A2.2: Synthesis report of the conclusions from public consultation meetings

(DRAFT VERSION)

AQUARES – WATER REUSE POLICIES ADVANCEMENT FOR RESOURCE EFFICIENT EUROPEAN REGIONS

2021

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1. INTRODUCTION

1.1 Background

Water reuse, defined as the more than once utilisation of wastewater that after treatment achieves a quality that is appropriate for other intended beneficial uses, is both a necessity and an opportunity[1]. In the EU, water scarcity has increased dramatically and affects 11% of the EU population and 17% of the EU territory. In addition, the world water market will be worth 1 trillion € by 2020, and a 1% increase in the growth of the EU water industry can create up to 20,000 new jobs. Recently, the EC introduced the new Regulation on minimum requirements for water reuse for agricultural irrigation and the new rules will apply from 26 June 2023 and are expected to stimulate and facilitate water reuse in the EU[2].

Water reuse is a key aspect of efficient water management in terms of supporting resource efficiency, technological and managerial eco innovation adoption, and green growth. It can also advance resource efficiency with eco innovations in areas such as restoration of wetlands, aquifer recharge, irrigating crops, advancing industrial uses (aggregate washing, concrete making), soil compaction, and enhancing landscape uses. Furthermore, it requires policy exchanges among EU regions & countries because their public authorities have introduced at different paces efficient water management practices for issues such as spatial planning, infrastructure, mobility policy, licensing, agriculture and landscape management, and water supply.

EU regions affected by water scarcity need to cooperate to find best practices to solve the problems of inefficient surface and ground water protection, adaptation to climate change & flood protection. There is thus a need to exchange practices and knowledge to: a) help harmonise reused water quality for different uses across the EU, b) integrate the objectives of different legislations to boost eco-innovation by further unifying the EU water market, and c) foster balanced territorial development without disparities. To this aim, the AQUARES project supports EU regions to achieve efficient water management through water reuse, profit from the opportunities in the water market, and secure the protection of water

[1] https://ec.europa.eu/environment/water/reuse.htm
[2] https://ec.europa.eu/environment/water/reuse.htm

bodies. In this context, the project pursues the integration of water reuse in national, regional and local development plans, promoting the efficient use and management of water, as well as sustainable development and eco-innovation adoption across the agricultural, industrial, urban and recreational sectors. Specifically, AQUARES aims to:

- Increase the capacity of public administrations to effectively support water reuse.
- Improve the addressed policy instruments, through the development of action plans benefiting authorities and beneficiaries.
- Develop one online toolkit on the evaluation of water reuse investments for regions promoting water efficiency.
- Develop thematic studies and analysis reports that will examine water reuse pathways.
- Organise interregional workshops, study visits, bipartite site visits and other dissemination events to promote capacity building among partners and stakeholders.

1.2 Aims & objectives of the report

AQUARES Activity 2.2 includes the organisation of 18 public consultation meetings with members of the public and stakeholders operating in partners' areas on issues that require broad public support/consensus. Through public dialogue, all benefits to the environment and the economy derived from water reuse were analysed and highlighted, barriers and enablers for their introduction and control were identified and taken into account in the policy measures to be designed in each region. Partners (excl. f-IEA) invited members of the public and local/regional stakeholders to ensure support towards the integration of water reuse in national, regional and local development plans.

This Synthesis Report is based on the results of the public dialogue events that were conducted in the countries of the partners of the AQUARES project. The information provided is a compilation of different findings as presented by project partners. The overall aim of this report is to analyse and synthesise the results from the various public consultation meetings (based on the summary reports provided by project partners), to identify common issues, barriers and enablers to measures proposed in actions plans that

require consensus and to develop recommendations on how to increase awareness on the suitability of reused water.

Public consultation meetings were based on the themes of AQUARES A1 activities:

- **A1.1: Comparative analysis of regional and national policies on water reuse:** The aim of AQUARES Activity 1.1 was to enable policymakers to understand the dynamics and policy obstacles related to water reuse and to integrate effective policy practices into the implementation of policy instruments, thereby providing feedback for the development of action plans.
- **A1.2: Analysing the needs of AQUARES regions in water reuse:** AQUARES Activity 1.2 analysed water reuse needs of the partnership territories. The needs analysis aimed at enabling policy makers in partnership areas to: a) comprehend the socio-economic and institutional context that could best support the proliferation of water reuse solutions, b) establish regional water consumption profiles and pinpoint organisational needs, and c) determine which sectors and uses have the largest water reuse potential.
- **A1.3: Evaluation of water reuse technologies and practices across different sectors and regions:** The purpose of AQUARES Activity 1.3 was to identify and assess current and future technology uses in different water reuse applications in different sectors of the economy. The evaluation enables policy makers to identify which technological solutions work best in the field of water reuse.

The structure of this report is based on the above-mentioned themes, so as to allow for the clear presentation of a) the feedback provided by participants, b) the similarities and differences in the findings of AQUARES A1 activities and public consultation meetings' results, and c) the results of public consultation meetings that should be included in AQUARES action plans in order to strengthen public consensus to the project and the local/regional society's support during the implementation.

In detail, Section 2 includes the outcomes of the public consultation meetings and it is divided in three subsections reflecting the themes of A1 activities as listed above. These subsections are: 2.1 Regional and national policies on water reuse and monitoring practices; 2.2 Local and regional need for water reuse and 2.3 Water reuse technologies and practices across different sectors. Each subsection presents all findings as reported by each partner

during the consultation meetings. Section 3 focuses on similarities and differences between the results of activity A2.2 and the results of A1 activities that have already been realised including A1.1, A1.2, and A1.3. The results are compared to the feedback of the meetings as depicted in A2.2, in order to deliver a comparative approach. Finally, section 4 provides concluding remarks and recommendations on policy planning.

2. OUTCOMES OF PUBLIC CONSULTATION MEETINGS

2.1. Regional and national policies on water reuse and monitoring practices

The first theme addressed during the public consultation meetings corresponded to activities A1.1, and focused on regional and national policies on water reuse and monitoring practices. Despite their success in various parts of the world, water reuse practices have not been as widespread in the EU, due to the lack of a relevant supportive and coherent policy framework among other reasons. EU member states' regulations (where existent) present significant differences with regards to allowable uses, as well as other criteria such as the chemical quality requirements, the type of indicator organisms to be measured and the thresholds set, the treatment requirements, and on-site measures. Thus, the discussion focuses on pinpointing policy measures to promote water reuse and obstacles to the integration of water reuse in water management schemes, as well as measures for the promotion of water reuse monitoring practices that ensure compliance with the appropriate standards.

The Regional Development Agency of the Pardubice Region (CZ)

During the meeting, the program RESAO – Regional Strategy of Adaptation measures for the Pardubice region was presented. The Strategy deals with several problems in the region including drought in watercourses, issues affecting the soil's condition, rates of erosion, issues on landscape cover. Among the aims of the Strategy are: to identify natural and social soil properties for evaluation and useful soils that can be used as a water resource and be possibly infiltrated into the facility; to evaluate the potential of soil irrigation and optimisation of surface drainage; to address the possibility to implement measures on watercourses; to indicate the requirements for water resources for human needs and ensure their quality.

Water Board of Oldenburg and East Frisia (DE)

In the beginning of the meeting, several research projects were presented such as MULTI-ReUse and B-WaterSmart. The MULTI-ReUse project is located in the city of Nordenham and the pilot plan showed the potential for reuse of treated municipal waste water for industrial

purposes. The technical tests used ultrafiltration and reverse osmosis for the additional treatment of wastewater and they concluded that the water quality produced by these processes could be used for industrial purposes. The project B-WaterSmart aims to design a pilot for the reuse of cow water in dairy industries. Moreover, digital solutions and new smart meters will be tested.

It was also mentioned that a national strategy for water reuse is currently missing in Germany. Germany has abstained from voting the EU regulation as the issue of water reuse is still viewed somewhat critically. Although it was considered essential to bring all stakeholders to the table for an open discussion and communicate the issues publicly, it was mentioned that the topic of reuse of treated waste water is quite sensitive in the country.

Regional Ministry of Water, Agriculture, Livestock, Fisheries and Environment of Murcia Region (ES)

A risk analysis is ongoing in Murcia region in order to implement the next Water Reuse Regulation. Treatment plants in the Region of Murcia are equipped technologically and therefore it will be easy to adapt the new European Regulation. Furthermore, the need for the introduction of further regulations was pointed out in order to cover all aspects of water reuse. It was noted that it is necessary to expand controls especially in water distribution networks for irrigation of crops, due to loss of traceability. On controls, the importance of the collaboration of the irrigation communities was highlighted. The Spanish National Ministry of Water is committed to sustainable drainage systems (SUDs), and also is developing a technical standard to laminate rainwater from torrential episodes that do not reach the water bodies. Apart from that, facilities such as environmental tanks are highly effective in preventing the dirtiest waters from reaching the lagoon.

Lombardy Foundation for the Environment (IT)

During the meeting, detailed information was shared about the regional ERFD 2014-2020 call “Bando AL VIA” which provides support for local industries and technological solutions to reuse water. The call includes two intervention areas: business development and relaunch of production areas. Plans eligible for funding need to include, among others, strategies that aim to restore optimal production conditions, maximise the production factors’ efficiency including energy and water; to optimise production and management of

waste and materials lifecycle. Since May 2020, 741 applications were received for a total amount of € 525,2 million. A potential extension of the invitation to tenders until 30 June 2021 is under discussion.

Association Baltic Coasts (LV)

Latvia is still lacking a unified and comprehensive regulatory framework which could constitute a sound basis for the promotion of water reuse in various sectors of the economy. The importance of the proper use of rain/storm water was highlighted: to introduce the reuse of rain/storm water, a sustainable environment for its management needs to be created as it is a "multifunctional infrastructure". Rain/storm water management does not only refer to rain water drainage but also to the use of water services or ecosystem services in urban environments, water storage etc. Moreover, Latvian legislation plays a crucial role as it could facilitate or hinder sustainable rain/storm water management. Another issue that was pointed out was the use of outdated climate data. It was suggested to define the type of data that should appear in building codes, construction climatology and LBN concerning rain drainage. To overcome uncertainties that water purification procedures may pertain, it was suggested to develop national-level guidelines or typical situation solutions for rainwater management. Furthermore, guidelines for municipalities should be developed that regulate cost determination of wastewater disposal system maintenance. Finally, it was mentioned that although legislative changes are necessary and proposals are being prepared, it is still necessary to outline priorities and competencies. For instance, these issues are not only in the competence of the Ministry of Environmental Protection and Regional Development, but also of the Ministry of Agriculture and Ministry of Economics, so proposals need to be discussed with both ministries.

Energy and Water Agency (MT)

Water reuse is an important element which started being implemented at a national level from the 1980s with the commissioning of the Sant Antnin Wastewater Treatment Plant. The reuse program was further expanded in the last years with the commissioning of three new polishing plants which produce high quality reclaimed water as part of the national New Water project. The control of sewage quality and the monitoring of industrial

discharges containing chemical species is routinely performed as required by the Sewer Discharge Control Regulations at an industrial level to reduce pressures towards the WWTP. This effort will soon be significantly improved through the installation of several automatic monitoring stations throughout the sewage network. These stations can aid in highlighting national areas where there is low sewage quality and result in better planning.

Policy measures promoting New Water will support the Maltese islands to optimise water use, implement circularity and hence reach water demand in a sustainable manner. It was also noted that public awareness on sustainable water management and the promotion of non-conventional water resources should also be of focus. Most attendees didn't know about the risk management framework regarding water reuse, which is being promoted in the new EU Regulation. For some or most people, water obtained from water reuse has a negative connotation as its source is wastewater. Therefore, the risk management framework should be a key tool to address such concerns, in particular if applied through a transparent process to ensure good supply quality.

Lodzkie Region (PL)

In Poland there are no clear regulations concerning the quality of recovered water and this blocks the possibility of any future investments in this field. A regional solution may be to develop a good practice handbook showing specific existing water reuse methods in different areas, presentation of installation costs of such methods and their economic and environmental benefits. The national implementation of Regulation (EU) 2020/741 of the European Parliament and of the Council of 25 May 2020 on minimum requirements for water re-use will certainly contribute to the development of regional water recovery strategies. The national "Drought Action Plan", which, among other things, defines actions that should be taken in various aspects and at various levels in order to minimise the negative effects of drought, is considered as a useful instrument. The document indicates actions related directly or indirectly to the subject of water reuse, e.g. development of a set of good practices to apply water use in agriculture; promotion of water reuse. During the meeting, attention was also drawn to the emerging programs supporting rainwater collection in households. In the context of creating precise regulatory frameworks, the importance of the definition of responsibility for water quality of entities involved in the

water recovery chain was emphasised. Apart from pointing out the lack of a legal framework, an attempt was made to determine how local governments could already contribute to the promotion of water re-use solutions. A solution proposed included the creation of certificates for companies and factories using a closed water cycle as part of their activities. It was also considered that the popularisation of water reuse solutions would be influenced by tax incentives, low prices for using recovered water and subsidy programs. It seems, however, that without the development and implementation of an appropriate legal framework regulating the principles of water recovery and defining parameters of water quality, it will be extremely difficult to create a regional strategy in this area.

The Municipality of Trebnje (SI)

The new regulation is a small step towards the expansion of water reuse in agriculture, but it should be seen as an optional mechanism. Discussion about the policy development was followed during the presentation from the Regional Development Centre about the sustainable development of spas (project HealingPlaces). In the second meeting, irrigation in agriculture was discussed and the fact that in Slovenia no special permission is required for its use (in contrary with other natural water sources where permission is obligatory). When it comes to its regulation, the national guidelines for good practices for irrigating agricultural land were published in 2017, and reclaimed water form WWTP is not recognised as a source. Under these circumstances, the FAO Report Water on quality for agriculture is applied. Moreover, it was mentioned that detailed guidelines for water reuse and monitoring standards in Slovenia are needed. Another issue raised was the implementation of the new EU directive. It was suggested that the municipalities as operators of sewage system, responsible ministries and agencies should follow the adequate steps towards its implementation.

2.2. Local and regional needs for water reuse

The second theme addressed during the public consultation meetings corresponded to AQUARES activity A1.2 and focused on the local/regional need for water reuse. The integration of wastewater treatment and reuse into the water management is usually linked to reasons of water scarcity, in the sense of unmatched temporary or structural water

demand. Uneven spatial distribution and seasonal variations in water demand and in the hydrological cycle as well as the need to preserve or improve the quality of the existing water bodies are often central to the integration of water reuse in water management schemes. Hence, the discussion focused on: a) the local and regional socio-economic and institutional context, b) the local and regional water consumption profiles and organisational needs, and c) the sectors and uses with the highest water reuse potential.

The Regional Development Agency of the Pardubice Region (CZ)

The presentation focused on the situation on water supply from VAK, a. s. Pardubice company. The company supplies more than 164 00 people, almost 132 000 people are connected to the sewer system and the water loss on the water supply is around 13,84% (average in the Czech Republic Is 15,8%). Main problems that were pointed out include: a) water quality is jeopardised due to the contamination of resources by human activity; b) decrease in water resource capacity; c) obsolete legislation that does not reflect current water needs (e.g. recycling, standards) and d) atomisation of water supply (there are 7 000 owners and 2900 operators making it difficult to reach common ground on water infrastructure renewal, recovery funds, subsidies and dividends). The expert suggested that waste water can be used to wash streets, roads; grey water could be flushed and cleaned but there is no legislation in the Czech Republic addressing this and rain water is problematic since there are no stable rains in the region.

Water Board of Oldenburg and East Frisia (DE)

The work of Oldenburgisch-Ostfriesischer Wasserverband (OOWV) as well as the situation of water resources in the region were presented. In some parts of the supply area the groundwater is not suitable for drinking water. In dry summers in particular, the need for drinking water is often higher than the drinking water production. The increasing demand for water and the impacts of climate change exacerbate the need for water reuse. Currently, the effluent from waste water treatment plants is indirectly used for drinking water through infiltration to the groundwater. While the OOWV is not using surface water for the purposes of the drinking water production, in other areas of Germany surface water is used for drinking water production or the irrigation of agricultural fields. In that case, quality monitoring was deemed important.

Regional Ministry of Water, Agriculture, Livestock, Fisheries and Environment of Murcia Region (ES)

The reuse of water for industrial use has been pending in the Region of Murcia because industrial activities require waters of a much higher quality than those produced by tertiary treatments commonly carried out in the region. In relation to ecological flows, it was underlined that there is a greater demand for these uses in interior areas rather than coastal areas. Regarding the local and regional water reuse needs, there is a high demand of the reused resources in the agricultural sector. In the coastal area, the quality of water coming mainly from the Mar Menor Sur WWTP, requires mixing these waters with others of higher quality so that the resulting mixture is ideal for agricultural use. In inland areas, the treated waters of the Murcia Este Treatment Plant have been requested for agricultural reutilisation. Nonetheless, these waters are essential for Murcia to maintain the ecological flow in the last section of the Segura River. This highlights the need of a local analysis and integrated management of hydraulic resources. Good management of the grey water generated by runoff from rainwater is necessary to prevent it from contaminating the water bodies (e.g. the aquifers and the Mar Menor). The discussion also focused on the possibility of taking advantage of agricultural activity drains.

Lombardy Foundation for the Environment (IT)

Lombardy region already exploits the potential of water reuse, mainly in agriculture. Water reuse can be also expanded in the secondary sector as there is availability of water resource within the region. It was also deemed necessary to identify the needs and opportunities for water reuse and locations where it could be useful and cost-effective to apply industrial circular economic models.

Association Baltic Coasts (LV)

Dry summers have already posed problems to the local farmers in Latvia as water reserves for watering the fields in summer are running low and new solutions are required. At the same time, heavy rainfalls have also caused issues as urban areas and agricultural lands are flooded. On river basin management plans, the problem of inadequate quality indicators or pollution of surface water bodies were highlighted. New, innovative technologies are

needed in the field of water reuse. The main economic sectors where water reuse politics implementation can be beneficial are agriculture (artificial wetlands); forestry (buffer zones and ponds for firefighting purposes); urban environment (blue – green infrastructure, recreation and irrigation) and service industry (technical equipment washing).

Energy and Water Agency (MT)

All participants from the attending public agreed that Malta suffers from limited natural water resources to meet the national demands. Some noted that Malta's water supply is not managed in a sustainable manner. Participants highlighted that there are two main water consuming sectors on the islands: the agriculture sector and the tourism sector (in fact this impression was corrected since the municipal sector was considered as more important than tourism). The agriculture sector tends to suffer mostly from water scarcity challenges due to its dependence on natural water resources, climate change, prolonged summers and the lack of rainfall. An issue which remains a challenge is the public perception regarding water reuse as people might not understand the quality level of reused water. This could be improved with an educative campaign on wastewater reuse.

Lodzkie Region (PL)

Regarding the needs for water reuse, programs for rainwater retention in households were discussed. The largest program, "My Water", was launched in July 2020 and is designed to build rainwater and snowmelt retention facilities. In recent years, the Lodzkie region has experienced several times the negative effects of drought manifested by periodic water shortages during the summer, so this program was welcomed. However, programs such as "My Water" cannot be applied in the case of rainwater management in municipalities and do not provide a solution to most of the issues related with the effects of natural disasters. Rainwater management has also been included in educational programs for students, with the aim to build awareness among the youngest about water recovery and reuse. A typical example of such educational programs, carried out in the Łódź Province, was the Łódź Rainwater Gardens and its aim was to build biological rainwater retention systems at educational institutions. According to data from 2015, almost 40% of water in the Łódź Province is used for industrial purposes. In this context, the problem is not only high water consumption but also the quality of sewage discharged into the sewerage system. In

particular, wastewater generated by textile production has a high level of toxicity. The solution to both of these problems can be installations designed to purify post-production water and reuse it for production, sanitary or cooling purposes. Textile plants in the Lodzkie region that have on-site sewage treatment plants already exist, but such solutions are still not usually applied. The issue of development of infrastructure for wastewater treatment at the place of its creation has been raised in the Lodzkie region. Reconstruction of existing installations or construction of new ones involves high financial costs, which will not pay off in a short period of time. Especially nowadays, at a time of economic crisis caused by the pandemic, the issue of financing investments in industrial wastewater treatment is extremely relevant. Another important issue is the lack of expertise of entrepreneurs; they are currently unaware of the benefits that can derive from water reuse technology. In this context, it is important to raise awareness on possible technologies and present an example of financial planning for the upcoming years.

The Municipality of Trebnje (SI)

Regional differences regarding water availability in Slovenia were presented: the most deficit regions are Karst, Mediterranean south-west of Slovenia and Pannonia North-east of Slovenia. The Municipality of Trebnje lies on the Karst surface and as a result it is among the "vulnerable" areas when it comes to water resources and special attention is needed. Groundwater is the main source in the country, but its quality and quantity has been decreasing due to climate change. Water scarcity is not applicable as only 3 % of water is used, varying between years (there is drought every 5-7 years). Collecting water has been unsuccessful and most of the water flows downstream. The southeast of Slovenia is a spa region with a high potential for water reuse, but the operators are not favouring it yet due to lack of awareness. Furthermore, due to the disperse of settlements in Slovenia the sewage system is still a problem and further investments are required. It was also stressed that water is still very cheap in Slovenia and this fact does not really help with regards to the promotion of water reuse and circular water use practices.

The majority of water sources in the country is torrential, so most of the water drains away during floods or high waters. The problem of polluted groundwater as a main source of drinking water in Slovenia was also raised. Moreover, an expert presented examples of water reuse in industrial sectors where large amounts of water are required (e.g. paper industry, production of fibreboards, chemical industry). He stressed the importance of monitoring and implementation of water reuse policies in Slovenia to reach wider use of water reuse methods. Finally, the monitoring system for detecting leaks named AquaLink was presented. AquaLink system is a monitoring platform that enables public utility companies to effectively manage leaks.

2.3. Water reuse technologies and practices across different sectors

The third theme addressed during the public consultation meetings corresponded to AQUARES activity A1.3, and focused on suitable water reuse technologies and practices across different sectors. The intended use of reclaimed water is the key determinant of the quality the water needs to meet upon treatment. The discussion thus focused on suitable technologies based on the area's needs and the sectors identified, examining the effectiveness of each technology in meeting the desired results in terms of water quality, their advantages and disadvantages, as well as their economic sustainability.

The Regional Development Agency of the Pardubice Region (CZ)

In this session, the representative from Ministry of environment from the Czech Republic talked about national legislation and financial support from the EU. The representative explained that there are some projects on the issue but none of them includes water reuse and recycling. Moreover, no further changes at legal and policy levels on water reuse are planned for the moment in the country.

Water Board of Oldenburg and East Frisia (DE)

On suitable water reuse practices, several cases from different countries were presented. In the Netherlands, Evides has been a drinking water supplier for over 100 years with 2.8 million people supplied with water. Wastewater reuse currently comprises 3% of sales. In

Terneuzen, municipal wastewater treatment is used as a source of water supply. It is treated by a two-stage reverse osmosis as process water and this practice allows for energy to be saved while conserving fresh water sources. Currently, the main aim is to increase the reuse of municipal wastewater as this practice contributes significantly to the sustainability of water supply. Another practice that was presented was the process of water recycling at a potato processing company. The company wanted to reduce its water demand by 50% and to achieve this, the municipal wastewater had to be recycled. For this, reverse osmosis, ultrafiltration and UV filtration were used. This practice reduced freshwater consumption by 30%. In the Flemish region, to respond to the increasing demand for drinking water especially in touristic coastal, the first trials with infiltration in dunes has started.

Regional Ministry of Water, Agriculture, Livestock, Fisheries and Environment of Murcia Region (ES)

The round table's discussions focused on the degree of water treatment technology achieved in the Region of Murcia, as well as the possible improvements to be made in the treatment plants. The debate analysed the good practices identified in other countries and the possibilities of implementation in the Murcia region. Additional cases were presented in North Africa and on the French Coast near Montpelier and Marseille. In these cases, the need for an organisation or union to control recovery actions was highlighted as well as the need to capture rainwater from torrential rains to reach the lagoons without prior treatment.

Lombardy Foundation for the Environment (IT)

Paolo Rolandi, who is an entrepreneur, shared his business experience regarding his industry "Cromatura Cassanese" which is located in Cassano Magnago. The industry is equipped with the best technologies available for the management and treatment of wastewater and obtained in 2003 the UNI EN ISO 14001 environmental certification. Particularly, the investment on a modern technology allowed to reduce to zero the water consumption and the production of waste. Moreover, he raised some crucial remarks: a) Italian bureaucracy is too complicated and does not allow for smart water reuse innovations in the short term (e.g. industrial symbiosis); b) financial instruments sometimes are not

always effective because they are not retroactive. Participants also stressed the urgent need for innovations in industrial technologies as climate change is hampering the availability of natural resources. Analysis through data collection and identification of strenghts and weaknesses have been promoted as an essential tool to improve the management of water within the industrial sector.

Another case that was analysed was CAP Lombardia that has developed a Sustainability Plan since 2019 and among its aims is to reduce water consumption from 200 litres/person/day to 180 litres/person/day. To reach this goal, CAP has been promoting the safeguard of potable water though the reuse of treated water. CAP depurates 300.000.000 m3 and gives back to the rivers 33% (120.000.000 m3). This water is then used in agriculture, since it is the most developed and easiest application of water reuse. CAP is also reusing water within the civil and industrial sector. In the south of Milan, the water from WWTPs of Assago and Basilio (depurated according to the strict Decree 185 of 2003) is reused for street cleaning. CAP allows recycled water of medium quality to be reused for the irrigation of golf camps. Last, CAP also plans to access different sectors which may use treated water; a typical example is the industrial sector as it can use recycled water for heating/refreshing purposes.

Association Baltic Coasts (LV)

During the consultation meetings several good practices were presented:

a) An expert from Philadelphia Temple University (USA) focused on ‘’water reuse in Philadelphia, stormwater regulations and green stormwater infrastructure tools”. He presented a cooperation model between city council and environmental agency to implement a plan that relies on green stormwater infrastructure to prevent and reduce the entrance of polluted stormwater runoff to sewer systems and waterways by 2036.

b) Another expert presented the development of the Skanste neighborhood in Riga city that will provide multi-functional services -stormwater collection and reuse for passive/ active purposes. A cascading system of swales, canals, ponds has been designed and is now in the construction procurement phase. The system offers multiple functions: stormwater runoff attenuation before restricted discharge into sewer network, groundwater recharge,

stormwater treatment by plants and soil, landscaping function, space for snow storage during winter. More importantly, the water is designed to be passively used for microclimate regulation and actively for firefighting and greenery watering purposes.

c) The good practice of a bioswale at the shopping centre SPICE parking lot which introduces an innovative approach to stormwater management was presented as a successful example of green-blue infrastructure.

d) The practice of rainwater reuse for service vehicle car wash in the territory of state joint stock company "Latvian Road laying Maintenance Company" Tukums District Branch in Kandava municipality was analysed. In this practice, the treatment plant consists of two parts, coalescence filter with sorbent and bio-block. Initially a sand trap settles everything (e.g. sand, dirt) that is washed from the service vehicle. When the water is settled, it flows to the treatment plant, where oil pollution, oils, aromatic hydrocarbons are captured and separated. After this treatment, clean water is stored in tanks that are insulated so that there is no impact on the environment. Purified water is reused for washing car equipment. Cleaned water can be collected, treated, and reused several times.

e) The Kandava old city park reconstruction project was implemented in 2019. During the project, the dry river was used to collect heavy storm waters as main green-blue infrastructure element.

Energy and Water Agency (MT)

Different types of wastewater reuse technologies available in the market were presented. The use of these technologies is vital in transforming wastewater into a new resource of water, as they are able to remove microbiological and chemical contaminants and produce a high-quality water. Regarding technologies used in the water reclamation and reuse sectors, most of the attendees had an idea of the situation in the Maltese Islands. The attendees were positive regarding the use of water reuse technologies as it can lead the country towards the creation of a new resource of water, which can promote sustainability of water management. The main advantage of these technologies is that they can generate high-quality treated water from wastewater. Increased water supplies coming from reclaimed

water will also support the national agriculture sector for both vegetative farming and livestock. A common concern among some of the attendees was that these technologies heavily depend on energy consumption and the water produced may be expensive especially for the farmers.

Lodzkie Region (PL)

The local textile plants in the region, based on Best Available Techniques (BAT) for the textile industry, have developed and implemented a chemical-biological textile wastewater treatment plant. This solution is beneficial for several reasons: a) it reduces the discharge into the environment of wastewater containing dyes, detergents, sodium chloride and other organic and inorganic substances that may have a negative impact on the biotope of water containers; b) it limits water intake (it is estimated that the amount of process water for chemical processing of textiles can be as high as 2400-5200 m3/day); c) it provides financial benefits to the company.

Another example presented on the use of process water for energy and technological purposes was Zakłady Azotowe "Puławy". The technology of water pre-treatment used in is based on the process of contact coagulation in DynaSand type gravity filters. The main advantage of gravitational sand filters in comparison with conventional ones is the use of a unique solution of sand scrubber, installed inside the filter. This allows for the continuous purification of the deposit and allows for the effective filtration of water with a high content of suspended solids and organic substances. In addition, the continuous deposit washing system allows for a significant reduction in water consumption compared to conventional filters. A Johnson Lamella separator was installed to reduce water losses during the filter flushing process. This separator purifies and returns rinse water to the treatment system, reducing water loss to approximately 0.3%.

Regarding possible reuse technologies in agriculture, it has been pointed out that when there are no specific standards set for the recovered water (e.g. for irrigation), it is difficult to talk about using such water on a wider scale. However, solutions are proposed for the maintenance and reclamation of existing retention reservoirs and the construction of new

ones. One of the problems identified in this respect is the frequent practice of building commercial facilities (e.g. large-area stores) in natural retention zones.

The Municipality of Trebnje (SI)

The operators of the sewage system and wastewater treatment plant presented the system used in Trebnje and highlighted the constantly rising demand due to the increasing population in the Municipality. They also focused on the Kast territory specifics and the need for environmental protection of the river Temenica and underground water. After the meeting, a field visit at the WWTP took place where reclaimed water is returned to the river. After returning it to the river, farmers use it for irrigation, so indirect water reuse already exists. The operators also presented the future plans for the WWTP such as upgrading with advanced tertiary treatment. During the second meeting, members of the company Limnos, who are specialised in constructed wetlands, co-natural sanitation of landfills and different sewage sludge treatments presented nature-based solutions for the protection of the surface water bodies. The possibility for the implementation of constructed wetland for stormwater and urban river in Temenica with the combination of co-natural sanitation of landfills was then discussed.

3. SIMILARITIES AND DIFFERENCES WITH THE RESULTS OF A1 PROJECT ACTIVITIES

3.1. Comparative analysis of regional and national policies on water reuse

Similarities

The main goal of both activities was to facilitate exchanges of experience regarding data on water supply and sanitation networks. Activity A1.1 implemented this goal through data gathering, and Activity A2.2 through the organisation of public consultation meetings. Both activities focused on the presentation of information on existing water reuse policies in partner countries, including applicable legislation and regulations, as well as data on the actual implementation of such policies.

The results of the activities were similar:

- A great variability in the way water reuse is regulated was identified.
- The main limiting factor for implementing reuse schemes and exploiting the full potential of reuse was the associated cost and the lack of awareness.
- The complexity of regulations, administrative problems, and acceptance by the public were identified as main barriers.
- It was widely believed that awareness raising is essential in order to debunk the false perception of the public that reuse is environmentally dangerous or a health hazard.

Differences

No differences were observed during the comparison of the results of activities A1.1 and A2.2.

3.2. Final report on AQUARES regions' needs and opportunities in water reuse

Similarities

The results of A2.2 match those of A1.2. The results of both activities included several major findings in common including:

- Water scarcity issues as a result of climate change and extended pollution are already experienced by most of the territories.
- Water shortages in AQUARES territories share different water stress levels and therefore water demand varies across countries.
- The great majority of treated wastewater is used as processing and cooling water in industrial/power production processes and agriculture irrigation needs; lower volumes are used within the tourism industry.
- Water reuse is not popular nor well received in the vast majority of AQUARES territories.
- Most territories seem to have a modern and well-developed public sewerage system.
- The main sources of pollution are untreated municipal wastewater, agricultural pollutants industrial discharges, and human activity in general.
- The main barriers to water reuse are the lack of legal frameworks and standards/requirements for the utilisation of reclaimed water.

Differences

No significant differences were observed between activities A1.2 and A2.2.

3.3. Evaluation of water reuse technologies and practices across different sectors and regions

Similarities

The purpose of both activities A2.2 and A1.3 was to identify and assess current and future technology uses, in different water reuse applications on different sectors of the economy. This was accomplished through the identification and assessment of current technology uses, including the agricultural, industrial, urban and recreational sectors, amongst others.

Both activities resulted to similar findings:

- The selection of the appropriate water treatment scheme depends upon a number of factors, including the location, the quality of the input water and the desired quality of the output water. Water reuse must be performed taking into consideration the specificities of each case.
- Economic considerations are highly significant when assessing the potential of water reclamation projects.
- Taking into consideration that centralised wastewater treatment plants are usually located in urban settings, decentralised technologies emerge as a suitable solution for various uses (agricultural, industrial etc.), reducing or eliminating the transmission costs.
- Despite the increasing levels of water stress across the EU and a large potential to reuse treated wastewater, the water reuse remains limited and unregulated in several Member States.

Differences

The best practices analysed in activity A1.3 identified a range of technologies, such as the combination of physical-chemical systems, primary sedimentation, disinfection technologies, activated sludge and sand filtration used in the wastewater treatment plants of the region of Murcia, to innovative approaches, such as the combination of nanoremediation with conventional treatment processes performed in Slovenia. Activity A2.2 presented best practices as well including reverse osmosis, ultrafiltration, UV filtration, water pre-treatment but in some cases the use of such technologies was also combined with other issues. For instance, technologies used in Italy were linked with issues arising from bureaucracy and financial constraints and technologies presented from the US were combined with cooperation models between city councils and environmental agencies for best outcomes.

4. CONCLUDING REMARKS & RECOMMENDATIONS FOR POLICY PLANNING

This section aims to introduce concluding remarks and recommendations for policy planning, based on the findings presented in the previous sections:

1) The need to apply resilient water supply options: The negative impacts of climate change were reported by all AQUARES partners during the meetings, and it was noted that the effects of climate change gradually increase the risk of clean water shortages. Therefore, alternative solutions must be applied such as agricultural irrigation with reclaimed water, rainwater, grey water and wastewater reuse. Municipal wastewater reuse in particular should be seen as key to increase available water resources while reducing pressure on freshwater systems and ecosystems. A multitude of treatment options was presented during the meetings, including engineered and managed natural treatment processes, which can address and eliminate contaminants in reclaimed water and meet quality standards.

2) Public perception: The greatest obstacle to reuse is public perception. Several partners mentioned that the public is not aware of water reuse, and Germany in particular has abstained from voting the EU regulation as the issue of water reuse is still perceived negatively. Gradual change can be guaranteed through the provision of detailed information on risks and benefits, awareness campaigns, transparency in all relevant processes, public consultations, and incentives that can help to achieve the end goal. When it comes to agriculture, incentives may be required along the agricultural produce supply chain, in order to encourage and increase water reuse for irrigation, and to overcome resistance due to mistrust. Last, water reuse should also be integrated in education as it plays an important role in shaping the public's view when it comes to environmental issues and sustainability.

3) Water reuse and circular economy: A transition to a circular economy could create significant synergies for the wide adoption of water reuse as an alternate water supply.

Water reuse issues could be addressed more effectively through a wider circular economy perspective. Recycling and reuse are central to a circular economy approach and contribute to the provision of water supply by better managing wastewater. This circular approach may also reduce entrepreneurs' fears of introducing ambitious ecological measures, which, however, involve (especially in the field of installations intended for water recovery and reuse) significant costs, which may not be returned within many years. In this context, it is important to take steps that would encourage entrepreneurs to change their business models including:

- Reforms in public procurement law that would stimulate demand for products produced by circular economy.
- Launch of programs to encourage universities to engage in research projects related to the reuse of raw materials (including water); including projects dedicated to the development of circular economy solutions in the programs supporting the R&D activity of enterprises.
- Reforms in the tax system that would encourage the circular economy model, e.g., by using a closed water cycle in production.
- The creation of regional ecosystems to support and promote activities in the circular economy by e.g., facilitating the process of internationalisation of the business.

4) Development of suitable policies and frameworks: The main tool to implement water reuse effectively is to standardise it through suitable regulatory framework. Standardisation in water reuse needs to be regulated in a clear and cohesive way and address all aspects: technical, economic, environmental and societal. Furthermore, it needs to cover both centralised and decentralised or on-site water reclamation, and direct and indirect reuse applications, taking into consideration the potential for unintentional exposure or ingestion. The implementation of consistent regulatory frameworks on standardisation can encourage water reuse, facilitate compliance and ensure the protection of public health and of the environment, providing a secure and uniform context for the companies and investors involved. Towards this direction, the adoption of the Commission’s proposal on minimum

requirements for water reuse should not be disregarded, as it is deemed imperative for addressing the long-term needs for water.