AquaSPICE Full Title: Advancing Sustainability of Process Industries through Digital and Circular Water Use Innovations

Aim:
AquaSPICE aims at materializing circular water use in European Process Industries, fostering awareness in resource-efficiency and delivering compact solutions for industrial applications. That challenging aim necessitates (i) fostering the industrial deployment of innovative water treatment and re-use technologies, (ii) closed-loop practices regarding water, energy and substances, (iii) a system for real-time monitoring, assessment and optimization of water (re-)use at different interconnected levels and (iv) an effective organisational, regulatory and business framework. AquaSPICE not only offers this but also demonstrates the effectiveness, supported by the breadth of European process industries providing evidence on the achievement of the declared aims.

Concept:
AquaSPICE aims at advancing efficient and circular water use in process industries. It adopts a genuinely holistic approach to boost water efficiency and circularity. This approach is holistic in respect of the following domains: Industrial water use and re-use solutions (typology domain): The domain of efficient water management in industries is extensive. Water conservation can start with practices for reducing water consumption and water losses and extended further by establishing closed-loops for recovering and reusing used water and deploying technological solutions for effective wastewater treatment and re-use. Most of the opportunities for water conservation exist in the water re-use and recycle options. Therefore, AquaSPICE focuses on the efficient implementation and
management of closed water loop solutions, in
combination with recovery of energy and other
substances. Operational scope (time domain):
AquaSPICE pursues water efficiency at all
operational levels/time scopes (real-time, short-, medium-, long- term), for which a number of
different services are provided. At the daily (real-
time or short-term) operations level, optimisation
targets the impact on water use and re-use of
variations in production schedule and processes
control parameters. The main focus is on the
operation and synergies of water treatment
processes and re-use practices, with optimisation
being both re-active and pro-active (i.e. inferring
and reacting to water-related inefficiencies,
contingencies, problems, malfunctions and
dangers). At the medium-term level, optimisation
targets production planning by detecting
production procedures, processes and/or
machines that need maintenance (predictive or
reactive), reconfiguration, replacement or
upgrade in order to minimize water use or
maximize re-use. At the long-term time-scope,
AquaSPICE provides decision support for water-
able optimised strategic planning across the
manufacturing and value chain, aimed at
retrofitting the production chain of any given
product to maximize re-use. Efficient water use
and re-use technological innovations (technology
domain): AquaSPICE builds upon previous water-
related projects and advances the SotA, while it
brings together multiple technological advances
and best practices in diverse fields, such as water
recovery, water treatment, IIoT sensor networks,
virtualization & digital twinning, big data analytics,
encryption and cyber-security, in such a way as
to fully capitalize on their synergies. It puts weight
on innovation in specialized fields but mostly on
the innovative integration of already available
advanced technologies. AquaSPICE proposes
and integrates under a common framework the
following technological components: (i) a set of
water saving & re-use best practices; (ii) a set of
advanced water recovery and treatment
technologies suitable for a wide range of
industrial applications; (iii) an innovative smart
IIoT sensory network combined with an intelligent
big data processing and analytics platform for
(iv) an advanced simulation model of the production system and its value chain, with special focus on water processes and use; (v) an innovative water-aware Cyber-Physical System (WaterCPS) for production chain virtualization and monitoring; (vi) novel assessment and optimisation techniques used by WaterCPS for decision support; (vii) AI tools for reactive and proactive detection of contingencies/problems/ anomalies/inefficiencies and inference of remedies or advice; (viii) expert tools for long-term planning and application design of technologies and practices.

Start date:
01/12/2020

End date:
31/05/2024