SLOVENSKI STANDARD
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Trajnostna integrirana uporaba in obdelava vode v industrijskih procesih - Praktični napotki (uporabna VODA)

Sustainable integrated water use & treatment in process industries - a practical guidance (Sustain WATER)

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CEN WORKSHOP AGREEMENT

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English version

Sustainable integrated water use & treatment in process industries - a practical guidance (SustainWATER)

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European foreword

The present Workshop has been proposed by the E4Water consortium, which is conducting a Collaborative Project on Economically and Ecologically Efficient Water Management in the European Chemical Industry (E4Water; www.e4water.eu) [1]. E4Water is supported under the 7th Framework Programme of the EU, Theme NMP.2011.3.4-1, Eco-efficient management of industrial water.

CWA SustainWATER was developed in accordance with CEN-CENELEC Guide 29 "CEN/CENELEC Workshop Agreements – The way to rapid agreement" [2] and with the relevant provisions of CEN/CENELEC Internal Regulations - Part 2. It was agreed on 2016-03-23 in an online meeting by representatives of interested parties, approved and supported by CEN following a public call for participation made on 2016-01-22. It does not necessarily reflect the views of all stakeholders that might have an interest in its subject matter.

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Introduction

This CWA aims to provide guidance primarily for company stakeholders to support implementation of sustainable integrated water use and treatment. While the whole procedure might be relevant for some stakeholders, only parts might be for others. Such sustainable integrated water system is essential for an efficient water use and treatment in any plant, including chemical and process industries. In its most advanced form it can also be described as an integrated industrial water management or even as an integrated water management when urban and industrial waters are managed together. This industrial approach has various dimensions starting from measures directly linked to single production processes up to measures and cooperation that go far beyond one industrial unit or even site. With an increasing range of scale to be considered in the industrial water management, the number of actors to be involved is growing (e.g. neighbourhood industrial sites, municipal wastewater treatment units, water resources management institutions up to catchment scale) and technology options are getting manifold. So there is a clear need to consider them in an integrated way.

To improve the management of water resources, water uses and final effluent disposal, for the companies in the chemical sector, multiple drivers exist. In many cases more than a single driver applies for each company, and frequently inter correlation between different drivers exists.

Companies located in water stressed areas (as assessed by various neat tools developed over the past years) will definitely identify the risk from various sides to reduce their water footprint by reducing the fresh water intake. Minimizing discharge to sensitive water bodies, not already regulated by local legislation implementation of the Water Framework Directive is also an important driver since it will require measures to ensure "good ecological quality" in each river water basin throughout Europe by 2027 latest.

Where competition with other users exists, typical governance foresees prioritization in water distribution where the industrial activities will come after, respectively, citizens and agriculture. The industry can look for alternative, although usually more expensive, water sources or it can reduce its dependency on fresh water. The latter can reduce in a sustainable way the risk of disruption in production. Moreover, the likelihood to see a pricing increase in such areas is a high risk, enhancing the pay back of water reuse.

Anticipating these developments many companies, ranging from SME's to multinationals, have included sound water management in their corporate and business strategies. Many have already defined clear objectives in setting targets for managing their water resources and some have applied tools to assess their sustainable water use in the expectation that taking voluntary action at an early stage provides the operating flexibility to achieve these goals when new and strict legislation is issued.

The overall process to move towards a sustainable integrated industrial water use and treatment can be described in the following way:

1. Clear definition of the conditions for implementation:

    a. Intention, drivers, issues to be addressed.

    b. Identification and description of the detailed non-technical framework to be considered, like financing, regulations, etc.

    c. 1st screening for the solution framework, to determine the scale that needs to be considered as boundary conditions and to analyse the surrounding environment

2. Developing a 1st set of technical options/solutions in combination with non-technical measures (where appropriate)

3. Assessment of applicability, efficiency and prove of compliance with technical and non-technical requirements (e.g. societal, administrative, regulative). Internal pre-assessment of sustainable water use.

4. Refinement and optimization of the selected? solution(s)
   Note: there might be several iteration steps between point 2 to 4

5. Final decision for a solution and implementation

1 Scope

The objective of the CEN workshop is to describe a framework for a practical approach on measures to achieve "a sustainable water use and treatment in chemical industry (and related process industry sectors)" considering technological and non-technological issues.

In the CEN Workshop Agreement "SustainWATER" the results and experiences on how to come to an efficient and sustainable water use and treatment are brought together out of the E4Water case studies to provide a guidance document on this approach The main objective of the E4Water project is to develop, test and validate new integrated approaches, methodologies and process technologies for a more efficient and sustainable use and treatment of water in chemical industry with transfer potential to other sectors.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

DIN EN 1085:2007: Wastewater treatment – Vocabulary; Trilingual version

ISO/TS 21929-2:2015(en): Sustainability in building construction - Sustainability indicators - Part 2: Framework for the development of indicators for civil engineering works

ISO 14044:2006: Environmental management – Life cycle assessment – Requirements and guidelines

ISO 14040:2006(en): Environmental management - Life cycle assessment - Principles and framework

ISO 14046:2014(en): Environmental management, Water footprint, Principles, requirements and guidelines

ISO 15663-3:2001(en): Petroleum and natural gas industries - Life-cycle costing - Part 3: Implementation guidelines

ISO 16075-1:2015(en): Guidelines for treated wastewater use for irrigation projects, Part 1: The basis of a reuse project for irrigation

ISO 18311:2016(en): Soil quality - Method for testing effects of soil contaminants on the feeding activity of soil dwelling organisms - Bait-lamina test

3 Terms and definitions

For the purposes of this document the terms and definitions apply.

3.1
BREF documents
Best Available Techniques (BAT) reference documents

[SOURCE: http://eippcb.jrc.ec.europa.eu/reference/]

3.2
capital expenditures (CAPEX)
money used to purchase, install and commission a capital asset

[SOURCE: ISO 15663-3:2001(en), 2.1.3]

3.3
economies of scope
efficiencies wrought by variety, not volume

[SOURCE: Joel D. Goldhar; Mariann Jelinek (Nov 1983). *"Plan for Economies of Scope"*. Harvard Business Review, https://hbr.org/1983/11/plan-for-economies-of-scope]

3.4
ecosystem services
benefits that humans recognise as obtained from ecosystems that support, directly or indirectly, their survival and quality of life

Note 1 to entry: These include provisioning, regulating, and cultural services that directly benefit people and the supporting services needed to maintain the direct services.

[SOURCE: ISO 18311:2016(en), 3.9]

3.5
integrated water use and treatment
considering interactions, interdependencies and synergy potentials between different measures of water use and water/wastewater treatment in and across various scales: process – plant – site – local - regional

3.6
life cycle
consecutive and interlinked stages of a product system, from raw material acquisition or generation from natural resources to final disposal

[SOURCE: ISO 14044:2006, 3.1]

3.7
life cycle assessment
LCA
compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle

[SOURCE: ISO 14040:2006(en). 3.3.4]

3.8
life cycle cost
LCC
cost of an asset or its parts throughout its life cycle, while fulfilling its performance (3.28) requirements

[SOURCE: ISO/TS 21929-2:2015(en), 3.25]

3.9
operating expenditure
OPEX
money used to operate and maintain, including associated costs such as logistics and spares

[SOURCE: ISO 15663-3:2001(en), 2.1.12]

3.10
Sustainable Water Management
meeting the present water needs and handling without compromising the ability of future generations to meet their own needs, incorporating environmental, societal and economic considerations to come to a robust water system

[SOURCE: based on the UN sustainable development definition: United Nations, 1987, "Report of the World Commission on Environment and Development" General Assembly Resolution 42/187, 11 December 1987. Retrieved: 2007-04-12]

3.11
Total Cost of Ownership
TCO
The CAPEX and OPEX are used to calculate the TCO (Total Costs of Ownership)

3.12
wastewater
water composed of any combination of water discharged from domestic, industrial or commercial premises, surface run-off and accidentally any sewer infiltration water

[SOURCE: DIN EN 1085:2007, 1010]

3.13
water-fit-for-purpose
providing water in a quality appropriate to the requirements of a specific use

3.14
water footprint
metric(s) that quantifies the potential environmental impacts related to water

Note 1 to entry: If water related potential environmental impacts have not been comprehensively assessed, then the term "water footprint" can only be applied with a qualifier. A qualifier is one or several additional words used in conjunction with the term "water footprint" to describe the impact category/categories studied in the water footprint assessment, e.g. "water scarcity footprint", "water eutrophication footprint", "non-comprehensive water footprint".

[SOURCE: ISO14046:2014(en), 3.5.14]

3.15
water related risks
risk of negative impact to process industry or an industrial process induced by water

3.16
water reuse
use of treated wastewater for beneficial use

Note 1 to entry: Synonymous also to water reclamation and water recycling.

[SOURCE: ISO 16075-1:2015(en), 3.1.23]

4 Drivers for sustainable integrated water use and treatment

4.1 Incentives/leverages of companies as driver (process industry)

In a challenging economic environment with growing international competition and natural resource scarcity, efficient resource management has become a strategic imperative for any resource-intensive industry. Water plays a crucial role in this equation, as it is not only the single most important chemical compound for human survival, but also a vital element of the manufacturing process as well as for the development of the Bio Based Economy. Furthermore water is also important in the development of a circular economy. There is a variety of driving forces why a company works on sustainable water use:

- **'*To do the right thing*':** Many companies have established their own sustainability program via which they commit themselves to improve their water efficiency. Several companies will also join forces at national, international or industry federation level (e.g. U.N. Global Compact CEO Water Mandate, WBCSD, etc.) to share experiences. Cooperation within the same watershed is done to protect the common 'water as raw material' or because this gives additional efficiency opportunities (e.g. symbiosis where wastewater from one partner is becoming the raw water for another partner) as part of the circular economy concept). Some companies demonstrate their water responsibility by the application of water stewardship schemes (e.g. European Water Stewardship or Alliance for Water Stewardship at international level).

- **Protection against water related risks:** Manufacturing sites can face a variety of water related risks with a huge impact if they are not well understood. Working to improve water efficiency will typically be a first step of any mitigation plan. Water related risks can be very diverse, changing over time and can depend heavily on external factors:

  - Limits/Reduction in available water quantity due to fewer water supplies (e.g. linked with global warming), growing water needs by others and/or changing priorities of water allocations.

  - Loss in water quality due to pollution (by others) or impact by e.g. climate change (e.g. higher silt index in dam reservoirs, growth of tidal areas due to sea water level rise causing more chloride in raw water, etc.).

  - Non-technical: for example, press coverage on water related topics, non-governmental organization (NGO) activities, public perception, and engagement, etc. can change the way water needs to be looked at in a certain location.

- **Legislation controlling the water intake:**

  - In several cases, companies see that the continuation of their activity is submitted to a tendency to a lower water uptake at equivalent production capacity or an unchanged water uptake is considered for an increased capacity.

  - In other cases, manufacturing sites are getting water efficiency targets in their permits specifying the maximum water intake to produce 1 ton of product.

- **Legislation controlling the water discharge:**

  - While it is very common to have permit requirements on the water quality which is discharged (with limits determined by the river basin approach directed in the EU Water Framework Directive [3]), there are more and more permit requirements which are limiting discharged volumes; sometimes with lower targets for 'dry periods' to