y
Hadass	<a href="http://esheldesign.nl/">http://esheldesign.nl/</a>		Y
ifw mould tec gmbh	<a href="http://www.ifw.at">www.ifw.at</a>		Y
Imbema	<a href="http://www.imbemagroep.com/">http://www.imbemagroep.com/</a>		Y
IMT	<a href="http://www.imtmembranes.nl">www.imtmembranes.nl</a>	Y	
IN-EKO	<a href="http://www.in-eko.cz">www.in-eko.cz</a>	Y	
Institute Kirilo Savic	<a href="http://www.iks.rs/">www.iks.rs/</a>		Y
IRC	<a href="http://www.irc.nl">www.irc.nl</a>	Y	Y
IRC International Water and Sanitation Centre	<a href="http://www.irc.nl/">www.irc.nl/</a>		Y
Kangjiezhi chem Water Treatment	<a href="http://www.kangjiez.com">www.kangjiez.com</a>	Y	
Kewiraswataan Company	<a href="http://wartawarga.gunadarma.ac.id/2009/11/kewiraswataan-dan-perusahaan-kecil/">http://wartawarga.gunadarma.ac.id/2009/11/kewiraswataan-dan-perusahaan-kecil/</a>		Y
KMA / LP Filter	<a href="http://www.KMA-industries.com">www.KMA-industries.com</a>	Y	
KOCH	<a href="http://www.kochmembrane.com">www.kochmembrane.com</a>	Y	
LANXESS	<a href="http://www.lanxess.com">www.lanxess.com</a>	Y	
LENNTECH	<a href="http://www.lenntech.com">www.lenntech.com</a>	Y	
Ludwigshafen University of Applied Science	<a href="http://web.fh-lu.de/enindex.nsf/en/ludwigshafenun">http://web.fh-lu.de/enindex.nsf/en/ludwigshafenun</a>		Y
Maastricht School of Management	<a href="http://www.msm.nl">www.msm.nl</a>	Y	Y
Mahle	<a href="http://www.mahle-industry.com">www.mahle-industry.com</a>	Y	
Manov Ingenieria	<a href="http://www.manovingenieria.com">www.manovingenieria.com</a>	Y	Y

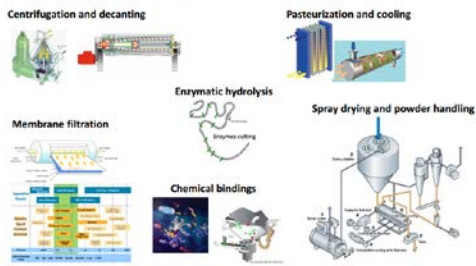
Metabolic	unknown		Y
METAWATER	<a href="http://www.metawater.co.jp">www.metawater.co.jp</a>	Y	
Montmelian partners	<a href="http://www.montmelianpartners.com/">http://www.montmelianpartners.com/</a>		Y
Nijhuis	<a href="http://www.nijhuisindustries.com">www.nijhuisindustries.com</a>	Y	
Ningbo Hidrotek Co., Ltd.	<a href="http://www.hidrotek.cn/">www.hidrotek.cn/</a>		Y
Nordic Water	<a href="http://www.nordicwater.com">www.nordicwater.com</a>	Y	
Oasen N.V.	<a href="http://www.oasen.nl">www.oasen.nl</a>		Y
OFS	<a href="http://www.water-monitoring.com">www.water-monitoring.com</a>	Y	
Oltremare	<a href="http://www.oltremaremembrane.com/">www.oltremaremembrane.com/</a>	Y	
ONTOP	unknown		Y
Palgey maim	<a href="http://palgey-maim.co.il/">http://palgey-maim.co.il/</a>		Y3
Pentair	<a href="http://www.pentair.com">www.pentair.com</a>	Y	
Proeko	<a href="http://www.proekojp.pl">www.proekojp.pl</a>	Y	
Prominent	<a href="http://www.prominent.nl">www.prominent.nl</a>	Y	
Pure Technologies	<a href="http://www.puretechltd.com/">www.puretechltd.com/</a>		Y
Red Flint Sand and Gravel	<a href="http://www.redflint.com">www.redflint.com</a>	Y	
Rixona B.v. Warffum	<a href="http://www.rixona.nl/">www.rixona.nl/</a>		Y
Rockwell Automation	<a href="http://www.rockwellautomation.de">www.rockwellautomation.de</a>	Y	
Saint Gobain Pam	<a href="http://www.pamline.com/">www.pamline.com/</a>		Y
SFT Filtros	<a href="http://www.stf-filtros.com">www.stf-filtros.com</a>	Y	
Siderurgica del Polesine	<a href="http://www.siderpol.it">www.siderpol.it</a>	Y	
SINAP	<a href="http://www.sh-sinap.com">www.sh-sinap.com</a>	Y	
Tauw	<a href="http://www.tauw.nl">www.tauw.nl</a>	Y	Y
Ultra Control Valves	<a href="http://www.ultravalves.co.za/">www.ultravalves.co.za/</a>		Y
ULTRAAQUA	<a href="http://www.ultraaqua.com">www.ultraaqua.com</a>	Y	
University of Applied Sciences, Kajaani, Finland	<a href="http://www.kajak.fi">www.kajak.fi</a>	Y	
VentilAQUA S.A.	<a href="http://www.ventilaqua.com">www.ventilaqua.com</a>	Y	
Veolia	<a href="http://www.veolia.com/en/">http://www.veolia.com/en/</a>		Y
VINAY BRASS PRODUCTS	<a href="http://www.vinaybrass.com/">www.vinaybrass.com/</a>		Y
Vitone	<a href="http://www.vitoneco.com">www.vitoneco.com</a>	Y	
Waterleau	<a href="http://www.waterleau.com">www.waterleau.com</a>	Y	
WaterQ	<a href="http://www.waterQ.com">www.waterQ.com</a>	Y	
WatMan Engineering Ltd Oy	<a href="http://www.watman.fi/">www.watman.fi/</a>		Y
World Water Magazine	<a href="http://www.wef.org">www.wef.org</a>	Y	
xylem	<a href="http://www.xylemwatersolutions.com">www.xylemwatersolutions.com</a>	Y	

## Annex 2: Presentation at the AquaStages

Introduction – presenting the agenda of the Aqua Stage event: Eco-efficient technologies in industrial water value chains (Palle Lindagaard-Jørgensen, DHI)

<p style="text-align: center;"> <b>EcoWater</b> Dairy company, Denmark Case study</p> <ul style="list-style-type: none"> <li>• Dairy company Environmental Strategy</li> <li>• Dairy production in a milk powder plant</li> <li>• Statements of feasibility of using EcoWater tools</li> </ul>	<h3>The Eco-efficiency Concept &amp; Metrics</h3> <ul style="list-style-type: none"> <li>• <b>Concept:</b> Simultaneous improvement of both economic &amp; ecological efficiency <ul style="list-style-type: none"> <li>– Increase of product or service value</li> <li>– Reduction of environmental impacts <ul style="list-style-type: none"> <li>• Use of natural resources</li> <li>• Generation of emissions &amp; wastes</li> </ul> </li> </ul> </li> <li>• <b>Metrics:</b> Measures the most cost-effective way of reducing environmental pressures / impacts</li> </ul> <p><i>Eco-efficiency metric = <math>\frac{\text{Economic output}}{\text{Environmental influence}}</math></i></p> <p style="text-align: right;">↑ "more" welfare ↓ ...with "less" nature</p>																																								
<h3>Water and energy resources</h3>  <p><b>Dairy plans:</b></p> <ul style="list-style-type: none"> <li>▪ 50% of the energy used within operations to be supplied via renewable sources</li> <li>▪ to reduce energy and water consumption by 3% within operations, and reduce fuel for transportation by 1% annually</li> </ul>	<h3>Water and energy resources</h3> <h4>Efficient use of resources</h4> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 5px; background-color: #4CAF50; color: white; text-align: center;"> <b>ENERGY</b>              Production: - 3% p.a./kg              Transportation: - 1% p.a./km         </div> <div style="border: 1px solid black; padding: 5px; background-color: #A1887F; color: white; text-align: center;"> <b>WATER</b>              Production: - 3% p.a./kg         </div> </div> <p><b>Examples of activities:</b></p> <p><b>Production:</b></p> <ul style="list-style-type: none"> <li>• Heat recovery and heat pumps will reduce energy consumption</li> <li>• Eco design will ensure low energy and water use in new plants</li> <li>• Large scale production supports energy and water reduction plans</li> </ul> <p><b>Transportation:</b></p> <ul style="list-style-type: none"> <li>• More km/l by eco-driving and speed limits on vehicles</li> <li>• Less km/tons by increasing trucks loads and optimising transport routes</li> </ul>																																								
<h3>Dairy products</h3> <div style="display: flex;"> <div style="flex: 1;"> <p><b>Powder</b></p> <ul style="list-style-type: none"> <li>• Caseinate</li> <li>• Hydrolysed proteins</li> <li>• Milk mineral (Capolac)</li> </ul> <p><b>Fluid products for other Foods dairys</b></p> <ul style="list-style-type: none"> <li>• Cream</li> <li>• WPC concentrate</li> <li>• Milk permeate</li> </ul> </div> <div style="flex: 1;">  </div> </div> <p style="font-size: small;">09 November 2013 5</p>	<h3>Yearly production level</h3>  <table border="1" style="font-size: small; width: 100%;"> <tr> <td><b>Raw material</b></td> <td></td> <td><b>Powder</b></td> <td></td> </tr> <tr> <td>Whole milk</td> <td>580.000 T</td> <td>Caseinat</td> <td>15.000 T</td> </tr> <tr> <td>Various ingredients</td> <td></td> <td>Milk mineral</td> <td>1000 T</td> </tr> <tr> <td></td> <td></td> <td>Hydrolysed proteins</td> <td>1200 T</td> </tr> <tr> <td></td> <td></td> <td><b>Liquid products</b></td> <td></td> </tr> <tr> <td></td> <td></td> <td>Cream</td> <td>56.000 T</td> </tr> <tr> <td></td> <td></td> <td>Whey proteins</td> <td>11.600 T</td> </tr> <tr> <td></td> <td></td> <td>Milk permeate</td> <td>50.000 T</td> </tr> <tr> <td></td> <td></td> <td><b>By-product</b></td> <td></td> </tr> <tr> <td></td> <td></td> <td>Permeate</td> <td>120.000 T</td> </tr> </table> <p style="font-size: small;">02 November 2012 6</p>	<b>Raw material</b>		<b>Powder</b>		Whole milk	580.000 T	Caseinat	15.000 T	Various ingredients		Milk mineral	1000 T			Hydrolysed proteins	1200 T			<b>Liquid products</b>				Cream	56.000 T			Whey proteins	11.600 T			Milk permeate	50.000 T			<b>By-product</b>				Permeate	120.000 T
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<h3>Dairy Company</h3> <p><b>Which processes have large water consumption?</b></p> <ol style="list-style-type: none"> <li><b>Rinse process in casein-plant:</b> <ul style="list-style-type: none"> <li>▪ ex. lactose contents in powder &lt; 0,3%</li> <li>▪ wheyprotein content in Caseinate &lt; 5 %</li> </ul> </li> <li><b>CIP cleaning in place</b> <ul style="list-style-type: none"> <li>▪ Internal equipment</li> </ul> </li> <li><b>Standardization/diafiltration of products</b></li> </ol> <p style="font-size: small;">09 November 2013 7</p>	<h3>Environmental KPI's</h3>  <p style="font-size: small;">09 November 2013 8</p>																																								

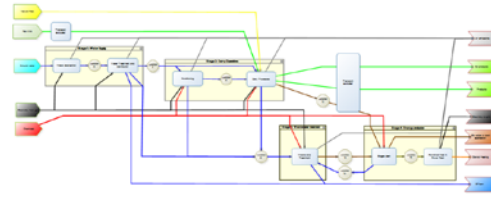
## Examples of technology applied



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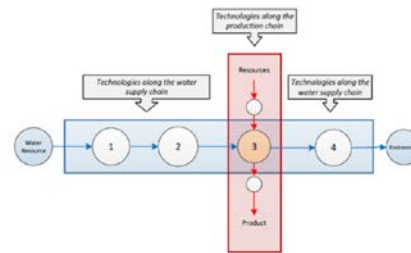
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## EcoWater - Systematic Environmental Analysis Tool Applied to HOCO



## Base-line Eco-efficiency indicators

Indicator	Dairy case
Aquatic Eutrophication Potential (Euros/tPO <sub>4,eq</sub> )	10,096,784
Global Warming Potential (Euros/tCO <sub>2,eq</sub> )	1,469
Resource Depletion – Freshwater (Euros/m <sup>3</sup> )	895



## Water chain technologies

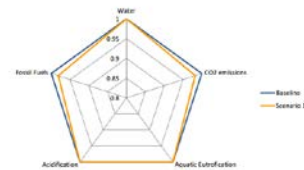
- Anaerobic pre-treatment of waste water
- Membrane bio-reactor with polishing and disinfection

### Production chain technologies:

- Condensation of vapour from spray towers
- Recovery of Cleaning in Place Baths

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## Statements from Dairy staff at the workshop

**Plant Director :** "We have reduced the water use significantly through savings and reuse- now we need to find new ideas"

**Production Manager :** "the EcoWater tools seem to be able to help us with a more systematic approach to reduce our water use- and still keeping focus on value creation and efficient use of resources"

**Sustainability Manager :** " The EcoWater tools seem to be able to help us move towards our environmental strategy goals and help select the most efficient technologies"



# How to assess the Eco-Efficiency of industrial processes and technologies (George Arampatzis, NTUA)

 <p>Amsterdam, 5-8 November 2013</p> <h2>Tools to calculate Meso-level Eco-efficiency Indicators</h2> <p>George Arampatzis School of Chemical Engineering National Technical University of Athens</p> 	<h2>The EcoWater Tools and Toolbox</h2> <ul style="list-style-type: none"> <li>An integrated suite of on-line tools and resources for assessing the eco-efficiency improvements from innovative technologies in meso-level water use systems</li> <li>Integrates             <ul style="list-style-type: none"> <li>Technology Inventory, providing detailed information on innovative technologies</li> <li>Eco-efficiency Indicators Inventory and their evaluation rules</li> <li>SEAT modelling tool, supporting the environmental assessment of a meso-level system</li> <li>EVAT modelling tool, supporting the economic assessment of a meso-level system</li> </ul> </li> </ul> 
<h2>The Technology Inventory</h2> <ul style="list-style-type: none"> <li>Supports the identification of potential innovative technologies/practices for improving the eco-efficiency of the water system</li> <li>Provides detailed information on             <ul style="list-style-type: none"> <li>Economic &amp; Environmental Performance</li> <li>Innovation and Maturity</li> <li>Availability in market</li> </ul> </li> <li>Technologies can be selected for implementation throughout the             <ul style="list-style-type: none"> <li>Water supply and wastewater treatment stages (common for all water use sectors)</li> <li>Water use processes (sector specific technologies)</li> </ul> </li> </ul> 	<h2>Systemic Environmental Analysis Tool – SEAT</h2> <p>The core model building tool of EcoWater</p> <ul style="list-style-type: none"> <li>Supports the assessment of the environmental impacts of alternative technological configurations of a meso-level water use system</li> <li>Allows the development of a model representation of the corresponding physical system, its processes and interactions</li> <li>Provides the flows of the materials that can be used for estimating the environmental impacts of the system</li> </ul> 
<h2>Economic Value Assessment Tool – EVAT</h2> <p>Extends the information included in a SEAT model incorporating economic data</p> <ul style="list-style-type: none"> <li>Supports the assessment of the economic performance of alternative technological configurations of a meso-level water use system</li> <li>Allows the development of a representation of the value chain and the various actors involved in the water supply chain and their interactions</li> <li>Provides the monetary flows that can be used for estimating the economic performance of the system</li> </ul> 	<h2>Thank you for your attention</h2>

How can industries and technology developers use the results of EcoWater. what can EcoWater offer to them today? (Michiel Blind, Deltares)

 <p><b>How can developers, consultants and buyers of technologies benefit from meso-scale eco-efficiency analysis?</b></p> 	<h3>Technology buyers &amp; consultants</h3> <ul style="list-style-type: none"><li>• Concepts, methods, tools and examples to assess the meso-scale effects of decisions.<ul style="list-style-type: none"><li>➢ A solid base for negotiation to share costs and benefits between different stakeholders</li><li>➢ Incentives to look over your fences when making decisions</li><li>➢ More sustainable decisions: increased welfare at lower environmental burden.</li></ul></li></ul>
<h3>Technology developers / providers</h3> <ul style="list-style-type: none"><li>• Methods, tools and examples to demonstrate eco-efficiency of <b>your technology</b> on a meso-scale<ul style="list-style-type: none"><li>➢ New selling arguments!</li></ul></li><li>• A technology toolbox, connected to a suite of tools to allow easy assessment of <b>your technology</b><ul style="list-style-type: none"><li>➢ Exposure of your technology</li></ul></li><li>• Demonstration case studies which may be able to accommodate <b>your technology</b><ul style="list-style-type: none"><li>➢ Real-life assessment of your technology</li></ul></li></ul>	<h3>Where to find us:</h3> <ul style="list-style-type: none"><li>• Booth: 07.422p2 (Hall 7, Holland)<ul style="list-style-type: none"><li>• Visit us to learn more!</li></ul></li><li>• Breakfast event: Thursday 7 November; D.508 Elicium Building (5th floor) 8:00 to 09:30</li><li>• Internet: <a href="http://environ.chemeng.ntua.gr/ecowater">environ.chemeng.ntua.gr/ecowater</a></li><li>• Pass on your business card – we'll contact you!</li></ul> <p>Thank you!</p>