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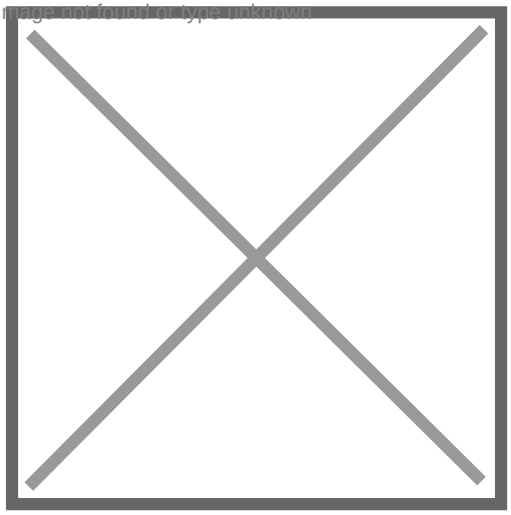

CE-SPIRE-07-2020

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-aware 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 real-time monitoring; (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