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EcoWater report

Results of the 2nd targeted event – Industry links

IVL Swedish Environmental Research Institute

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This report has been reviewed and approved in accordance with IVL's audited and approved management system.

This report is a deliverable or other report from the EU project EcoWater.

At project closure it is was also published in IVL's C-series, available from the IVL web-site.

The EcoWater project was conducted by an international consortium coordinated by NTUA (National Technical University of Athens). IVL participated in the R & D work, in addition to leading one of the industrial case studies (Volvo Trucks), represented by Volvo Technology.

EcoWater ran 2011-2014. The project is presented in more detail on http://environ.chemeng.ntua.gr/ecoWater/
The project website holds a complete repository of all public deliverables from the EcoWater project.

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For Deliverables, please see additional information on this specific report on the subsequent Document Information page.

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 2nd 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.

Contents

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 24th 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:

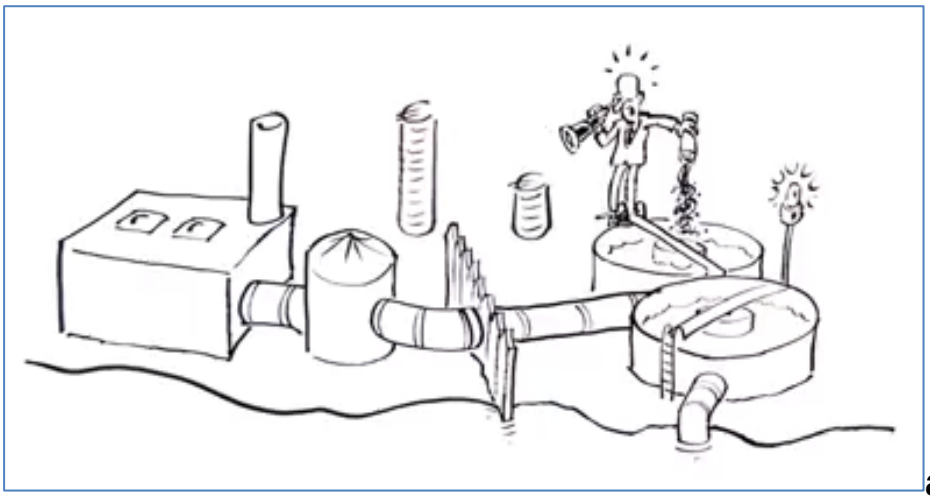
1. Present the EcoWater project to the water industry, communicating concepts and discussing results so far;
2. Develop contacts and links with industry.

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

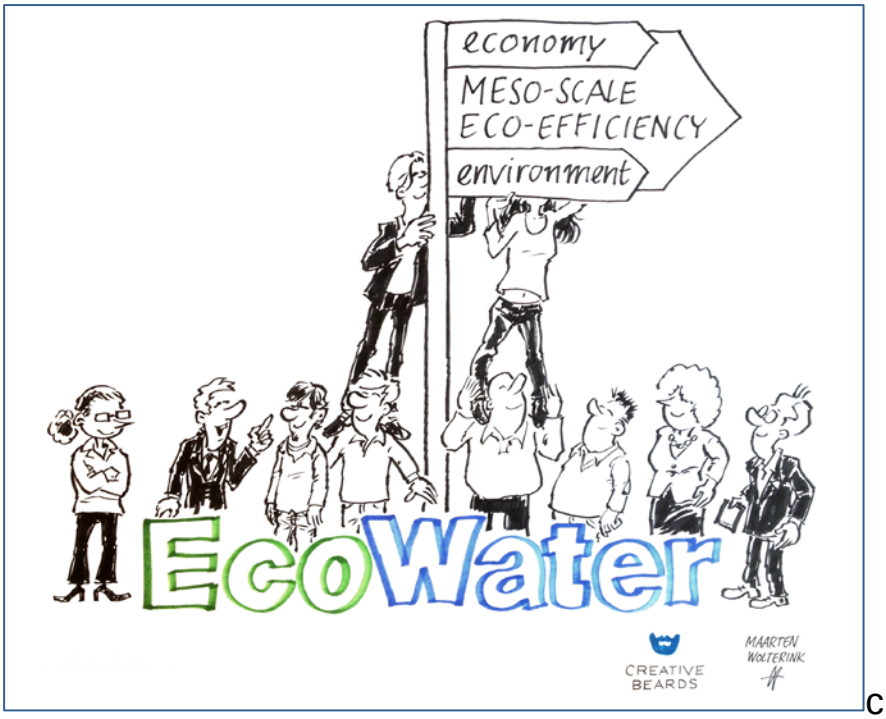
Several products were developed to showcase the EcoWater Project in the AquaTech conference:

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.



a

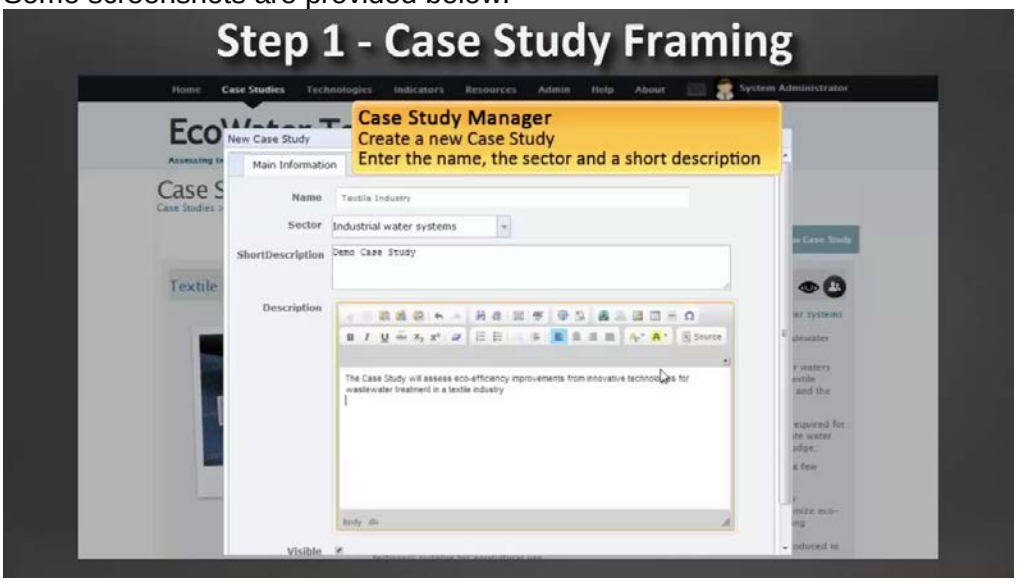
b

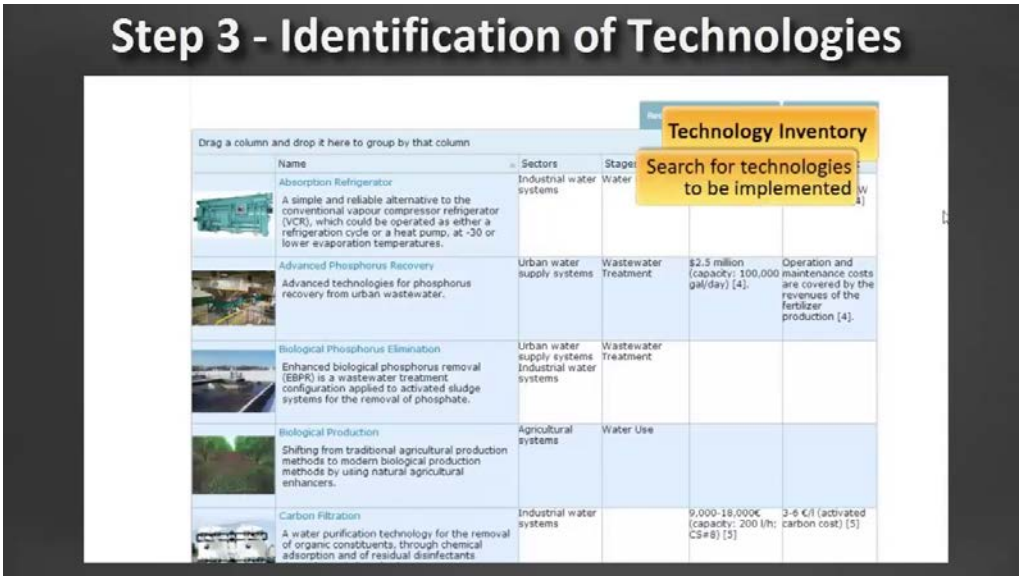


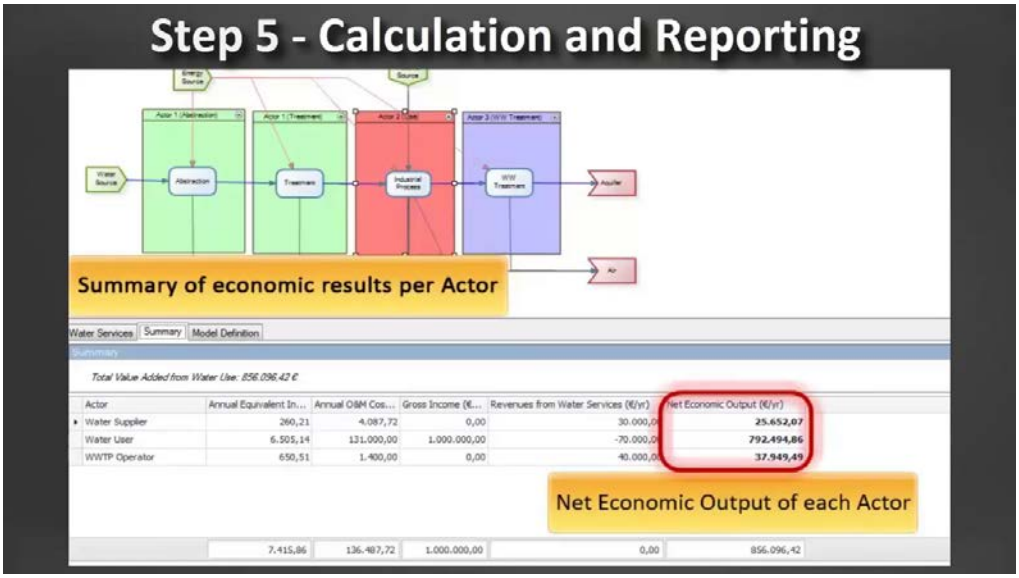
c

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.





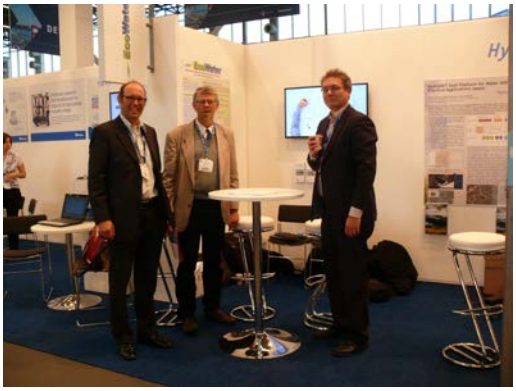


3. A set of presentations was developed for the AquaStages and for the breakfast event. These presentations are available on the website http://environ.chemeng.ntua.gr/ecoWater/Default.aspx?t=287
4. Finally, case study leaflets and two posters were also produced for the conference, and published as a 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 clarly 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	*Palle Lindgaard-Jørgensen, DHI*
Animation on the need for meso-scale eco-efficiency	*Animation*
How to assess the Eco-Efficiency of industrial processes and technologies (demo - movie)	*George Arampatzis NTUA*
How can industries and technology developers use the results of EcoWater? What can EcoWater offer to them today?	*Michiel Blind, Deltares*
Questions and feed-back from participants	*Facilitation: Palle Lindgaard-Jørgensen, DHI*

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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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.

Annex 1: Visitors of the booth and the AquaStages

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

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

EcoWater

EcoWater
Dairy company, Denmark
Case study

- Dairy company Environmental Strategy
- Dairy production in a milk powder plant
- Statements of feasibility of using EcoWater tools

The Eco-efficiency Concept & Metrics

- **Concept**: Simultaneous improvement of both economic & ecological efficiency
  - Increase of product or service value
  - Reduction of environmental impacts
    - Use of natural resources
    - Generation of emissions & wastes
- **Metrics:** Measures the most cost-effective way of reducing environmental pressures / impacts

Eco-efficiency metric = *Economic output* / *Environmental influence* — "more" welfare ...with "less" nature

Water and energy resources

Dairy plans:

- 50% of the energy used within operations to be supplied via renewable sources
- to reduce energy and water consumption by 3% within operations and reduce fuel for transportation by 1% annually

Water and energy resources

Efficient use of resources

ENERGY
Production:
- 3% p.a./kg

Transportation:
- 1% p.a./km

WATER
Production:
- 3% p.a./kg

Examples of activites:

Production:
- Heat recovery and heat pumps will reduce energy consumption
- Eco design will ensure low energy and water use in new plants
- Large scale production supports energy and water reduction plans

Transportation:
- More km/l by ecodriving and speed limits on vehicles
- Less km/tons by increasing trucks loads and optimising transport routes

Dairy products

Powder
- Caseinate
- Hydrolysed proteins
- Milk mineral (Capolac)

Fluid products for other Foods dairys
- Cream
- WPC concentrate
- Milk permeate

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Yearly production level

Raw material
Whole milk 580,000 T
Various ingredients

Powder
Caseinat 15.000 T
Milk mineral 1000 T
Hydrolysed proteins 1200 T

Liquid products
Cream 56.000 T
Whey proteins 11.600 T
Milk permeate 50.000 T

By-product
Permeate 120.000 T

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Dairy Company

Which processes have large water consumption?

1. **Rinse process in casein-plant:**
   - **ex. lactose contents in powder < 0,3%**
   - **wheyprotein content in Caseinate < 5 %**
2. **CIP cleaning in place**
   - **Internal equipment**
3. **Standardization/diafiltration of products**

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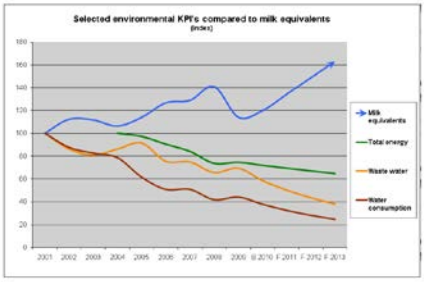
Environmental KPI's



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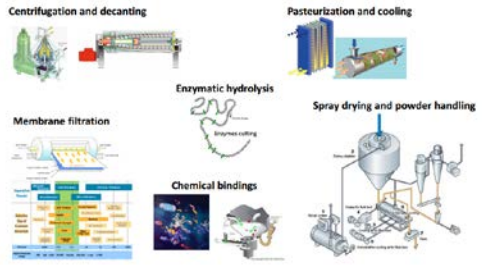
Examples of technology applied



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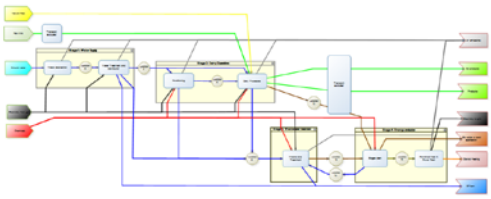
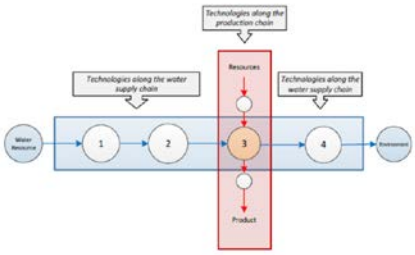
EcoWater - Systematic Environmental Analysis Tool Applied to HOCO



Base-line Eco-efficiency indicators

Indicator	Dairy case
Aquatic Eutrophication Potential (Euros/$tPO_{4,eq}$)	10,096,784
Global Warming Potential (Euros/$tCO_{2,eq}$)	1,469
Ressource Depletion – Freshwater (Euros/m^3)	895



Water chain technologies

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

Production chain technologies:

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

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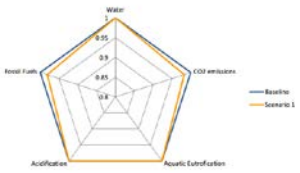

Statements from Dairy staff at the workshop

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)

EcoWater

Aquatech

Amsterdam, 5-8 November 2013

Tools to calculate Meso-level Eco-efficiency Indicators

George Arampatzis
School of Chemical Engineering
National Technical University of Athens

The EcoWater Tools and Toolbox

- An integrated suite of on-line **tools** and **resources** for assessing the **eco-efficiency** improvements from innovative **technologies** in **meso-level** water use systems
- Integrates
  - **Technology Inventory**, providing detailed information on innovative technologies
  - Eco-efficiency **Indicators Inventory** and their evaluation rules
  - **SEAT** modelling tool, supporting the environmental assessment of a meso-level system
  - **EVAT** modelling tool, supporting the economic assessment of a meso-level system

The Technology Inventory

- Supports the **identification** of potential innovative **technologies/ practices** for improving the eco-efficiency of the water system
- Provides detailed **information** on
  - Economic & Environmental Performance
  - Innovation and Maturity
  - Availability in market
- Technologies can be selected for **implementation** throughout the
  - Water supply and wastewater treatment stages (common for all water use sectors)
  - Water use processes (sector specific technologies)

Systemic Environmental Analysis Tool – SEAT

The core model building tool of EcoWater

- Supports the assessment of the **environmental impacts** of alternative technological configurations of a meso-level water use system
- Allows the development of a **model representation** of the corresponding physical system, its processes and interactions
- Provides the **flows** of the materials that can be used for estimating the environmental impacts of the system

Economic Value Assessment Tool – EVAT

Extends the information included in a SEAT model incorporating economic data

- Supports the assessment of the **economic performance** of alternative technological configurations of a meso-level water use system
- Allows the development of a representation of the **value chain** and the various **actors** involved in the water supply chain and their interactions
- Provides the **monetary flows** that can be used for estimating the economic performance of the system

Thank you for your attention

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

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