Final report on social acceptance and behaviours towards water-smart solutions

Deliverable 5.7

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D5.7

Summary

This report of Work Package 5 – Society, Governance, Policy corresponds to D5.7 – "Final report on social acceptance and behaviours towards water-smart solutions" (M48). It is the final output from Task 5.3 - Assessment of stakeholders' attitudes towards water-smart solutions, which aimed to analyse perceptions, practices and attitudes throughout the Project. It includes an analysis of results from the CoP meetings and stakeholder interviews regarding issues of acceptance of water-smart solutions by policymakers, stakeholders, end-users, and the public, as well as a citizen survey conducted in Bodø.

The report applied the social acceptance analytical model developed in the project's Milestone 7 document (July 2021). Among other key concepts, it considers risk perceptions, justice and fairness notions, and trust between stakeholders, as well as in authorities and companies. This report is as complement and follow-up to D5.4, which included a preliminary assessment of acceptance issues in detailed chapters for each B-WaterSmart Living Lab, based on qualitative data collected from the CoP meetings and semi-structured interviews with key stakeholders. D5.7 presents a synthesis of the issues raised and discussed during the project, including the results of a stakeholder survey.

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List of Acronyms and Abbreviations

CE Circular Economy

CoP Communities of Practice

DMP Drought Management Plan

DSS Decision support system

EC European Commission

EEA Environmental European Agency

EU European Union

LL Living Lab

MED Mediterranean

NBS Nature-based solutions

OECD Organisation for Economic Cooperation and Development

SA Social acceptance

SDG Sustainable Development Goals

SM Smart Meters

SRL Societal Readiness Level

T Task

TRL Technology Readiness Level

WP Work Package

WTP Willingness to Pay

WWTP Wastewater treatment plant

UNFCCC United Nations Framework Convention on Climate Change

UWOT Urban Water Optioneering Tool

Executive summary

D5.7: Final report on social acceptance and behaviours towards water-smart solutions is a follow-up from D5.4 (preliminary report) and Milestone (MS)18 (internal report), both outputs from Task 5.3 of WP5 – Society, Governance, Policy, which offered a first assessment of the issues that might constitute barriers, or drivers, for the acceptance of the B-WaterSmart solutions across the socio-political (policymakers), market (end-users, consumers) and community (household, citizens) target publics. D5.4 had also addressed the implications of the COVID-19 pandemic in the implementation of water-smart solutions, as well as the consideration of gender issues in the B-WaterSmart LLs.

This report is composed of a qualitative assessment (section 2), complemented by the results of a stakeholder survey (section 3) and a case study summarising the results of a citizen survey carried out in Bodø (section 4). The report concludes with some key insights and recommendations for further steps beyond B-WaterSmart, as this report was submitted at the end of the project (M48, August 2024).

The qualitative assessment follows-up from the first public report of D5.4 and draws from notes from the CoP meetings in each LL – the main point of interaction with key stakeholders – as well as semi-structured interviews, which served to complement the information on the key issues of acceptance, especially in those cases where the discussions taking place at the CoPs had not yet addressed the topic directly. The quantitative assessment draws from a survey applied to a sample of key stakeholders. The online questionnaire was distributed among the CoP members and other stakeholders from the water sector, covering the cross-cutting topics of water resilience, water scarcity, and a water-smart society, complemented with specific sections on water reuse, circularity and stormwater management (nature-based solutions).

Regarding the key dimensions considered in the B-WaterSmart acceptance model, the report identifies trends that should be considered when implementing and replicating water-smart solutions.

- **Risk perceptions** – acceptance of water reuse, as well as a sense of urgency for finding alternative water sources, tends to be associated to perceptions of water scarcity; there is generally a good acceptance of water reuse, however this mostly applies to non-potable uses; future potential expansion of reuse to e.g. the food industry requires transparent information and sound risk assessment systems.

- **Notions of justice** – costs of infrastructure, and trade-offs between sectors, need to be carefully managed and assessed with full transparency; financing of some solutions will require new governance and business models, such as public-private partnerships.

- **Trust** – a crucial factor for water resilience policies in the future; organisational trust, i.e. in water utilities and authorities, is key for a wide acceptance of water reuse, as well as for promoting emerging solutions such as NBS for stormwater management (e.g., among farmers).

1. Introduction and methodology

The previous version of this report, D5.4, consisted of a detailed account of the key issues regarding the behaviour and attitudes of stakeholders towards water-smart solutions, including reflections of stakeholders on possible barriers and drivers of social acceptance that need to be considered when implementing and replicating B-WaterSmart technologies and tools over the coming years.

D5.4 included a literature review on social acceptance issues, with a particular focus on water reuse and digital tools, two key areas of the project. The primary data collection was based on qualitative methodologies, consisting of an analysis of the CoP discussions, complemented with semi-structured interviews in each of the Living Labs (LL), carried out by WP5 team members in collaboration with the LL teams (owners and mentors).

The objective of this report is to support the contribution of B-WaterSmart towards a water-smart society in Europe and beyond, in line with other tasks in the project, namely T1.2 and T1.5 – the implementation of the CoPs and set up of the LL Strategic Agendas, and T7.3 – Exploitation and route to market. It also takes into account the work undertaken to define socio-economic indicators for the Water-smartness Assessment Framework (D5.2; D6.2; D6.3), as well as the project definition of a water-smart society (D6.1):

> *Societies are water-smart when they generate societal well-being via sustainable management of water resources. In water-smart societies, well-informed citizens and actors across sectors engage in continuous co-learning and innovation to develop an efficient, effective, equitable and safe circular use of water and the related resources. This is achieved by adopting a long-term perspective to ensure water for all relevant uses, to safeguard ecosystems and their services to society, to boost value creation around water, while anticipating change towards resilient infrastructure.*

The conclusions of this report should be useful to other water-related projects, as well as for policymakers, especially those involved in water innovation, water resilience and adaptation to climate change.

This report is a follow-up of a preliminary version submitted in Month 36, and it consists of two main components: a) update of the insights from the CoPs, considering the meetings held in the period M36-M48; b) quantitative component consisting of a survey distributed among stakeholders, primarily through the CoP mailing lists, as well as a citizen survey carried out in Bodø. The sampling method for the surveys is, therefore, a purposive sample, and the questionnaire was designed with the purpose of collecting insights from the CoP stakeholders across different economic sectors and typologies of institutions.

The key definitions applied in the CoP analysis, interviews and survey draw from the model of social acceptance developed specifically for B-WaterSmart (M18, Milestone 7), D5.7 follows the approach of D5.4, allowing to analyse the evolution of risk perceptions, notions of justice (e.g., regarding distribution of costs of the water-smart solutions), as well as attitudes of key stakeholders and end-users (Figure 1).

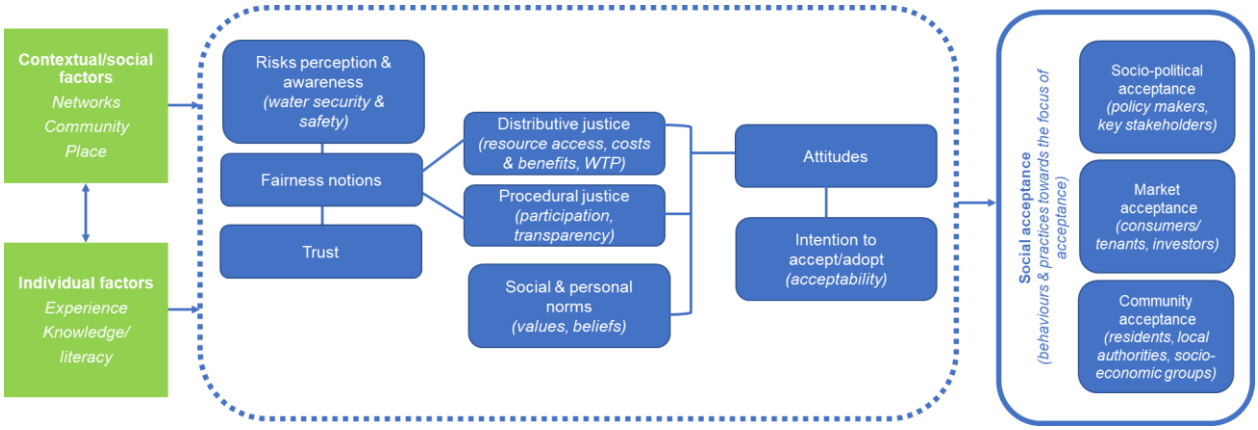

Figure 1 - Conceptual model for the assessment of acceptance in B-WaterSmart

(Gomes *et al*., 2023, adapted from Huijts *et al*., 2012; Wüstenhagen *et al*., 2007, Upham *et al*., 2015)

This report is the final output from Task 5.3. The approach to the task and the connected deliverables were co-created with the team members during the WP5 monthly meetings. A key challenge that we had to address is the fact that most LLs are not directly involved in WP5, so to ensure that we received appropriate feedback and validation from the LLs we created a 'task force' among the WP5 team members who could ensure this regular interaction and guarantee that the information provided by D5.7 is adequately contextualised, validated and useful for the implementation of the B-WaterSmart solutions. The methodology for this task was presented at the WP5 meeting of September 2022 and refined in subsequent meetings, as well as the survey design.

The plan for interaction and validation of the acceptance issues has also been discussed within WP1 and has been considered in the design of the CoP Roadmaps, with the calendar of meetings and focus groups. Besides dedicated work groups within the plenary CoP meetings, each LL has organised dedicated focus groups to discuss the acceptance issues of specific solutions (e.g., climate-ready certificates in Lisbon, water reuse in agriculture in Flanders) with policymakers and the most directly involved stakeholders and end-users.

The LL solutions (technologies and tools) considered for the purposes of this analysis of social acceptance are the same as agreed for D5.4 (with the WP5 and LL teams), ensuring the coherence and consistency of results. Only those that are most relevant, and which implementation and replication will likely raise more issues, were contemplated. This selection also benefited from previous work carried out to identify drivers and barriers to the implementation of the solutions, as well as socio-economic metrics for the Water-Smartness Assessment Framework (Task 5.2). The main documents for reference in this context are D5.2. – Socioeconomic metrics for the Water-Smartness Assessment Framework, D5.3 – Drivers and

Barriers for Water-Smart Solutions Across 6 Cases: Policy and Governance and D5.5. – Proposal for a new governance model, all available at the project website[1].

1.1. Survey methodology

The questionnaire (Annex I) was reviewed and translated by each LL, with the support of the WP5 team members from each country/region. It was circulated in online form through a professional academic account of Microsoft Forms (which ensures compliance with the EU regulation on data protection), through a link and a QR code (to allow completion through mobile phones). The link and code were circulated by each LL along the CoP reports, when reporting to the stakeholders on the CoP meeting results, as well as published on websites and events, when relevant (e.g., Venice survey at the project final event in July 2024). The respondents were selected from a purposive sample of CoP members who have participated in at least one meeting, with the possibility of forwarding to other stakeholders of the water sector (expert and snowball sampling) - 60 respondents from five LLs filled in the questionnaire between July and August 2024. The survey results were analysed using Excel.

The form is multilingual in order to allow the respondents to select their own language while still keeping the English version of the questions to allow for an integrated analysis by the WP5 team. There is a branch of common questions across the LLs, to allow for a comparative analysis, as well as some questions that are specific to only some LLs, considering their environmental and socio-economic context, as well as the solutions that were developed during B-WaterSmart. The LLs were given the opportunity to propose and adapt questions.

The common questions address cross-cutting topics such as water resilience and perceptions of water scarcity in the region and into the future. They include open questions that are meant to elicit the respondent's own notions of water resilience and water-smartness. In line with previous WP5 work on water governance, the survey seeks to collect the stakeholders' impressions of the main issues to be addressed in relation to governance scales, policy implementation, transparency and stakeholder engagement, among others (based on the principles of the Organisation for Economic Cooperation and Development for water governance, OECD, 2015). The sections on water reuse, water circularity and nature-based solutions were included for specific LLs and adapted to their circumstances (for more detailed information, see the questionnaire in Annex I).

In sum, this survey was designed in a way that it would collect useful insights across the work of the project, therefore this D5.7 report works as a 'take home' synthesis of key issues to be addressed over the near and medium term regarding socio-economic and policy aspects (D5.2; D5.3), but also governance issues (D5.5.), complemented by recommendations for policy and regulation (D5.6, submitted February 2024) and by four policy briefs that draw from the experience of the B-WaterSmart LLs and focus on the topics of water reuse, energy, large infrastructures, resources recovery and sludge (M48, August 2024).

[1] https://b-watersmart.eu//results-downloads/society-governance-policy/

For more detailed information of the LL interviews carried out in 2023, please refer to D5.4 (Gomes *et al*., 2023). The tables with the information from the CoPs are updated to include the most recent meetings. The previous information is kept, to allow for a complete understanding of the status of the discussions throughout the whole CoP process.

This version of D5.7 presents results from five LLs where the survey was circulated between June and July. In Flanders, it was not possible to carry out a survey of this nature, but the LL partners provided data from recent surveys on social acceptance and risk perceptions of water reuse that were previously analysed in D5.4 and are summarized in this report (chapter 2), along with the results from the CoP and stakeholder interviews.

Throughout the process of preparing D5.7, there was a constant interaction with the project Ethics Advisor, who reviewed the survey design prior to data collection. The report was also reviewed by the advisor, in order to ensure the data analysis respects ethics principles related to personal data collection, anonymisation and data interpretation. The content of the questions also reflects the ethical concerns of the project, in that we sought to assess the respondents' concerns with issues such as data privacy (especially regarding digital tools) or fairness in the distribution of costs related to implementation of water-smart solutions, as well as the concerns related to fair processes of participation in decision-making and trust-building.

The survey is anonymous and did not collect sensitive or personal data, such as gender or age group, as it was not considered relevant for this type of purposive sample (CoP stakeholders) and for the type of analysis undertaken. Considering the small sample of respondents and the probability of identification of specific persons by indicating sectors and typologies of institutions (e.g., of the national environment agency or main water utility), we included the option of 'prefer not to respond', following recommendations from the project Ethics Advisor, who revised the original survey.

The online form is preceded by an informed consent disclaimer in fulfilment of the EU data protection regulations. It details how the data are going to be used in this deliverable and other outputs of the project (including scientific papers), which has to be agreed upon in order to proceed to the questions. The survey was circulated by the LL teams to their CoP mailing lists and according to their informed consent procedures when constituting the CoPs, and therefore no personal data was shared with the WP5 team (who manages the survey forms). The only personal information collected from the survey is an optional email address at the end, only in the cases where the respondent desired to be contacted and informed of the study results. This is not directly linked with the responses, and it is extracted to a different list for the purposes of this later contact.

1.2. Key definitions: B-WaterSmart model of acceptance

The model for analysing social acceptance issues in B-WaterSmart was first proposed and discussed in the MS7 internal report "Assessment of social acceptance and behaviour towards water-smart solutions" (July 2021) and was further used in D5.4 (M36, August 2023) as the main framework for analysing acceptability issues regarding water-smart solutions produced within B-WaterSmart (Gomes *et al*., 2023).

Based on the review of the critical literature considering different disciplinary approaches and conceptual models, as well as on the review of the key acceptance issues raised by the B-WaterSmart LLs, this interdisciplinary model harmonises concepts from both environmental sociology and environmental psychology and provides an analytical background that can be easily applied by a wider audience within the B-WaterSmart consortium. This model is the overarching framework for the project, yet specific elements of the core (e.g., risk perceptions, willingness to pay or justice issues) are given a different emphasis depending on the type of water-smart solution under development within the specific context of each Living Lab.

The core of the model refers to the interconnected and reciprocal influence of various psychosocial concepts such as risk perception and awareness (e.g., towards water security and safety issues), notions of fairness and trust influencing both distributive and procedural justice, social and personal norms (as internationalisation of social norms) determining attitudes towards water-smart solutions and the intention to accept/adopt water solutions. The above-referred concepts consider the influence of contextual and individual factors (Upham *et al*., 2015) that will shape how involved actors perceive and act towards water-related challenges, policies, and technologies and are represented in the diagram as having a reciprocal influence between them (Figure 1).

Risk perception relates, in the light of the water challenges, to water security and safety, encompassing the awareness of water scarcity (or perception of abundance) and the impacts of climate change and extreme weather events, as well as concerns associated with the safety and health risks of reclaimed water and/or process water for different purposes (e.g., watering green areas vs agriculture irrigation vs drinking water). With the increase in digitalisation, also in the water sector, risk perceptions related to privacy concerns and data security are rising, for instance, reflected in the concerns about installing smart meters at private homes.

Regarding the analysis of fairness notions, two dimensions are considered: **distributive justice** and **procedural justice**. Distributive justice relates to issues of resource access, equity and distribution of costs and benefits, which ultimately (coupled with social variables such as income) influence the willingness to pay (WTP) for technological innovation or an increased tariff. Procedural justice concerns how a decision-making process is conducted based on community engagement principles (recognition, respect, and equity) and how fair social actors consider the process has been, namely, the degree of consultation of all interested parties and what degree of influence they effectively have in the decisions and how transparent was the whole process (e.g., perceived procedural bias).

Trust is a key element of the OECD principles for water governance, where it is associated to an inclusive stakeholder engagement, transparency and accountability, also deemed essential to managing trade-offs between water users (Akhmouch *et al.*, 2018). Institutional trust in water management organisations has proved critical for risk perceptions over water quality and the acceptance of operations such as water reuse schemes (Smith *et al.*, 2018). In this context, trust can entail how companies will manage the information provided by smart meters, or public confidence that water managers will follow sound safety protocols and protect public health.

Accurate information and honest communication with stakeholders encourage shared responsibility and learning in face of environmental challenges such as climate change and water scarcity. The willingness to share power and accountability through mechanisms of co-

creation of solutions, such as the Communities of Practice, will ultimately build trust and ownership, towards a more inclusive, fair and adaptive governance.

Attitudes towards water-smart innovations, i.e., evaluative judgements towards new technologies, will arise as an outcome of risk perceptions, fairness notions, social and personal norms (including personal values and beliefs influenced by social norms), consequently, lead to an intention to adopt a given technology (when it requires an active decision, a purchase, etc.). The intention is an expression of acceptability (or lack thereof) that may lead to an effective behaviour of opposition or adoption.

Finally, the model considers three types of social acceptance: **socio-political, market and community acceptance**. Socio-political acceptance is social acceptance on the broadest level concerning the acceptance by key stakeholders and policy actors of effective policies. Community acceptance refers to the specific acceptance by local stakeholders, citizens, and local authorities. A particular feature of community acceptance is the time dimension, interfering with the acceptability of new technology, as demonstrated by empirical research on the acceptance of renewable energy projects. More prolonged exposure to technology may, among other factors, improve knowledge of its operation, impacts and benefits. The time factor may increase acceptance of innovation or, on the contrary, lead to a stronger rejection. In any case, it is a crucial variable to consider when planning a project and its communication with stakeholders and the community. The last level of acceptance refers to market acceptance, or the process of market adoption of a given innovation (technological or not) and focuses on consumers/clients and investors (Wüstenhagen *et al*., 2007).

Different actor groups will have to be consulted when implementing and replicating B-WaterSmart solutions: policymakers, local authorities, key stakeholders, end-users of each solution, and the broader public. It is important to note that CoP discussions, composed of key stakeholders, often refer to issues of **community acceptance,** i.e., some of the insights shared in this report, particularly in the qualitative assessment (section 2), derive from how the stakeholders perceive the attitudes of consumers and citizens at large (from CoPs and interviews). The survey in section 3 focuses on stakeholders, while also including issues that are relevant for community acceptance. The survey conducted in Bodø (section 4) is herein featured as a case study and is focused on community acceptance.

In B-WaterSmart, **socio-political acceptance** (including by national and regional institutions, such as regulators and environment agencies) has also been addressed through specific focus groups in the CoPs and other ongoing work under WP5: D5.5. – Proposal for a new governance model (submitted M36, August 2023); D5.6 - Guidelines and recommendations for regulation and policy instruments (submitted M40, February 2024) and D5.8 – report and set of policy briefs for different topics and target groups; and focus groups with policymakers within CoPs. **Market acceptance** was assessed through T7.3 - Exploitation and route to market.

Social inclusiveness, across the three spheres mentioned above, will enhance transparency and trust, thus improving acceptability of water-related policies and innovation.

2. Qualitative assessment: insights from the CoPs

This is a summary of the key issues related to social acceptance that were discussed among stakeholders of B-WaterSmart at the CoP meetings, updated with CoP reports M36 to M48, according to three dimensions of the B-WaterSmart acceptance model: risk perceptions, trust and justice, and attitudes towards water-smart solutions (table 1, updated in July 2024).

Table 1 - Summary of key issues raised at the CoP meetings

Alicante			
Solution/topic	**Target publics**	**Concept**	**Insights from CoPs and interviews**
Energy recovery from sewage treatment plant effluents and organic waste through co-digestion. Recovery of nutrients from the sludge line to produce fertilizers. Production of disinfectants from brine from the regeneration of reclaimed water.	1st CoP: NGOs, Local administration, Professional associations; Environmental experts, Regional Administration, Academics; Agriculture representatives, Industry associations. 2nd CoP: Agriculture representatives, Authorities, Industry, Research, Utilities, NGOs, Associations 3rd CoP 4th CoP Water end-users, academia, engineering companies	Risk perceptions	Lack of public participation and awareness was found to be a relevant issue. Many sectors of society were not fully concerned with the value of water and a reliable water supply and management at low cost was always taken for granted. Environmental experts highlighted the lack of knowledge of the costs of no-action and the need to quantify the environmental value of water. Lack of awareness regarding water reuse in Alicante is highlighted as a problem, indicating the need for improved communication and public information on this topic. Risk perception gap and a growing belief that technology alone can solve water scarcity; Government institutions and media are recognized as vital in promoting adaptation through reclaimed water, green areas and climate shelters (municipalities) (interviews)
		Trust and justice	To ensure fair water management “water price should take into account its availability" and there should be (encouraging) legislation, economic incentives, and financial support, especially for small projects or initiatives. There is a need for involving local development agencies.

			For the agriculture and industry sectors, lack of funding may be a barrier in addressing water scarcity. Integrated analysis of affordability (distributive justice): The energy cost associated with water consumption, particularly for heating, may be a more relevant incentive for the population than the monetary cost of water itself. Need to address necessities of people in vulnerable situations (social commitment) (6th CoP) Mistrust regarding the composition of reclaimed water and apprehensions about solid waste. Distributive justice: Large consumers and administration, not citizens, should bear the additional costs of water-smart solutions. (interviews)
		Attitudes	General positive attitude and very high interest especially towards increasing the use of reclaimed water. Some scepticism among the representatives from agriculture and industry due to financial and legislative barriers. Importance of implementing technical, legal, economic, and awareness measures to encourage water conservation and reuse, as well as the need for enhanced communication and public education on this issue. Implementing incentives, such as providing additional water for every cubic meter saved, can encourage water conservation and discourage excessive usage. (4th CoP) Scepticism persists in the agricultural sector regarding the quality of reclaimed water, as it's perceived to have less quality compared to drinking water. On the other hand, the industrial sector may show greater inclination towards acceptance; financial incentives could foster greater receptivity.

Bodø			
Smart meters	Households/ consumers	Risk perceptions	Sense of urgency regarding water scarcity is low, due to abundance of resources
		Trust & justice	Trust in water authorities generally high (especially relevant for smart meters); more accurate measure of water consumption could lead to lower water fees for households that use less water than what is the norm (based on size in m3) today.
		Attitudes	Concerns with privacy need to be considered; a dedicated work on this has been carried out by Bodo municipality through a household survey (results in section 4)
NBS/stormwater management	(CoP 03/22; CoP 05/23) Property developers (CoP 06/24) Engineering companies Authorities	Risk perceptions	There does not seem to be a sense of urgency concerning stormwater and how NBS could be part of the solution for handling stormwater.
		Trust & justice	Concerns over how the extra costs of NBS will be covered and where lies the responsibility for implementing them on private/public land; Building developers say they have experienced that it costs too much, and they cannot afford/want to maintain green areas due to lack of finances/resources; potential challenges related to justice between small and large developers, if the small ones are burdened by additional costs for NBS.
		Attitudes	Public awareness on NBS is low, among property developers is varied. CoP4 (June24) made a significant contribution to build capacity on stormwater management by presenting stormwater mapping of surface waters - blue-green and white) factor – as a strategy for better integration of NBS into development projects and planning.
East Frisia			
#6: Increase water reuse in the dairy industry through combined treatment of vapour condensate (cow water)	Dairy industry Agriculture (Interviews)	Risk perceptions	There might be potential negative perceptions about the use of treated process water in the food industry that need to be addressed with maximum clarity and transparency.
		Trust & justice	Trust in the relevant actors and organisations will be crucial for acceptance. The sector from which the pioneer companies for such solutions come will also play a role here. The dairy industry surely has a more positive image than other food industry sectors. This is a bonus. Transparency of the approval processes

			and involvement of all relevant authorities and stakeholders is important.
		Attitudes	<u>Particularly supportive stakeholders</u> Environmentally educated citizens: Citizens with a strong environmental awareness and sensitivity to sustainability approaches are generally open to such a solution. People with a high affinity to technology and a high level of environmental awareness <u>Particularly critical stakeholders</u> Technology-critical and general sceptics Rather technology-critical persons or people with fundamental scepticism and general concerns about the quality of drinking water.
#28 Short-Term Demand Forecasting Tool (STDFT), based on the use of smart meter data.	County Research inst. Water sector (Interviews)	Risk perceptions	Economic risk: perceived economic / financial disadvantages for the consumer through a potential new price structure or cost model Privacy: Consumers are averse to being transparent and put into a situation where they might need to justify their consumption patterns and habits.
		Trust & justice	A perceived decreasing trust in state actors and "official" institutions The sense of justice and the sense of meaningfulness and effectiveness of individual action must be strengthened, by sharing costs and responsibility fairly. There is a discrepancy in water abstraction rights attributed versus real consumption based on a lack of data for all water abstractions.
		Attitudes	Awareness of water as an increasingly scarce commodity is increasing among the population. There are also voices that the price of water is still too low.
Flanders			
Potential effluent reuse for drinking water (#3)	Policymakers and regulators; Households & citizens; Research institutes CoP 1-2: practical lessons (knowledge, technology, infrastructure and business models) to accelerate and scale up circular and smart water use	Risk perceptions	The work required to obtain a permit is quite extensive, even for small pilots and demonstration of technologies at a very small scale. Not everyone (on different levels e.g., households) is willing to take responsibility regarding water supply (drinking water, rainwater use…). The right quality for the right application is required. Regulations are based on price; it would be better to base them on risk. Impact on ecosystem services.

	CoP 3 addressed the decoupling of the human water chain (householders) and the water systems		Need for a clear research and innovation agenda. There is a lot of confidence towards drinking water companies to delivery drinking water with a good quality even when using effluent as source. It would be valuable to involve citizens at an early stage when implementing blue-green solutions, in order to identify and address eventual disadvantages (stakeholder interviews).
		Trust & justice	Liberalisation of the water market is necessary to become less dependent on the major players[2] Effluent reuse should only be for local stakeholders. We should move away from a first come first serve principle, a masterplan is needed. Plan for prioritization is needed. Role of funding: should infrastructure projects always be funded, if the business model is already solid? Shouldn't we reserve the funding for umbrella organisations, knowledge institutes, safeguarding social importance, innovation…
		Attitudes	Low awareness about water treatment costs may act as a barrier to the implementation of treatment solutions. Initiatives with citizen participation are difficult to set-up, due to lack of interest. Based on a survey from 2022, findings show varying degree of acceptability depending on the type of water. Research has been carried out, however, showing that the behaviour of stakeholders' changes when a solution is implemented. Nevertheless, the philosophy of large consumers should be that investments in greater water availability will in the long run yield more than losses incurred in a crisis situation if no investments are made. Initiatives with citizen participation are difficult to set-up, due to lack of interest.

[2] In Flanders, the ministry is taking actions to narrow down the number of drinking water companies. This remark reflects the opinion of one of the attendees of the CoP meeting and does not imply a consensus on this matter among LL or CoP members.

Stormwater reuse for agriculture (#5)	Policymakers and regulators; Farmers; Farmers associations/organisations; Research institutes CoP4 (Nov23)	Risk perceptions	While stormwater is not considered 'reclaimed water', there will be a need to better define how it should be managed at regional level. A treatment before infiltration may be necessary. It is still to be determined who should carry the cost for such improved solutions. Impact on ecosystem services. Effluent reuse for agriculture is seen as difficult regarding quality. Environmentalists and/or environmental organisations are therefore cautious. They are keen on using effluent to replenish wetlands and return nature to function the way it should but want to ensure that it is of the right quality so as not to exacerbate existing issues like PFAS contamination. (interviews)
		Trust & justice	Mechelen pilot: Building trust with the local farmers as well as citizens who live close to the site where the stormwater basis will be built is very important; Water infiltration will take place on their fields, therefore underpinned information about benefits and/or risks is needed to gain trust. (CoP meetings) With new technologies, farmers need to be able to trust that these technologies will not affect crop yields. Demonstrating the new solutions through a pilot offers farmers the possibility to see the technologies work in practice, the benefits and how to replicate/expand them (stakeholder interviews) With regards to water availability, there is a need for international agreements on water flow across borders, particularly for the Southwest region, where inflow of surface water is important. Cooperation in cooperatives seems a good idea, for citizens to engage and reap the benefits (co-creation). The economic justice of compensating those who provide the effluent and the responsibility for ensuring the quality of the final water product are important consideration; the solutions will work if the farmers are still in control and the costs are reasonable for them (stakeholder interviews).
		Attitudes	Better outlook for nature-based solutions because they add value to the landscape and may even have a recreational value. As such, they may be more easily accepted by citizens than the classic grey infrastructure Which may not look nice (stakeholder interviews).

Lisbon			
	CoP 3 (May 2023) National & local authorities (e.g., environment), regulators, NGOs; local associations CoP 4 (May 2024) Follower municipalities in Lisbon Metropolitan Area (AML)	Risk perceptions	The closer the contact with reclaimed water, the lower the acceptance of its use (confirmed by recent surveys e.g., Águas de Portugal, 2021). In the Lisbon metropolitan area there is still a low sense of urgency in relation to water scarcity, due to high levels of supply coverage, available water sources (surface and groundwater) and varying regional conditions (recurrent droughts have especially hit the Southern regions of the country). At national level, risk perceptions have been changing due to recent drought episodes and the challenges brought about by the effects of climate change.
		Trust and justice	Water Transparency Indexes have revealed that for Portugal trust in public institutions has not improved over the last few years Trust between institutions, more collaboration is required; limited experience in water reuse and the lack of a consolidated market Costs associated with reuse are a significant concern among stakeholders in CoPs and the interviewees. Future business models will have to ensure a fair distribution of costs and benefits.
		Attitudes	A barrier that still exists is the willingness to pay for this use. The willingness to pay for reuse is still low among household consumers and it has not been tested; Also, companies and water utilities will need to regard their future investment in reuse as economically viable
Venice			
Industrial Effluent Reuse (Solution #4) General Water Reuse and effluent valorisation (Solution #16)	Industry (end-users)	Risk perceptions	Risk perceived by industrial end-users, i.e. the main target group, particularly regarding the quality of recycled water, for several parameters related to the use of water, with particular emphasis on microbiological characteristics.
		Trust and justice	Theoretical positive acceptance of a (potential) market (though a real market is difficult to be seen) - provided that roles and responsibilities and cost coverage are identified correctly and in time.
		Attitudes	There is a high sensitivity on applying reuse and recovery practices of water and related resources; Awareness among the industrial end-users is needed to save freshwater.

Sludge Valorisation (Solution #19)	Farmers (end-users)	Risk perceptions	Regardless of the causes, the main risks perceived relates to the quality implications of this product.
		Trust and justice	A low trust by a part of governance on transparency and traceability of sewage sludge management was found; this is under resolution thanks the strategic DSS for sludge valorisation, in developing phase.
		Attitudes	Awareness of need to valorise sludge towards the most appropriate direction - some disturbed perception however on quality and risks. Apart from that, no issues related to notion fairness. all stakeholders agree on the economical convenience of this solution (also for the market).

2.2 Key insights from the qualitative assessment

This section summarises how the acceptance issues identified in previous CoPs, internal assessments (MS7, MS18) and deliverables (D5.4) have been addressed with stakeholders to co-create fair and sustainable approaches. The CoPs have been instrumental to overcome governance hurdles, increase transparency and brainstorm how to manage emergent products, services, and concepts (such as nature-based solutions), often resulting in proposals to adapt legislation, regulation and funding arrangements.

The CoP meetings were organised so as to strategically involve different target groups to discuss specific solutions at different stages of B-WaterSmart, according to a roadmap defined within WP1 early in the project. In addition, focus group meetings were held with smaller groups of experts and stakeholders to address sub-topics in between meetings (e.g., access to data for the digital tools, policy and regulation meetings with policymakers).

The regular engagement with the target public identified in the acceptance analytical model - key stakeholders from industry, agriculture, land planning and development, among others - allowed to prepare pathways for better knowledge, transparency and accountability around the implementation of water-smart solutions and, therefore, for their acceptability.

2.1.1. Risk perceptions

One of the key solutions developed through B-WaterSmart is **reclaiming water** from wastewater treatment plants (WWTP) or industrial process water for reuse for both potable and non-potable uses. Concerns with **water quality** and eventual health risks certainly play a role as a barrier in public perception (e.g., treated process water in LL East Frisia). The perception of reclaimed water as ‘waste’ may constitute a barrier to acceptability for use in the food chain, as people tend to associate processed water with a waste product, in particular if the origin, treatment and safety measures are not properly explained (mentioned by communication stakeholders at the Lisbon CoP). The public perception of using effluent in food and beverage production is a potential barrier/concern (also relevant for Flanders). Nevertheless, landmark products such as the Vira beer (made with reclaimed water) can have a positive marketing impact on a wider acceptance of water reuse among younger groups (Lisbon), as was proposed at one of the most recent Lisbon CoP meetings focused on social acceptance and governance (May 2023). It has

also been mentioned that renaming WWTPs as ‘Water Factories’ intends to have a positive impact on how wastewater treatment is perceived in the context of a circular economy.

Survey data gathered from 300 respondents living in Flanders showed that feelings of disgust and fear of contamination are key drivers of consumer resistance to water reuse and potentially override environmental concern (Verhoest *et al*., 2022). However, perceptions of **water scarcity** highly influence the receptivity of alternative water sources. One survey conducted by Vlakwa in 2022, in Flanders, grouped respondents according to ‘low risk’ and ‘high risk’ perceptions of water scarcity and indicated that this latter group – more likely to be younger women with higher education levels - show higher acceptance of adopting rainwater and especially recycled greywater for certain activities at home (mostly non-potable uses). This characterisation is consistent with the profile of the climate-aware citizens who are more likely to adopt pro-environmental behaviours in recent population surveys in other LL countries, such as Portugal (Schmidt *et al*., 2022; Águas de Portugal, 2021).

Historically, the areas with more abundant water resources have been less concerned with measuring water consumption (e.g., Bodø). Still, future challenges may shift the water management paradigm in urban areas, especially as new estate developments prop up. Even in Southern Europe, historically most affected by recurrent droughts and threatened by water scarcity, there is still a low awareness among the public regarding the urgency of the water challenges in regions with more abundant resources, although this perception is gradually shifting, as more recurrent and severe droughts hit across the country over the last few years. Water has ranked among the main concerns of citizens in recent population surveys (Schmidt *et al*., 2022).

One of the key insights from debates within the CoPs and interviews across many LLs is that there is generally a low literacy among the public on the water challenges and the water cycle, which is key for community acceptance of innovative solutions. Other risks related to the impacts of climate change on the water cycle are still poorly understood by citizens, which may impact the willingness to invest in more sophisticated solutions. Floods and heavy rains have become more frequent and intense, requiring a reorganisation of the water management system, including storage capacity in cities. NBS for stormwater management are also an emergent reality for stakeholders, which has been addressed mostly in the Bodø and Flanders cases.

In addition to contributions collected from the CoPs, the LL interviewees have highlighted the importance of carrying out visual experiments and informative events to raise water **awareness and literacy**, promoting a ‘circular’ culture of reuse (especially relevant for farmers in Alicante). Active community participation and word of mouth were identified as effective ways to influence public acceptance. Government institutions and the media were deemed important for promoting and ensuring the acceptance of reclaimed water through campaigns and safety controls.

Municipalities play a crucial role in promoting green spaces for adaptation (e.g., cooling and carbon sequestration). Education, especially in schools, was highlighted as an essential pillar, emphasising practical learning through experiments and small pilots (Alicante and Lisbon CoPs), as well as involving property managers in decision-making.

2.1.2. Notions of justice

Justice notions become evident in stakeholder discussions, most notably regarding **cost distribution** (distribute justice) and possible **new sources of financing** for new products and services of the water circular economy.

This dimension relates mostly to the acceptance of end-users (stakeholders in industry and agriculture), as some key water-smart solutions require a new scheme for water management, namely the construction of new infrastructures for the provision of alternative sources of water (reclaimed water) that will imply additional costs. While this will likely be ensured by public funding at an early stage (e.g., the new reclaimed water networks in Lisbon), over the next few years, there will be the need for a co-responsibility and share of costs-benefits across key sectors, including industries and agriculture. In stormwater management schemes, for instance, it is possible that farmers closer to water storage locations may benefit more from easier access (relevant for LL Flanders), which may raise issues of distributive justice, as well as trade-offs between users, that should be carefully assessed.

It is necessary to discuss how industries with high water consumption could invest in their own reuse systems or water innovative solutions, which is mostly relevant for LLs Alicante and Lisbon. Transport and infrastructure costs are the main issues at stake for implementing circularity of water reuse in agriculture and rural areas (e.g., replication in Lisbon Metropolitan Area or peripheral areas of Alicante). The Lisbon CoP addressed these concerns by focusing CoP3 (May 2023) on social acceptance and governance and CoP4 (May 2024) on the conditions to replicate water-smart solutions at the metropolitan level (17 follower municipalities) and beyond B-WaterSmart.

Furthermore, future water challenges will push for **smart metering** and demand forecasting, such as the tools under development in East Frisia LL (#28), which may affect not only economic sectors but also citizens. Smart metering may influence **water tariffs**, especially when these new tools imply a new system for measuring consumption, such as in Bodø (instead of based on building area). The eventual impact in water bills needs to be communicated carefully and with full transparency. The survey conducted by LL Bodø in preparation for the installation of smart-meters (analysed in chapter 4 of this report) is an example of how the B-WaterSmart LLs approached the challenge of improving the **community acceptance** of water-smart solutions.

Also, water tariffs should be adjusted taking into consideration the increase in the cost of life overall, especially for the most vulnerable groups in society (such as low-income households and larger families). Even if water tariffs are generally low in our LL countries and are not considered a critical issue, they still have to be accounted for within household expenses. A deeper understanding of how water is used across sectors (industry, agriculture) is also paramount for a greater sense of fairness and justice among citizens.

Regarding **willingness to pay**, given the present economic situation there is not much scope to increase tariffs among household consumers. There might be the need to create special tariffs or use restrictions for non-potable uses in drought-prone areas (applicable to all LLs except Bodø). Efforts should be put in to ensure clear frameworks for water distribution and pricing to avoid unfair access across stakeholders, especially citizens.

New products, services and emerging concepts will require capacity-building and new sources of funding, as well as new governance models. The Bodø Living Lab adapted the focus of the CoPs by integrating the debate on nature-based solutions for stormwater management. As this LL is working in a new development area (from where the airport was displaced), the discussion on how to integrate nature-based solutions into the urban water cycle cropped up. A key topic that emerged from the CoP meetings is the concern among building developers that the costs of new blue-green infrastructures will be too high to maintain on private developments. There could be potential challenges related to justice between small and large developers if the smaller ones are burdened by additional costs for NBS.

2.1.3. Trust

Trust in institutions in the water sector varies across countries and has been mentioned as a potential barrier to be taken into account (e.g. in LL Lisbon), as trust in water treatment systems mediates the acceptability of reclaimed water. Transparent digital platforms that convey regular information, as well as risk management tools that have been developed by the LLs address these concerns.

The adoption of the EU Regulation on Data Protection (GDPR) has brought to the fore consumer concerns with **data privacy**, which have been mentioned e.g., in LL East Frisia. At the same time, the installation of smart meters has become widespread to monitor consumption and avoid water waste. It is fundamental to convey how the consumer gains control over their consumption, by having access to more precise monitoring, but also how greater security of supply and monitoring ultimately benefits society as a whole.

This reasoning is also relevant for the Lisbon climate-ready certificates, as they require regular audits and the voluntary adhesion of households and companies, possibly supported in the near future by ever more precise smart meters. Privacy concerns might hinder the installation of smart meters for water consumption in private households, however this does not amount to a critical risk for the implementation of these solutions in the B-WaterSmart LLs.

Improving **communication** and awareness-raising across the water cycle is crucial - involving all relevant stakeholders, including, for example, industries, water sector stakeholders, etc. - also on the impacts of climate change on the precipitation patterns and increased intensity of extreme events. There is still an urgent need for a broader understanding, among stakeholders as well as citizens, of the phenomena of climate change vs climate variability, e.g., recurrent and severe droughts vs the cumulative effects on water scarcity over years and decades. This long-term view is crucial for policymakers, water utilities and authorities to be able to plan ahead.

There is now a higher awareness of risks and possible crises among the population than, for instance, a decade ago (Lisbon, East Frisia). Generally, support can be expected by those who have directly experienced water scarcity or water shortage situations and public calls to save water (e.g., garden watering bans) or who work in particularly water-intensive sectors where conflicts of use are also present (e.g., agriculture). Environmental protection organisations are also expected to be supportive of this sort of technology.

In Flanders, where a new governance model for stormwater reuse is being created with farmers (pilot Mechelen), many are sympathetic to the project to do something for farmers because there

is quite a feeling at the moment in Belgium that farmers always have paid a heavy burden for ensuring adequate food supply with sustainability requirements, and probably more so after the farmer protests that influenced the postponement of the water resilience strategy by the European Commission. Yet, there are potential conflicts due to the limited availability of space in the region and the conflicting interests between nature conservation (ensuring sufficient water flow in waterways for ecological purposes) and agricultural needs as droughts become more frequent and intense.

The following chapter discusses the results of the quantitative assessment carried out among the CoP stakeholders through a detailed survey that incorporates the key issues identified over the four years of the B-WaterSmart project. It is divided into sections according to the sections of the questionnaire, which can be consulted in full at the end of this report (Annex I).

3. Quantitative assessment: LL stakeholder survey

The stakeholder survey was carried out as part of Task 5.3, with the objective of collecting a wide range of views from stakeholders of different socio-economic sectors on water resilience, the impacts of climate change, issues of water governance and others that might hinder or drive the implementation and replication of water-smart solutions, with a special focus on water reuse, circularity and nature-based solutions, the latter in the context of stormwater management.

The design of the survey took into consideration the specific context of each LL, as well as the solutions they developed, and was therefore adapted and validated by each LL team (owner and mentor, with the support of a WP5 team member). The type of questions is diverse in that we sought to balance multiple-choice questions, allowing for faster responses, with open questions that give the respondent the opportunity to make a pondered reflection and express their thoughts freely. Throughout the questionnaire, there are multiple opportunities for providing additional comments, but these are optional, as it was very important to avoid overburdening the respondents. As always in a survey, there has been a careful balance between collecting responses on a wider range of subjects, to maximize the useful information for the project, while ensuring a reasonable response rate. Tables 2 and 3 show sectors and institutions represented.

The survey is composed of a common branch of three sections (water scarcity; water resilience; water-smart society), with cross-cutting responses from four LLs and three additional sections that were adapted and applied to only some of the LLs (water reuse, circularity and nature-based solutions). Sixty responses were collected between from the surveys applied in Alicante (12), Bodø (14), East Frisia (10), Lisbon (10) and Venice (14). While not a strictly representative sample, these responses allow to identify insights and trends that should be taken into account when implementing and replicating water-smart solutions over the near and medium term.

Table 2 - Share of survey respondents by typology of institution[3]

Institution	Percentage per Institution (%)
Municipality	30%
Water utility	27%
Company	17%
National government authority	7%
University	5%
Non-governmental organisation	3%
Professional association	3%
Central and Regional administration	3%
Local association	2%
Regulator agency	2%
Prefer not to respond	2%
Total	100%

[3] Options of responses provided in the questionnaire on Annex I

Table 3 - Survey respondents by typology of sector[4]

Sector	Percentage (%) per sector
Water management	53%
Other industries	13%
Land use and planning	12%
Education	5%
Agriculture	3%
Energy	3%
Health	3%
Urban planning	3%
Food industry	2%
Other	2%

3.1. Risk perceptions

3.1.1. Water scarcity and resilience

The first sections of the survey aimed at assessing the perceptions of the B-WaterSmart stakeholders on the **risk of future scarcity in their respective territories in the horizon of 2030**, as well as their notions of water resilience (open question). For scarcity, a definition was provided above the question, which was based on a 6-point Likert Scale.

> *Definition: Water scarcity refers to the lack of water resources to meet demand in a given territory. It intensifies as demand increases and/or as water supply is affected by decreasing quantity or quality.*

The responses to this question highlight the contrast between the environmental conditions and the perceptions of abundance of water resources among the LL. In Alicante, the majority of respondents consider a high or very high risk of water scarcity worsening up to 2030, while in Bodø, it is exactly the opposite, the majority do not believe this risk will be significant over the medium term. This is in line with the results from the CoP meeting discussions, as well as the interviews carried out in this LLs. In Venice and East Frisia, the responses are more located around the midpoint of the scale, with half of the respondents in Venice still concerned with a high or very high risk of water scarcity in their territories (Figure 2).

[4] Options of responses provided in the questionnaire on Annex I. Besides the first option, some respondents added an additional sector in response to the question “Other? Which?”

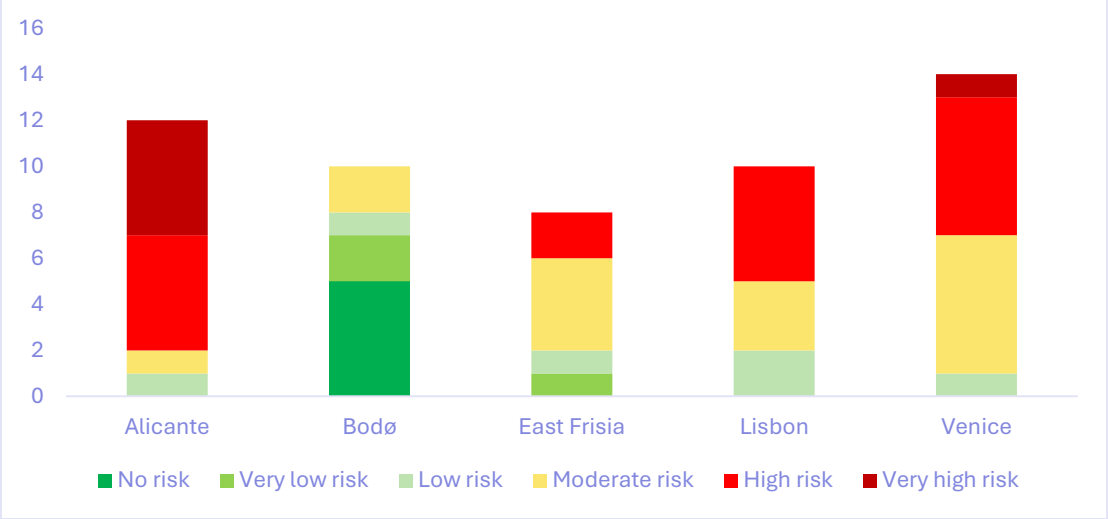

Figure 2 - Perceptions of water scarcity in the LLs

Regarding water resilience, the concept has emerged as a key focus of EU water policy in recent years, in the context of implementing the Green Deal (2019) and an integrated water strategy as part of a future 'ambitious Blue Deal'. At this stage, the team wanted to elicit open responses that could spontaneously reflect the current challenges and understandings of water issues across the LLs, and therefore, we purposefully did not provide a definition for this concept.

What does water resilience mean to you in the current context of your region?
[open question]

The responses to the 'water resilience' question in **East Frisia** reflect a balanced concern with the impacts of extreme events, both droughts and floods, through integrated approaches to managing demand and stormwater run-off, with adequate retention of water resources in the landscape and water reuse, with benefits for agriculture.

> "*For me, water resilience means that the region can (intelligently) manage its water resources in the event of too little or too much precipitation in such a way that demand is met for all users (people and the environment) and there is still sufficient capacity for higher demand" (*Statement in survey East Frisia*).*

While water pollution has been mentioned as a priority concern for the future EU water strategy, only one respondent refers to water quality and risks of contamination, as well as to adaptation and transformation, with the need to "adapt to changing conditions in the medium to long term". The notion that resilience implies adaptation was a clear tendency in **Alicante** LL. Many respondents referred to the 'need to adapt' to the impacts of climate change, especially recurrent droughts, and manage the variability in the availability of water resources, as most present among the responses of Alicante. It was also in this LL that terms

of ‘fairness’ and ‘society’ appeared in connection to water resilience as a ‘lasting solution for the future’.

Notoriously, in **Bodø,** the concern with the state of the water supply network is more present in the context of water resilience. Also, the respondents show a particular concern with the security of water supply and risks of contamination in case of extreme events such as floods, connecting climate risks with the need to manage an intensified water cycle through stormwater management. The notion of resilience as adaptation is also very prevalent, but governance issues are raised, such as the need for a stronger collaboration between “*different actors in water management, including municipalities, counties, and relevant organisations to share knowledge and resources*” as well as solid contingency plans.

Lack of literacy on water services among citizens might create problems in the near future, according to another respondent.

> *“There is also little citizen involvement, and knowledge in the population about the state of the pipeline network. This lack of knowledge will probably create dissatisfaction when one does not understand the background for increasing taxes in households in the future to make up for the maintenance backlog.” (*Statement from Bodø survey*)*

For **Lisbon**, water resilience is also associated with managing the urban water cycle in a more efficient manner. There is an emphasis on water scarcity as a key issue that needs to be prevented to ensure the availability of water resources for all sectors and uses over the long-term. In the case of Lisbon, there is also a concern with water pollution and ecosystems health. One respondent states that water resilience should lead “to return water with the least possible pollution to the water environment, thus allowing water to be made available for safe indirect reuse in agriculture, preserving water resources, river and maritime beaches and thus enhance reuse in industry and agriculture”.
The need for a ‘holistic governance’ is also associated with the notion of water resilience in **Venice LL,** which “goes beyond sectoral compartments (drinking, irrigation, meteorology) and knows how to identify the priorities for intervention, highlighting the benefits and synergies that arise”, ensuring adaptation to climate impacts, the ‘ability of a system to withstand external stress factors’, and availability of water in both aquifers and surface water bodies.

After reflecting on what water resilience means to them and in the context of their regions, the respondents are then asked to select interventions from a list of five options by ordering them in terms of priority (Figure 3). Consistent with previous responses, results give prominence to managing extreme events, especially floods and storms (prevalent for Bodø) and water scarcity through water reuse (prevalent for Alicante).

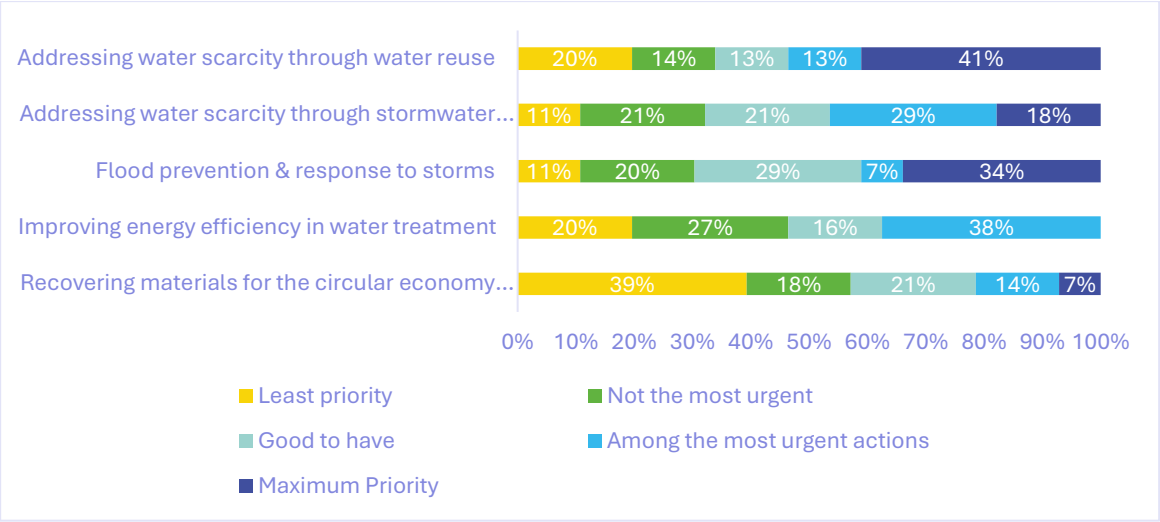

Figure 3 - Implementations ranked by order of priority

3.2. Water-smart society

The following section of the survey addressed the notions of respondents towards a 'water-smart society', using the B-WaterSmart definition, which orientated the strategic objectives and agenda of the LLs (D6.1) as a starting point.

> *"Societies are water-smart when they generate societal well-being via sustainable management of water resources. In water-smart societies, well-informed citizens and actors across sectors engage in continuous co-learning and innovation to develop an efficient, effective, equitable and safe circular use of water and the related resources. This is achieved by adopting a long-term perspective to ensure water for all relevant uses, to safeguard ecosystems and their services to society, to boost value creation around water, while anticipating change towards resilient infrastructure."*

Within this section, the survey addresses gaps and challenges of water governance, in complement of the work developed in D5.3 and especially D5.5, taking this opportunity to collect the stakeholders' impressions on these dimensions, in addition to previous interviews and focus groups organised in the context of the CoPs. The same section covers the dimensions of knowledge (sources of information) and intention to adopt water-smart solutions in the near future (over the next five years), as well as an additional question on water tariffs.

Questions concerning governance were organised around the key principles of water governance of the OECD (2015, adapted). In their responses, stakeholders highlight the 'trade-offs between sectors with competing demands', the need for 'data and monitoring on the use of water resources' and 'financing and affordability' as the most critical issues to address, which are well aligned with the water-smart solutions developed in the project (Figure 4), e.g., digital tools for decision support and demand management, as well as the prevalent concern with the financing conditions of water-smart solutions into the future. The concern with communication between institutions is related to intersectoral integration, which has also been noted as the Achilles heel of water governance.

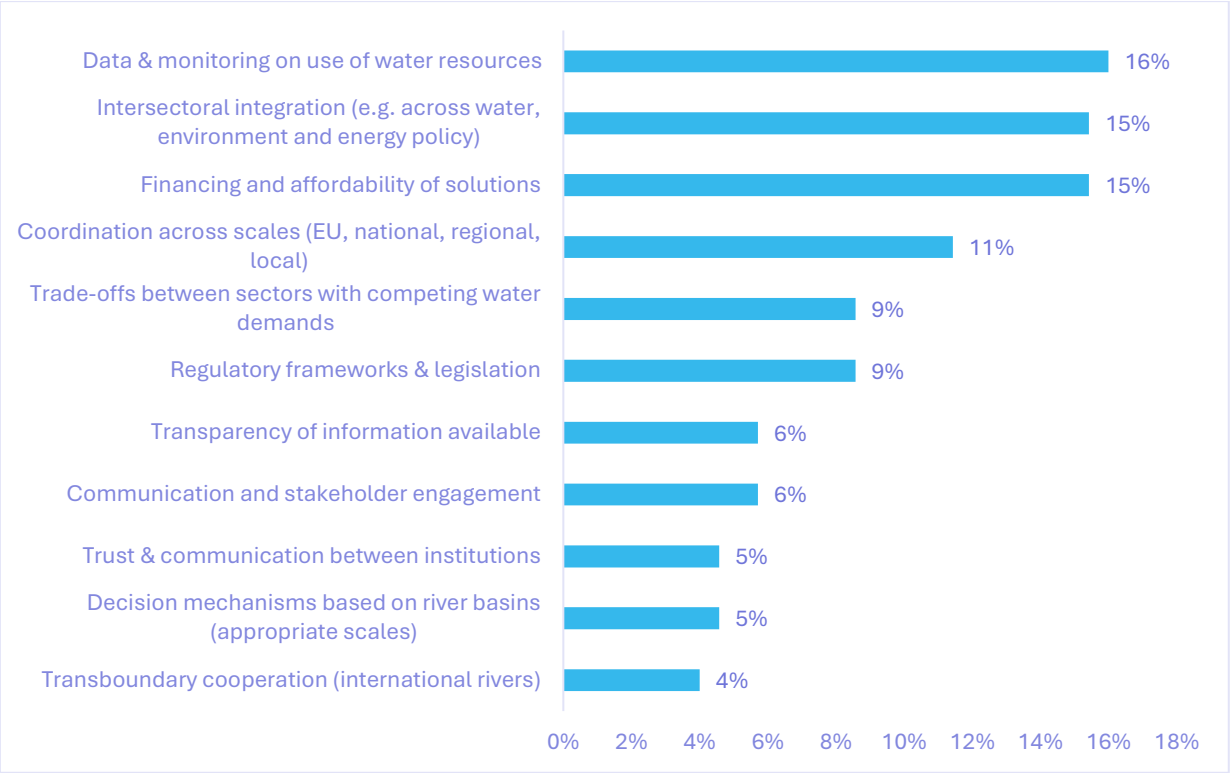

Figure 4 - Water governance's most critical challenges across the LLs

In this section, there is one question that only three LLs opted to include: what is the impact of the implementation of water-smart solutions on water tariffs? We present here the responses, which show that it is in Alicante and Venice LLs where the more stakeholders agree that tariffs will be impacted (Figure 5).

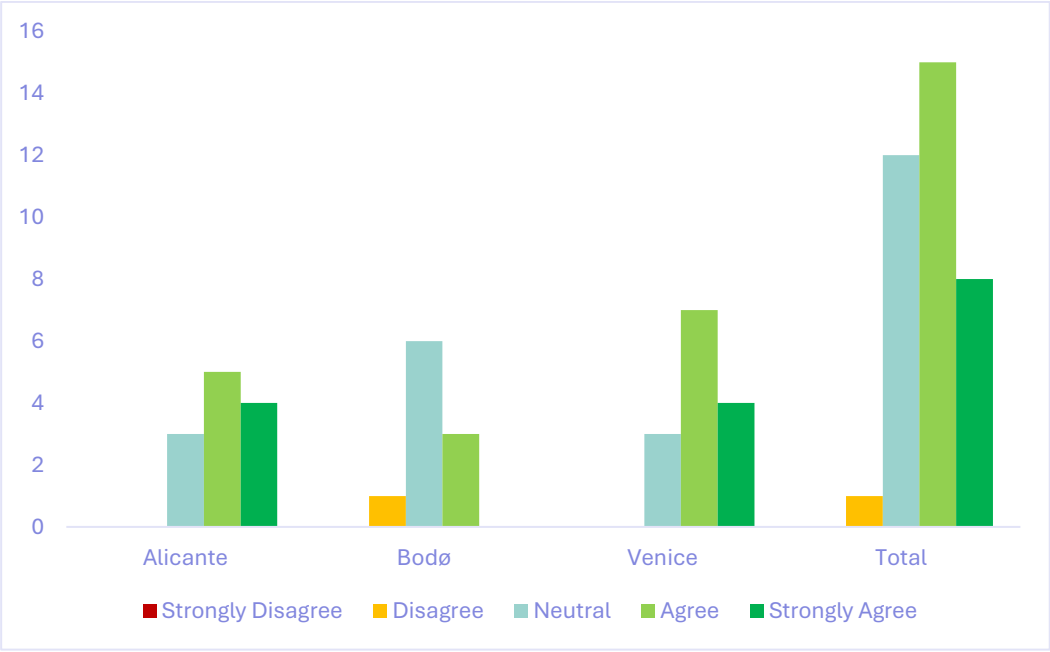

Figure 5 - Respondents who agree that water-smart solutions will have an impact on the water tariffs

Regarding the water-smart solutions to be implemented over the next five years (according to the respondent's knowledge, in their respective organisations), energy efficiency solutions are the most mentioned, in pair with stormwater solutions, sludge valorisation and smart meters (Figure 6).

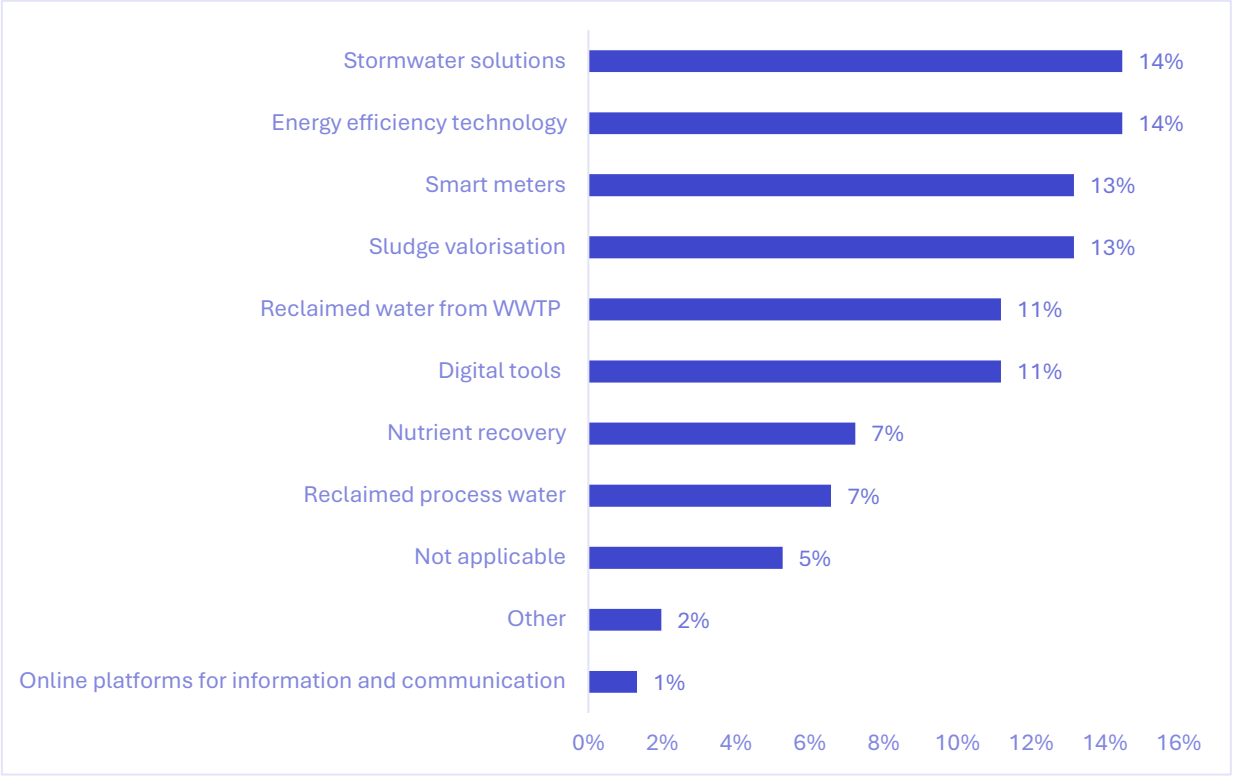

Figure 6 - Water-smart solutions to be implemented over the next five years

If we look into the responses per LL[5], along with energy efficiency, reclaimed water from WWTPs collects more responses in Alicante and Lisbon, while in Bodø and East Frisia, stormwater solutions and sludge valorisation are more prevalent. In Venice, smart meters, energy efficiency, and sludge valorisation are among the most selected (Table 4).

Table 4 - Water-smart solutions to be implemented over the next five years (per LL)

Water-smart solutions	*Alicante*	*Bodø*	*East Frisia*	*Lisbon*	*Venice*	*Total*
Digital tools	6	1	4	2	4	17
Energy efficiency technology	8	2	4	0	8	22
Nutrient recovery	1	3	4	0	3	11
Online platforms for information and communication	0	0	0	2	0	2
Reclaimed process water	2	0	4	1	3	10
Reclaimed water from WWTP	7	1	2	4	3	17
Sludge valorisation	2	5	5	1	7	20
Smart meters	3	3	4	1	9	20

[5] The option 'online platforms for information and communication' was only included in the Lisbon survey.

Stormwater solutions	2	9	5	2	4	22
Other	0	2	1	0	0	3
Not applicable	3	1	0	4	0	8

Considering the sources where stakeholders have been most exposed to information on water-smart management and solutions, peers and professional networks are the most notable, along with professional roles and events. Still, it is interesting to note that stakeholder events, such as Communities of Practice, are considered key sources of information, considering the last five years (Figure 7). Also notable is the low influence of mass media, in favour of specialised media.

Figure 7 - Main sources of information on water-smart solutions

3.3. Water reuse

The section on water reuse has been included in all surveys except for Bodø, as the survey was adapted to fit the target public and context of each LL. Water reuse was included for LLs where it has been a key solution under development in B-WaterSmart and is expected to have a stronger impact in the near future, thus returning results from five LLs.

Given the technical nature of this section and to clarify the scope of 'water reuse' in the context of this survey, we provided the respondents with a definition to frame the following questions.

> *Water reuse, also known as water recycling or water recovery, is the process of treating and reusing wastewater for various purposes, such as irrigation and industrial processes.*

Linking with the previous question on governance, the section starts by inquiring about the key challenges that should be addressed in order to expand water reuse in the future (Figure 8). The costs of infrastructures for water reuse, such as treatment infrastructures and new distribution networks, are the top concern for the stakeholders at the moment, as well as how they will be shared in society (State, private companies, consumers). There is a deep awareness

that reuse requires a significant investment in infrastructure, and these results are consistent with issues raised in CoP meetings when discussing the expansion of reclaimed water. Issues related to water governance are also among the key concerns, followed by possible resistance to the adoption of reclaimed water by end-users and the public, which, as we have seen before, will mostly apply to potable uses but not so much to non-potable uses (irrigation of green areas, washing streets, etc.), where previous surveys have demonstrated a generally positive attitude. The case of agriculture is somewhat in between, as there may be some concerns with food safety, depending on the type of crops, and there the implementation of the EU regulation and adequate risk management systems that B-WaterSmart has contributed to develop will surely be determinant for a wider adoption.

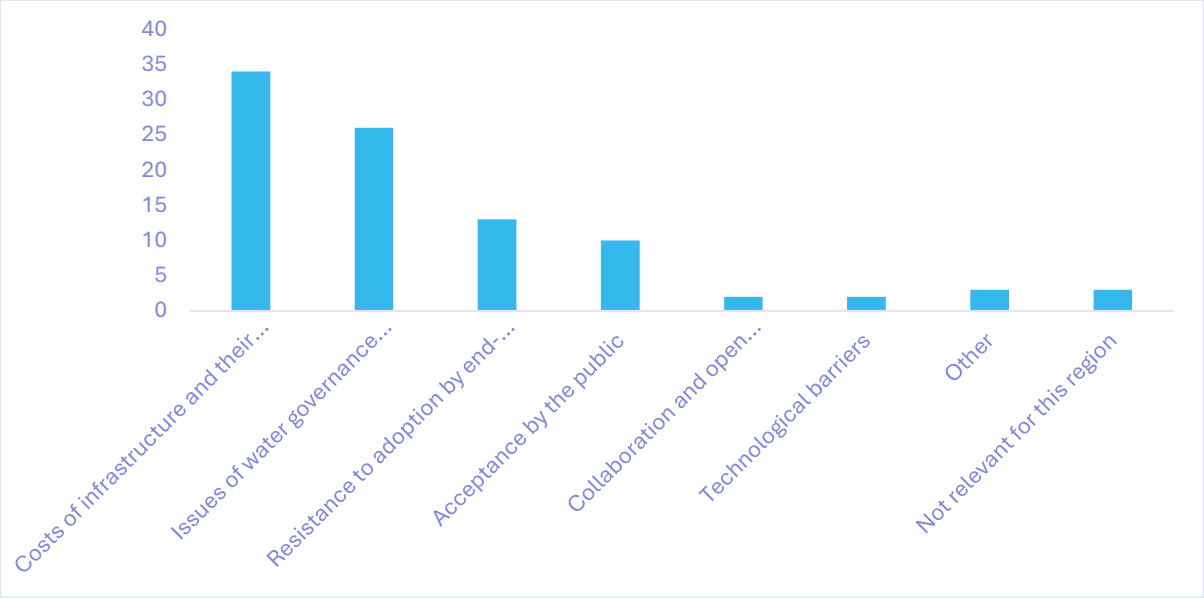

Figure 8 - Key challenges to be addressed to expand water reuse

The following question covered the most relevant sectors that are targets for reclaimed water in each region, allowing for choosing the two most relevant. The charts below are based on the sum of the two elected options, revealing that agriculture is deemed very relevant for both Venice and Alicante LLs, in parallel with 'watering green areas', while in Lisbon it is this latter option that gathers more enthusiasm for the moment (Figure 9). It is also important to consider here the scope of the B-WaterSmart LLs, as the Lisbon pilots covered the urban area of Lisbon during the project, therefore a less important role attributed to agricultural uses, which may grow in the future as water reuse expands to the Lisbon Metropolitan Area and other regions.

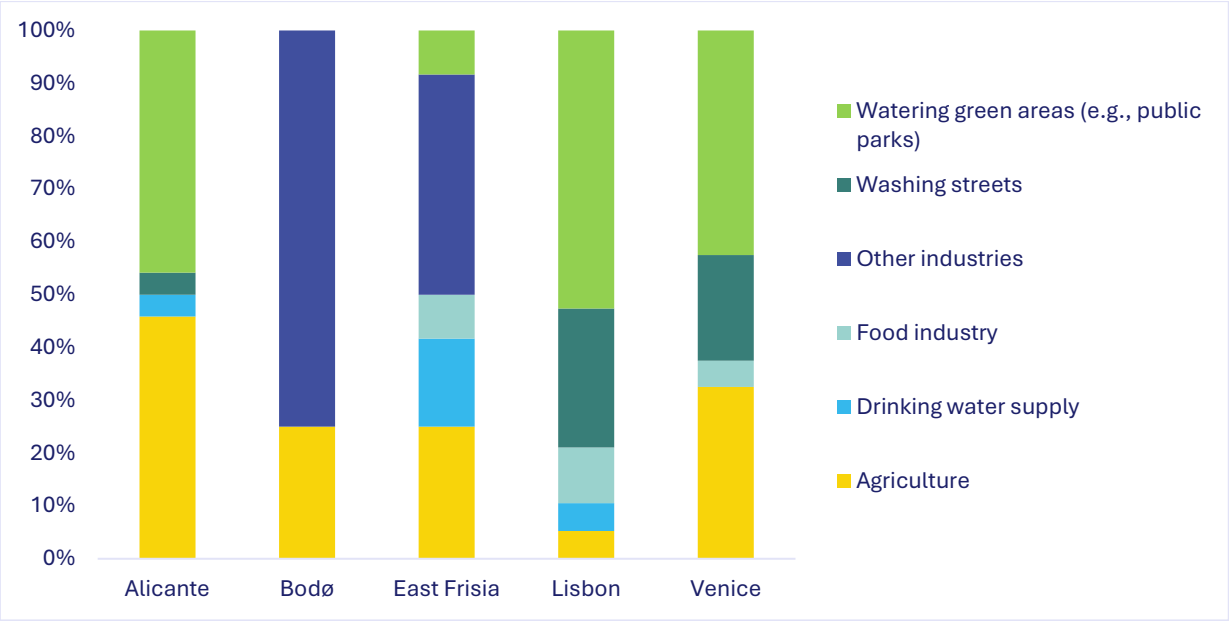

Figure 9 - Most relevant purpose for reclaimed water in the territory

The two following questions assess the centrality of water reuse within the regional strategies to address water scarcity, first for each LL and then for each socio-economic sector. Both were expressed in terms of a 5-point Likert scale (from 1, “Least Important”, to 5, “Most important”). Comparing the results between the LLs, as expected for Alicante, water reuse is considered a key priority in this LL, followed by East Frisia and Venice (Figure 10).

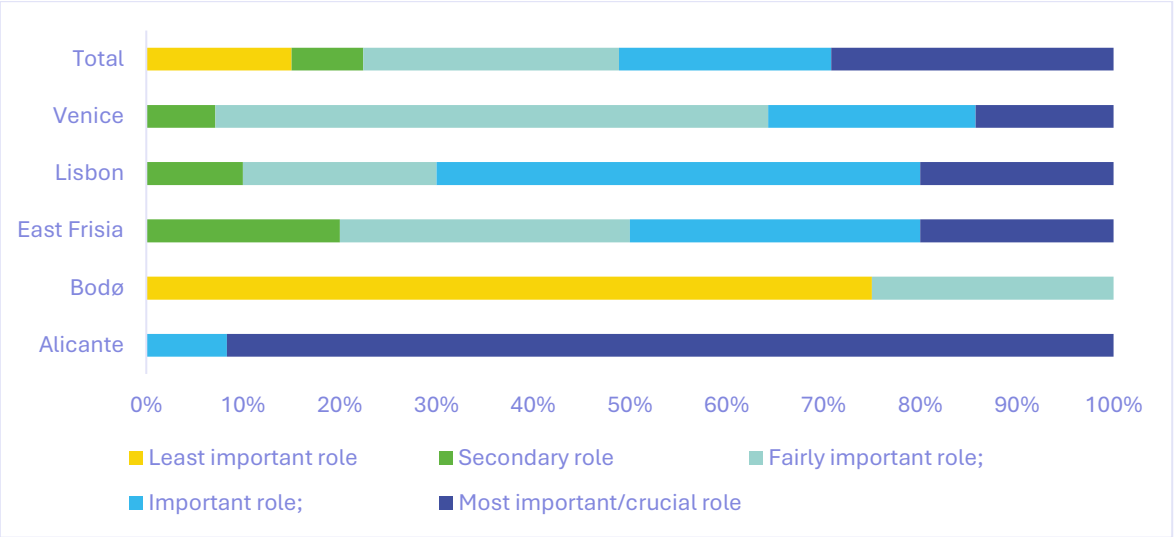

Figure 10 - Importance given to the role of water reuse in addressing water scarcity

Comparing these results with the responses concerning the socio-economic sectors (those identified at the beginning of the survey), we verify that notably, the enthusiasm for agriculture seems lower than for other sectors such as energy and industry, including the food industry (Figure 11). Located at the extremes of the scale, respondents from the land use and planning sectors seem more divided about the role water reuse will play in the future.

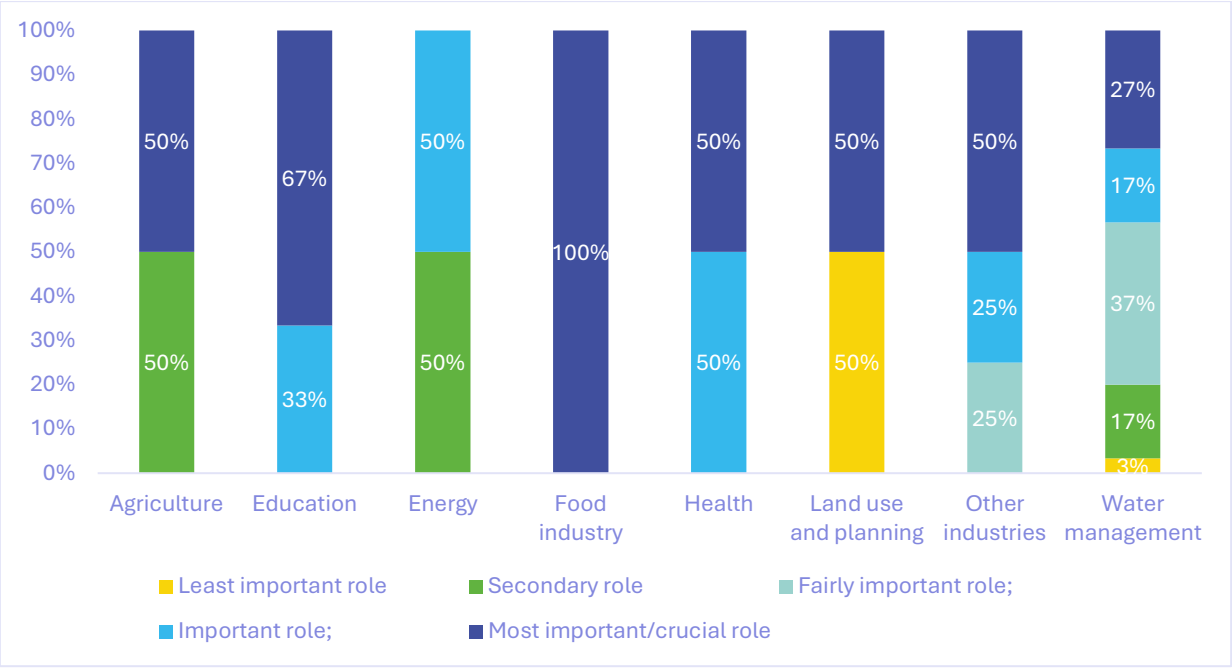

Figure 11 - Role of water reuse in managing water scarcity in each sector

3.4. Water circularity: from waste to resource

This section is related to the previous one on water reuse and has been proposed by LL Alicante. It was included in all the surveys except for East Frisia and Lisbon. Therefore, we hereby analyse the results from LLs Alicante, Bodø and Venice. The section focuses on the expected adoption of by-products from the water cycle, inquiring about a possible **labelling system** that would distinguish 'circular' products and services in the market.

In all three LLs, biogas is the top choice in the by-products that respondents expected to use most in the near future, along with fertilisers, especially for Bodø, and reclaimed water for Alicante and Venice (Figure 12).

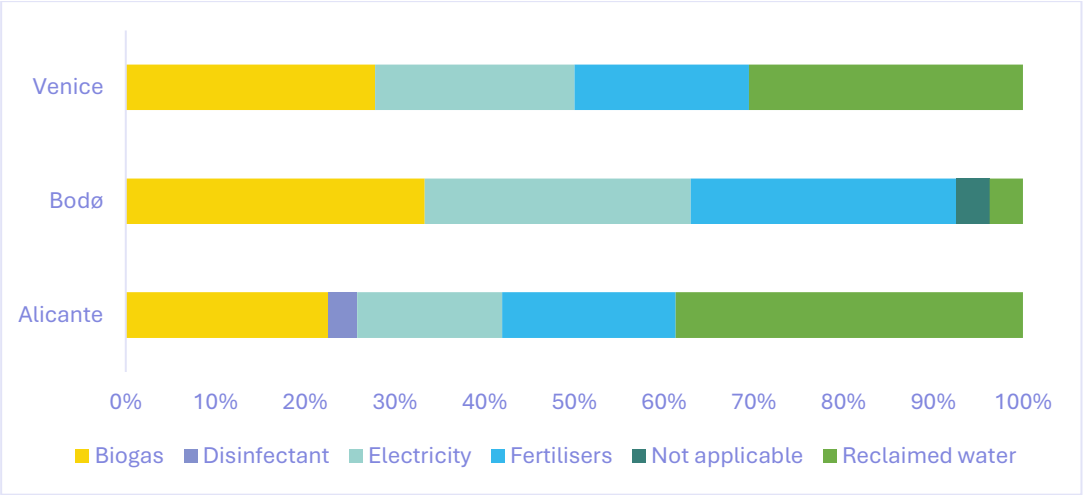

Figure 12 - Implementation of by-products from the urban water cycle

The possible creation of a labelling system that would certify products and services originated from the circular economy is significantly supported among this sample of respondents on a 5-point Likert scale, where 5 is equivalent to 'strong support' and 1 to 'strongly against´), being the most expressive support in Alicante (more than two-thirds of respondents strongly support such a system) (Figure 13).

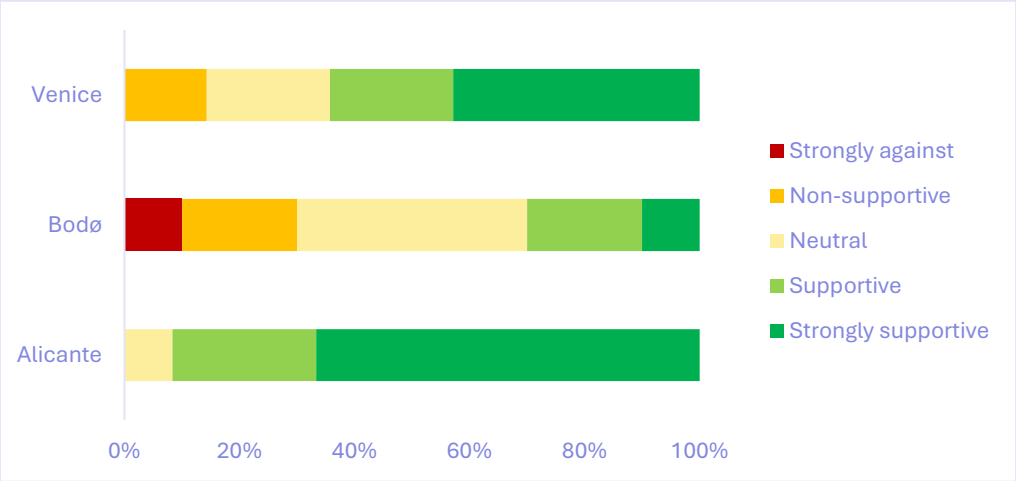

Figure 13 - Willingness to support a 'circular' labelling system

3.5. Stormwater and nature-based solutions

The last section of the stakeholder survey focuses on the emerging topic of nature-based solutions (NBS), especially those applied to managing stormwater. This has been an emerging topic for LL Flanders and LL Bodø, where specific CoP meetings and activities were dedicated to discussing the role of NBS. While LL Flanders was not covered by this specific survey, both LLs are involved in collaborative work on the application of NBS as a strategy for stormwater management, which led to a joint paper that was presented to the Sustainability Transitions Conference in June 2024 in Oslo and has been submitted to an interdisciplinary peer-reviewed journal. This section was therefore included in the surveys of Alicante, Bodø, Lisbon and Venice.

First of all, instead of a definition, we presented a selection of options that are considered NBS applicable to managing the water cycle, asking the respondents to select those that they feel most relevant for their territories. In Alicante, a strong preference goes for floodable parks, a solution that is already being implemented in this city, while 'rain gardens' and sustainable drainage systems (SUDS) gather the most interest in Bodø. In Venice, the responses are quite scattered, but even so, 'water retention for aquifer recharge' emerges as the top option, followed by floodable parks (Figure 14).

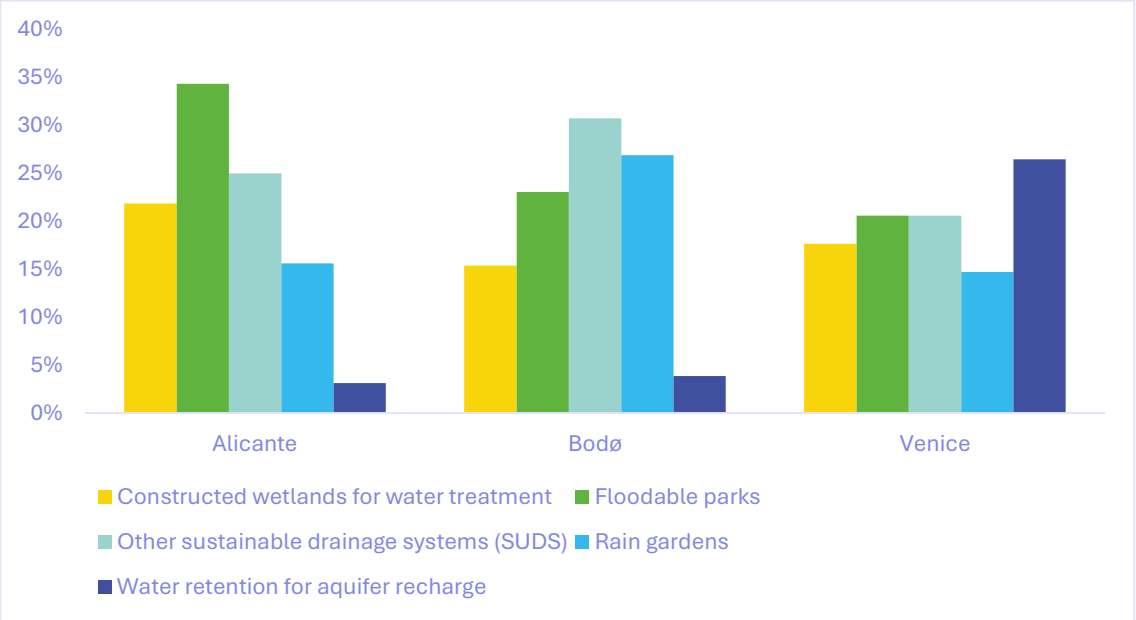

Figure 14 - Most applicable NBS in the LL territory

In the Lisbon survey, the questions regarding NBS, and stormwater management were addressed in a different way. This survey asked respondents what the main ecosystem service provided by NBS in the LL territory would be, including tackling heatwaves and preventing floods, as well as storing water to help manage water scarcity (Figure 15). Each option was scored along a Likert scale, from 1 (least relevant) to 5 (most relevant).

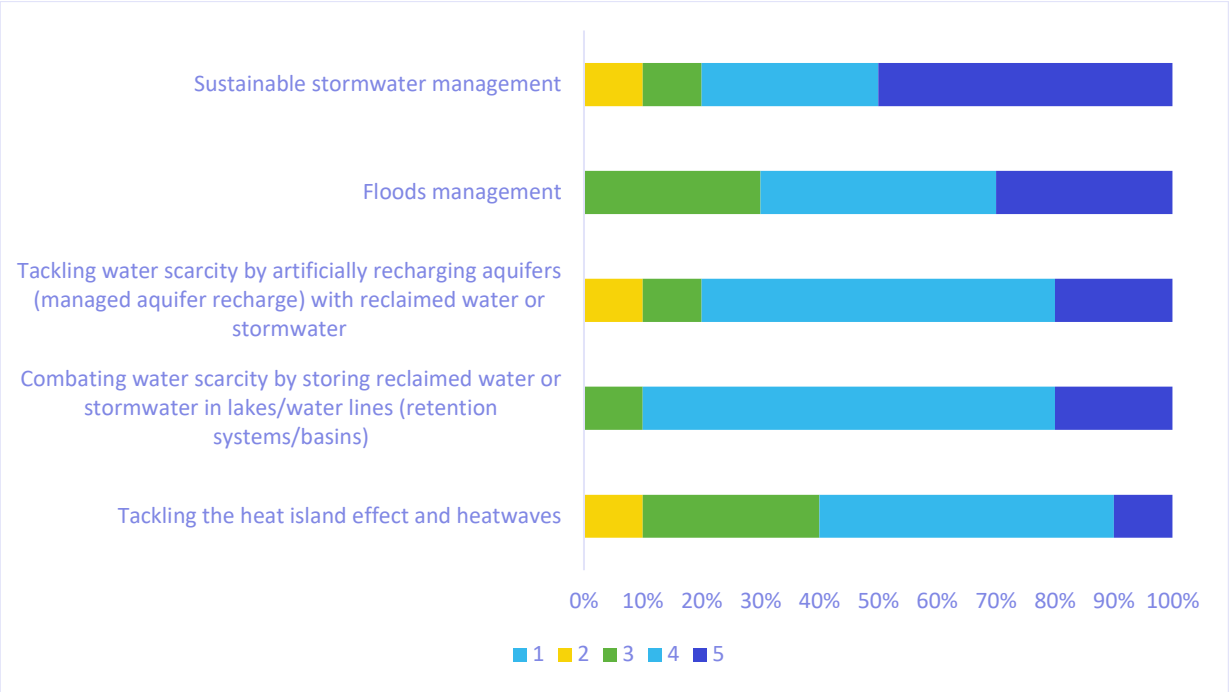

Figure 15 - Services that NBS are expected to provide in Lisbon

After this rather technical appreciation, which also serves the purpose of defining the scope of the section, the respondents are invited to reflect on the relevance of NBS for climate adaptation within the next decade (Figure 16). Alicante stands out with the strongest expression of support for NBS in this context, followed by Venice, whereas the responses in Bodø are more scattered between the 5 points of the scale. Still, the majority of respondents seem clear that this will be a central approach for climate adaptation in the future.

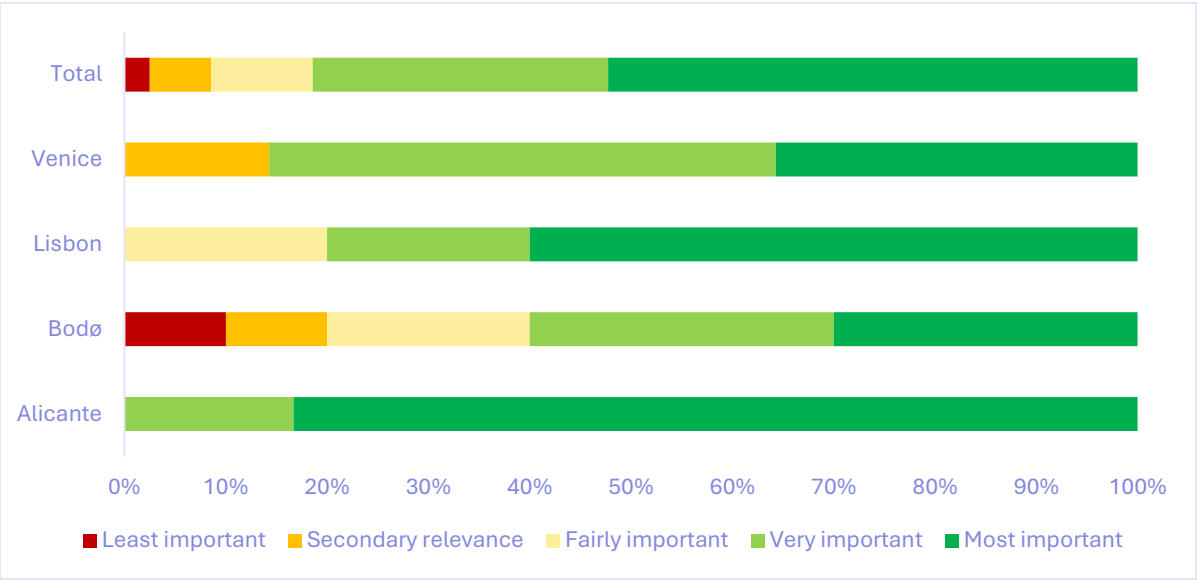

Figure 16 - Importance attributed to NBS for climate change adaptation over the next decade

One of the key purposes of stormwater run-off can be groundwater infiltration for managed aquifer recharge (MAR), as well as reuse in agriculture when retained, as demonstrated by the Flanders pilot in Mechelen in the context of B-WaterSmart. Looking at a wider implementation and replication of this approach in the future, the survey inquired about the conditions that need to be created, namely, how to attract the necessary financial resources. The results are quite divided across the options but favour public funding and public-private partnerships (Figure 17).

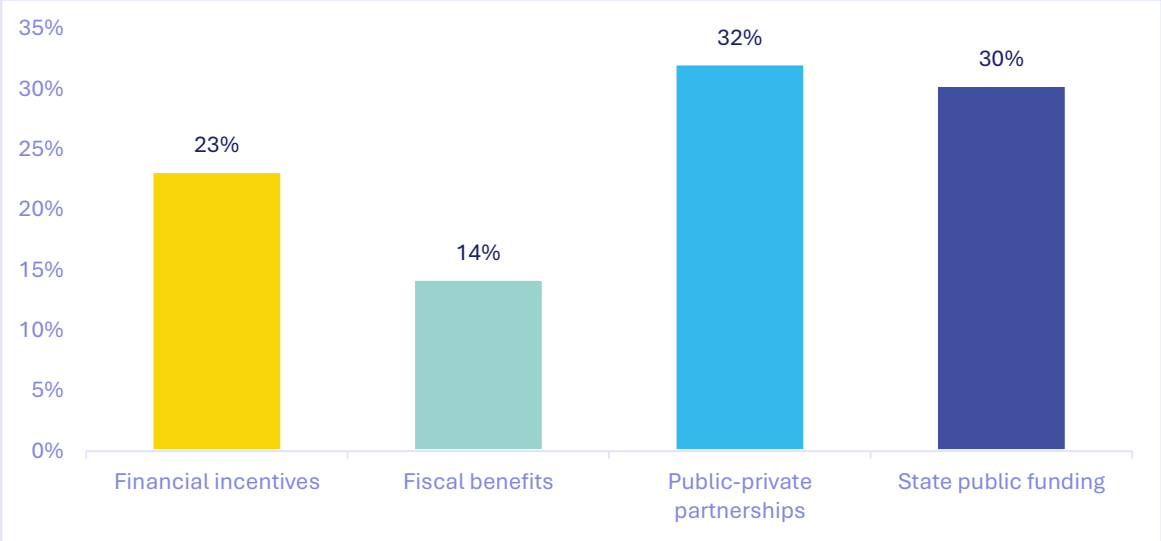

Figure 17 - Conditions proposed for further expansion of water reuse in agriculture

When the responses are analysed by LL (three included this question, public-private partnerships are favoured in Alicante, while financial incentives and fiscal benefits are preferred in Bodø, with much stronger support for State public funding in Venice (Figure 18).

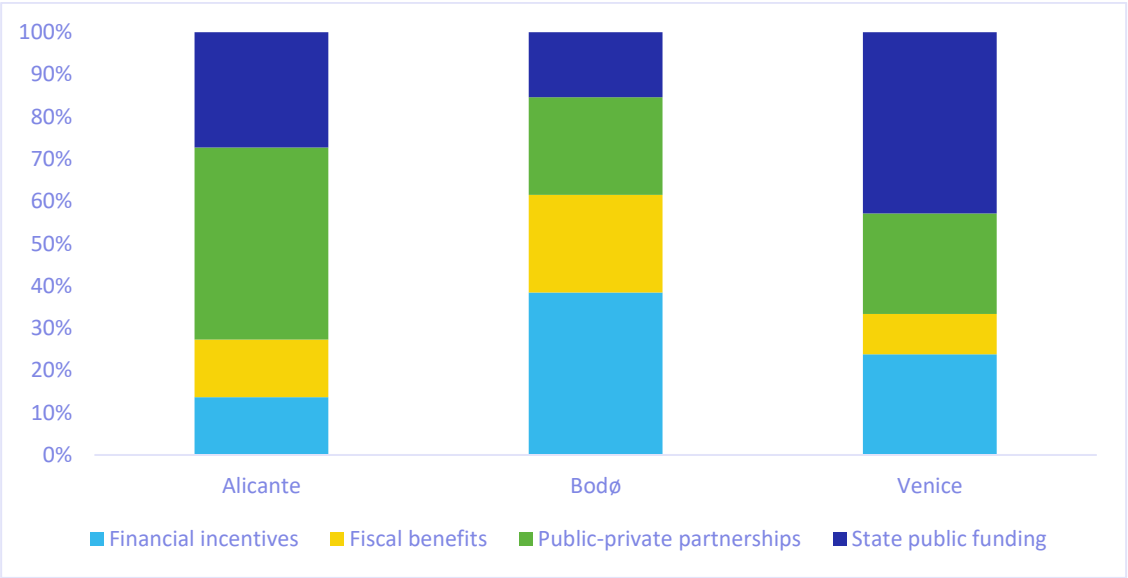

Figure 18 - Conditions proposed for further expansion of water reuse in agriculture (for each LL)

Finally, looking at the overall preferences for financing the infrastructure needed to implement NBS for stormwater management (Figure 19), the responsibility attributed to the State is clear, as most of the respondents support direct public funding or private-public partnerships, with the municipalities being considered as an important source of funding in this context (12%). The chart below shows the total sum of the responses (it was possible to select up to two options).

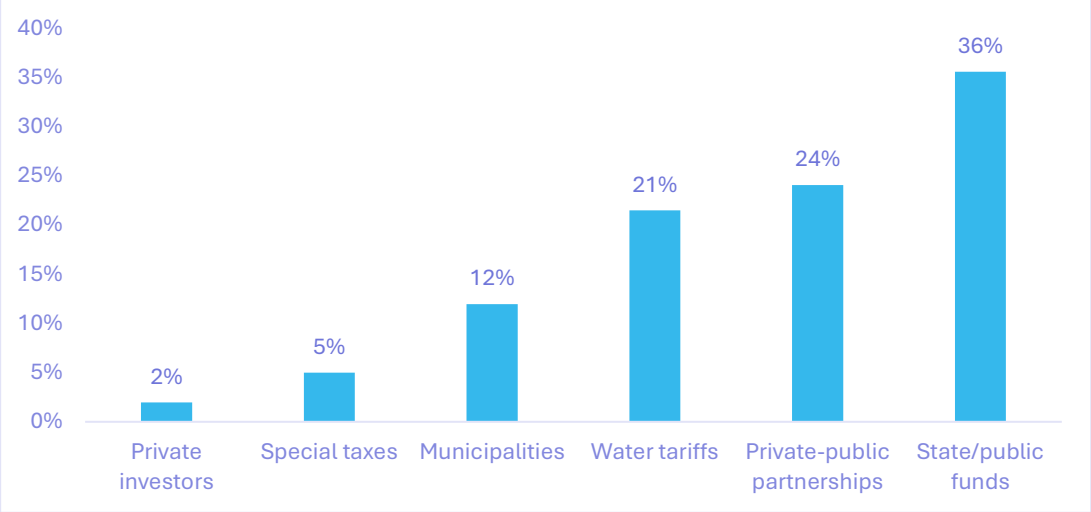

Figure 19 - Sources of funding for NBS infrastructure (total)

Looking at the results in each Living Lab (Figure 20), we verify that public funds are favoured in Alicante and Venice, although in Alicante there is a preference shared with private-public partnerships, in almost equal measure, and in Venice a much greater importance is attributed to water tariffs as a source of funding for nature-based solutions. In Bodø the responses are more scattered, but even so the weight attributed to water tariffs is also significant. These tendencies should be observed in the context of the LL diversity, as the type of NBS most relevant for each territory varies, and therefore the funding and governance schemes applicable will also be different.

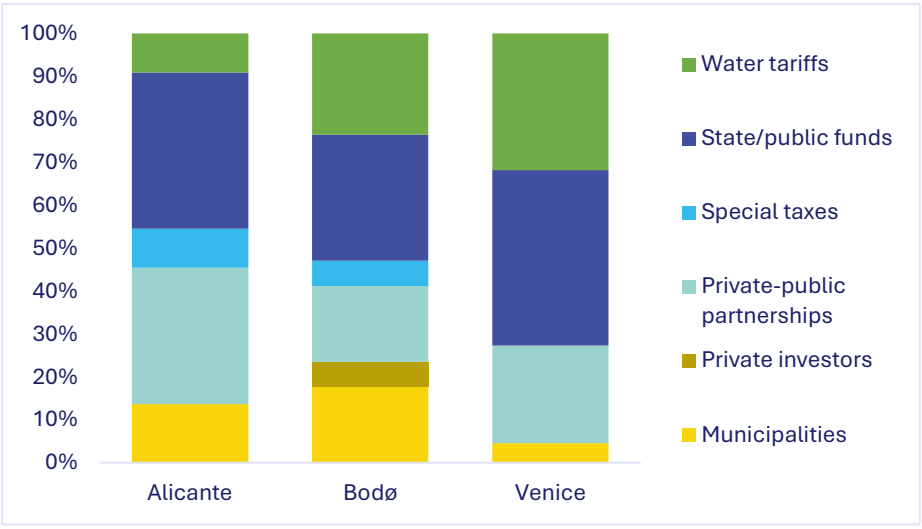

Figure 20 - Sources of funding for NBS infrastructure (per LL)

4. Case study: citizen survey in Bodø

4.1. Knowledge, attitudes and practices regarding water management

Sigrid Damman

Bodø LL is working with several innovations (e.g., smart water meters, recovery of energy and possibly nutrients from wastewater treatment, and nature-based solutions for stormwater management). Regarding all, it is important to get more information of the knowledge, attitudes and practices of citizens to develop solutions that are socially acceptable and sustainable in the local context. For Norway as a whole, there is very little knowledge about citizens' perspectives and practices regarding water management.

We, therefore, decided to conduct a small, descriptive survey on Knowledge, Attitudes and Practices (KAP) related to water management in Bodø, with some parts related to water cycle services in general and some sections that address key issues of particular relevance for the three innovative solutions that are in focus in the LL. On average, the survey took 11 to 37 minutes to complete.

The original intention was to send the survey directly to a broad sample within Bodø municipality, but this turned out to be difficult due to regulatory issues (with the way GDPR is implemented in Norway, it is difficult for the municipality to address citizens directly with requests for this kind of information) and budgetary constraints (hiring a professional survey provider would be costly). The survey was, therefore, rather distributed online – through the municipality's website and Facebook accounts and via posters and QR codes at shopping centres/grocery stores in different parts of town. All citizens above age 18 were encouraged to respond, teased by the opportunity to win one of two gift cards for use at a central shopping mall (each card was worth 1000 NOK, or around 100 EUR).

The survey was open from June to September 2023, and 153 citizens responded. As Bodø municipality has a population of more than 50,000 people, this means the survey cannot be used to draw representative conclusions of any kind. However, it still provides some insight into prevailing perceptions and practices.

4.1.1. Respondents

The age distribution of the respondents was as expected, with a majority between 30-50 years, slightly less between 18-30 (27) and 50-70 (35), and three respondents between 70-100 years. One hundred and ten respondents were female, and 78 had been living in Bodø for more than 20 years, while 23 had been local residents for less than five years. While around 2/3 had completed higher education, the respondents were quite evenly distributed across income categories. All districts were represented, with more respondents from the central districts, which also are more densely populated.

4.1.2. Responses

Climate change and circular economy

Considering climate change impacts on water resources (Q: Which climate change impacts do you think will have the most serious consequences for Bodø in the coming years), the responses were as shown below (Figure 21):

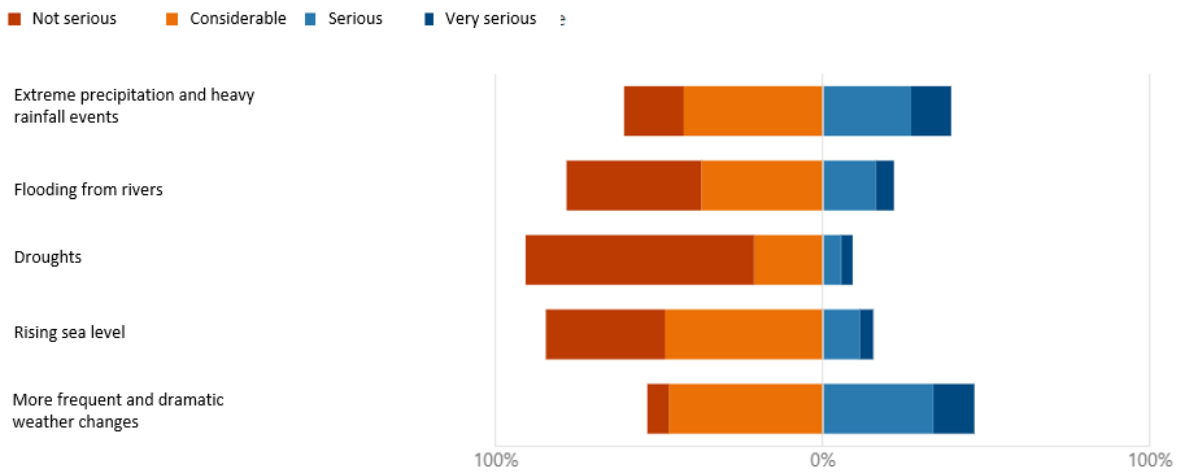

Figure 21 - Climate change impacts on water resources for Bodø in the coming years

Regarding circular economy in general, most respondents reported that they contribute themselves, mainly via recycling but also via reuse and repair, and less so in terms of sharing services (e.g., car sharing). Less than a third felt that the municipality has a strong focus on the circular economy, and while many felt that green and sustainable urban development should be an important or very important aim, even more respondents ticked the box 'important' or 'very important' for the aim to increase place attractiveness and liveability.

Perspectives on present and future water challenges

When asked if they have the impression that Bodø municipality has any water management challenges currently, two-thirds responded 'no'. Among those seeing challenges, the majority identified flooding, stormwater, pollution of rivers and creeks, wastewater discharge, and leakages as the main challenges.

The vast majority has never experienced any water challenges (in terms of quality, down periods, restrictions on use, flooding issues) directly. Those who did (mainly having experienced down periods) largely reported that the municipalities fixed the problems quickly (4 respondents claimed they had to fix it on their own). 77 anticipated increased water challenges in the future, while 62 thought the situation would be as today.

Water use and smart meters

As many as 120 responded that their household uses all the water, they need without saving or using excessive volumes, while 15 felt they use more than enough, and only 13 said they consciously practise water saving.

Only 22 respondents had a standard water meter in their home in 2023 (these are optional in Bodø municipality) however, 81 said they would be willing to install one. Among those not wanting a water meter, fear of increased water expenses was the main reason, followed by concern over privacy and the time it takes to read and report the measurements.

Asked whether a smart water meter that would be read off automatically and possibly could use to monitor and control their own water use would be an interesting option, 52% responded that this would be interesting or highly interesting. In comparison, 44% also were a bit sceptical, with a view to how it might affect their water bills.

Resource recovery, water fees and willingness to pay

Regarding perceptions of what the municipal water and wastewater fees are used for, most respondents thought that a large part are used to renew ageing infrastructure, and to a somewhat lesser extent for implementing more energy-efficient solutions, and urban development (new district). What they thought they are least used for, is more nature-based solutions for stormwater management.

Asked whether they would be willing to pay more for wastewater services, if this would lead to resource recovery, as many as 46% responded 'yes'. On the question of how big an increase they might tolerate, responses were as follows (Figure 22).

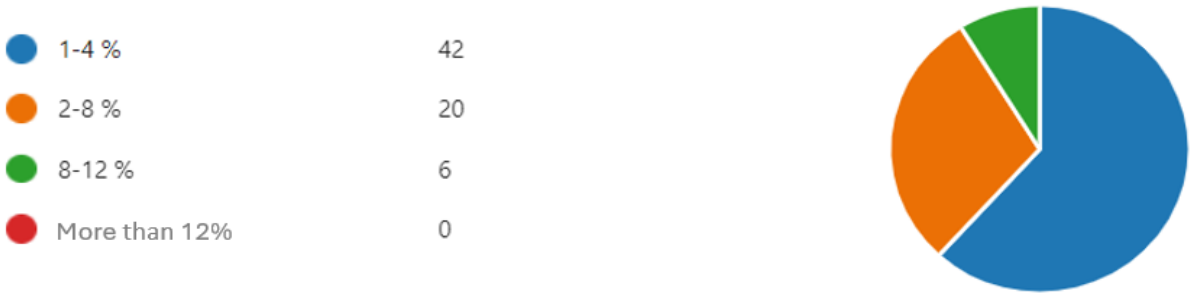

Figure 22 – Willingness to pay for increased water bills

Among those unwilling to accept an increase, almost half responded that they are unable to pay more than today, and the other half felt that the government should pay, whereas around 5% stated that they do not care about resource recovery.

While 98% said that they never throw hygiene articles in the toilet, and 97% never throw medicines in the toilet, 84% responded that they never throw food waste in the toilet – indicating that this still happens in some households, but according to the responses it happens rarely (15%) rather than often (1%).

Water reuse

Asked whether they would be willing to use reclaimed water for different purposes in the future, the sample responded as shown in Figure 23.

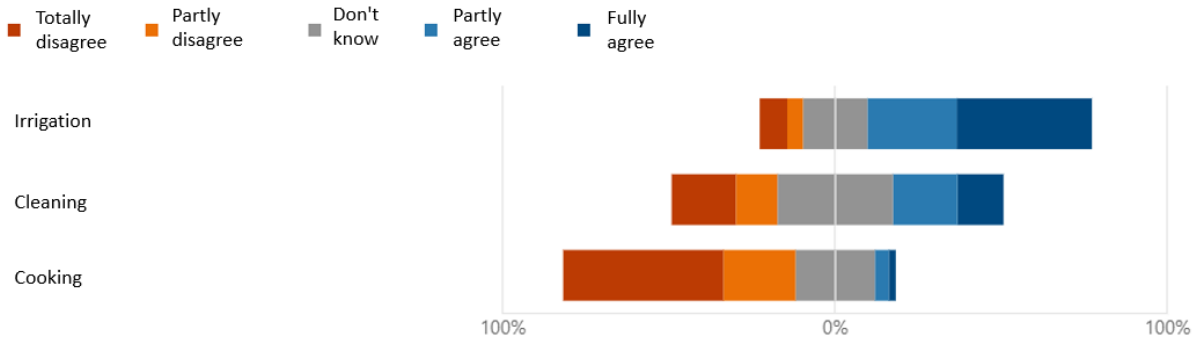

Figure 23 - Willingness to use reclaimed water for diverse purposes

In other words, reuse for watering gardens seems quite acceptable today, whereas attitudes to use of reclaimed water for cleaning are more mixed, and use of reclaimed water for cooking seems completely unthinkable (48%), or quite unthinkable (22%) for most respondents.

Information availability

Regarding the availability of information from different departments of the municipality, the respondents were asked to what degree did they feel that they receive sufficient information about different service areas in the municipality (Figure 24):

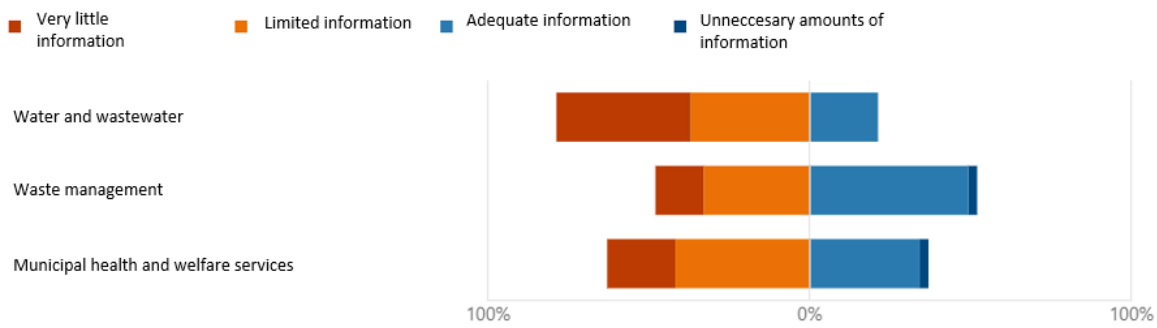

Figure 24 - Perceived availability of information on water services

While some thought the availability of information was appropriate, larger shares of the respondents answered that they receive relatively little (37%) or very little (42%) information on water and wastewater management, while for waste management and municipal health and care services, larger shares of the sample felt they receive adequate information.

Trust

As to whether the respondents trust the municipality's technical department as the provider of water and wastewater services, the respondents answered as follows in Figure 25.

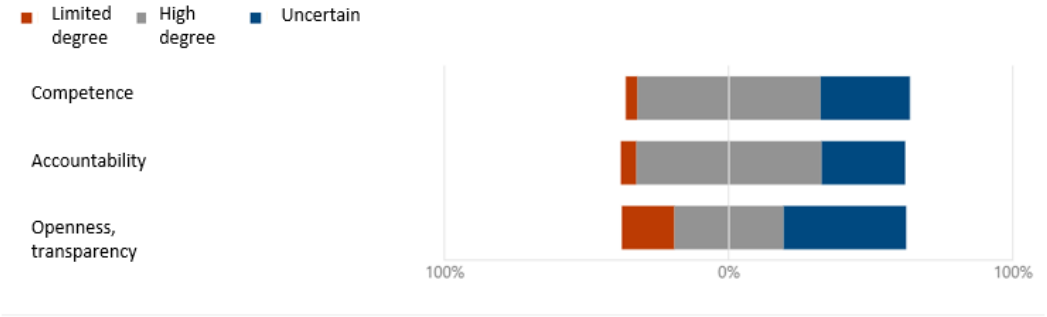

Figure 25 - Degree of trust in the water and wastewater section of Bodø municipality

As the figure shows, there were indications that the technical department is quite trusted for its competence level. The same goes for accountability, but when it comes to trust in the openness of the municipality regarding water and wastewater services, the responses express a higher degree of uncertainty. A slightly higher share of the respondents (18.5%) indicated that they had less trust in the openness of the water and wastewater department.

4.1.3. Other inputs from respondents

Finally, the survey provided the opportunity to share other views or experiences that the respondents might find relevant (open text field). Here, there were 13 responses. Four simply responded 'no', while 3 emphasized the importance of working with nature-based solutions and restoring nature. One stated that as long as the municipality can maintain the level of service they provide today, all is well and good. Another questioned the purpose of the survey and project, wondering if there were any hidden agendas, such as making water more expensive or "selling it to the EU". Yet another respondent called for more incentives to encourage environment-friendly behaviour, and another stressed the need to continue working towards more visibility and participation. One noted that some people in the area also have private water supply, and lastly, there was one comment on the form itself.

4.1.4. Some summary remarks

The survey indicates that citizens of Bodø are well aware of expected climate change impacts on water resources in their region. Respondents increasingly orient towards a circular economy, but do not yet see a strong focus on this on the side of the municipality.

The awareness of current water challenges is variable. The majority of the respondents are not practicing water saving. Relatively few have installed water meters. There is a positive interest in smart water meters, but also some scepticism related to concerns of how such metering might affect water bills, and in some cases, for privacy reasons.

The citizens participating in the survey were mostly positive about resource recovery and stated a certain willingness to pay for this. Their wastewater practices are conducive, i.e. they rarely throw unwanted substances in the toilet. There is also a certain acceptance of reuse for irrigation, but there is more scepticism about using treated wastewater within the household.

While the survey suggests there may be an improvement potential regarding information sharing, the respondents report a quite high level of trust in the municipality's water and wastewater section, especially regarding competence and accountability, and a little less so regarding openness.

5. Conclusions and recommendations

The results from both the qualitative assessment (CoP meetings and stakeholder interviews) and the stakeholder survey (quantitative assessment) allow for an integrated overview of the key issues related to acceptance and behaviours towards water-smart solutions. The insights summarised in D5.7 should be useful for implementing and replicating B-WaterSmart tools and technologies and other projects and initiatives related to the water circular economy.

In sum, acceptance of water-smart solutions will be inextricably linked to an inclusive, fair and transparent governance, crucial conditions for a water-smart society. One key step to improve **distributive justice** around costs and manage trade-offs between sectors with competing water demands is to conduct integrated socio-environmental vulnerability assessments.

It seems clear that there is a generally receptive attitude from the public towards water-smart solutions, including water reuse for non-potable purposes, however **willingness to pay** is generally low. In most of the LL countries, an increase in water tariffs is not very welcome and will always require two crucial steps: again, full transparency on how costs are formed and protection of the most vulnerable social groups to ensure water affordability and accessibility, considering other household costs (e.g., energy). As has been raised in CoP meetings and is supported by the Bodø citizen survey (community acceptance), the concerns with smart metering mostly centre on the eventual impacts on water bills.

Risk perceptions of water scarcity in the future vary greatly according to the abundance of the resource and the past experience of both stakeholders and populations in a given region, as it has become clear from the interviews and surveys carried out in the B-WaterSmart LLs, and reiterates the studies conducted over the past few years in these countries. Whereas in Alicante or Lisbon, a higher concern with future scarcity leads to higher acceptability of reclaimed water, in Bodø the most significant concern is how to address the impacts of extreme events such as floods. The citizen survey in Bodø reiterates the impact of perceived abundance of water resources on concern with future water challenges.

Concerning risk perceptions around **water quality** and public health, for solutions related to water reuse, it is clear that there is a wide acceptability, which reiterates previous studies in the LL countries, yet it mostly stands for non-potable uses, and acceptance decreases in direct proportion with proximity to the reclaimed water. The perception of reclaimed water as ‘waste’ may constitute a barrier to acceptability for use in the food chain and water supply, as interviews and surveys have demonstrated. Such considerations will have to be taken into account in future communication campaigns and citizen engagement actions. Concepts such as ‘Water Factories’ (adopted in Lisbon) may contribute to a positive image of reclaimed water as a resource rather than as ‘waste’, as discussed in the Lisbon CoP. It is also clear from the citizen survey in Bodø how good acceptance of water reuse is limited to non-potable uses (as in Lisbon and Flanders).

Trust in water utilities and public institutions has also emerged as a key factor for acceptance of water reuse, namely trust in water utilities, the quality of water treatment and the safety procedures employed. Any further control over consumption that is deemed to affect consumer tariffs has to be communicated with great care and transparency, as recent surveys reveal that

willingness to pay more for water services is rather limited, although these varies between regions and according to socio-economic context and perceived risk of scarcity.

The issue of **financing** appears to be among the most critical for future implementation and replication of water-smart solutions. For emerging products and services of the water circular economy, it is still not clear how they will be financed, and thus, one of the key contributions of the project is the proposal of business models. However, as both the CoP discussions and the surveys demonstrate, direct public funding and public-private partnerships, are still the major sources for ensuring adequate infrastructure for reclaimed water and stormwater management.

The CoP discussions highlighted an investment gap in water infrastructure in Europe, which emphasises the need for new funding and governance models – such as cooperatives (as proposed by CoP members in Flanders), but also public-private partnerships, largely supported among stakeholders who responded to the surveys in East Frisia, Alicante, Bodø and Venice.

The results of the WP5 work during the four years of B-WaterSmart - which culminated in the present D5.7, as well as D5.6 (Guidelines and Recommendations for Regulation and Policy Instruments) and D5.8 (set of four policy briefs) - took into consideration the work developed across WP1, WP4, WP6 and WP7. Another development of this past year is the dedicated work of water governance, most notably the publication of D5.5., a comprehensive analysis of governance in the six LLs according to the OECD principles. This output was crucial for us to gain a more complete understanding of how governance and social acceptance issues interplay, and it is also meant to contribute to future policy on water resilience and the circular economy.

Earlier in 2024, new policy and governance challenges emerged in the EU as the implementation of the Green Deal – notably the goal of cutting down chemical fertilisers by half – was met with backlash from farmers, who argue EU requirements on agricultural production create unfair competition with imported products. The announced new Water Resilience Initiative ended up being postponed (was planned to launch in March 2024) and is now being discussed as part of a new Blue Deal. The objective of this integrated strategy is to tackle the challenges of water scarcity, extreme events (such as floods) and water pollution. The EU is not on track to meet its goals of the Water Framework Directive (good quality of water bodies until 2027), and diffuse pollution from agriculture is among the main causes.

The extraordinary measures taken over the past few years to prevent water scarcity in several EU countries by approving water rationing (e.g., Portugal in winter 2023-2024) highlighted the trade-offs between socio-economic sectors such as agriculture and tourism and how it is crucial to actively involve both sectors in future strategies for water resilience, climate adaptation and the circular economy.

Regarding notions of justice, transparent and effective public participation is paramount to ensuring **procedural justice** in water management and distribution decisions. This is especially relevant as climate change increases the frequency and intensity of future droughts, worsening the risk of water scarcity and trade-offs between economic sectors such as industry, agriculture and tourism. To properly address issues of redistributive justice between sectors, there will be the need for co-responsibility and to share costs and benefits between the key sectors that will be the users of water-smart solutions.

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B-WaterSmart

ANNEX I – Questionnaire (English version)

Stakeholder survey: 'Building a water-smart society'

B-WaterSmart D5.7: Final report on social acceptance and behaviours towards water-smart solutions

B-WaterSmart is a 4-year Project funded by the European Commission (Horizon 2020, GA no. 869171). It aims at enabling water-smart systems, societies and economies that are more resilient to climate change impacts and supportive of a thriving European water-dependent business. The Project consortium brings together six coastal European cities and regions as LL - Alicante, Bodø, Flanders, Lisbon, East Frisia, and Venice - in a large-scale systemic approach to select, connect and demonstrate tailored suites of innovative technology, management, and interoperable smart data solutions for multiple users and sectors.

This online survey aims at gaining a better understanding about the acceptability of water-smart solutions among the key stakeholders of these six regions, including those who have been engaged in the project activities through the Communities of Practice from 2020 to 2024. Its main purpose is to support the elaboration of a report on social acceptance and behaviours towards water-smart solutions.

The survey should take less than 10 minutes to complete. Thank you for your collaboration!

Informed consent

In accordance with the EU General Data Protection Regulation (GDPR, 2016/679)

The information collected through this survey is anonymous and will only be used by the Project research team (members of the consortium), will be kept confidential and not transmitted to third parties. Data will be stored in computers and servers protected by passwords, only accessible by the members of the research team. After analysis, the information collected might be used for the purposes of communicating and disseminating the Project results, through reports, research publications (scientific journals) and communications in conferences. However, the opinions expressed through this survey will not be directly identified, meaning that they will not be traced back to each person. The original data will be stored only for as long as they are necessarily to carry out these analyses, and no personal data will be kept beyond the end of the Project (August 2024). For more information about the project, you can visit our website: https://b-watersmart.eu

□ I understand and agree with the use of the survey responses as specified above

Common questions (across LLs)

Location: (Living Lab; region; country)

Please indicate what type of institution you represent:

National government authority
Regulator agency
Water utility
Municipality
Non-governmental organisation
Research institute
University
School
Local association (e.g. resident association)
Professional association (e.g. water providers, urban planners)
Company – technology provider
Consulting company
Prefer not to respond
Other? Which? (optional)

Which sector are you working on? [indicate more than one if it applies]

Land use and planning
Energy
Water management
Agriculture
Health
Education
Food industry
Other industries
Prefer not to respond
Other? Which? (optional)

1. Water Scarcity (ALL)

Definition: Water scarcity refers to the lack of water resources to meet demand in a given territory. It intensifies as demand increases and/or as water supply is affected by decreasing quantity or quality.

1.1. Do you think there is a risk of water scarcity in your region in 2030?
(please rank it from 0, no risk, to 5, very high risk)

2. Water Resilience (ALL)

2.1. **What does water resilience mean to you in the current context of your region?**
[open question]

- Please rank the following implementations regarding their priority for water resilience in your region. [please order them]
- Addressing water scarcity through water reuse
- Addressing water scarcity through stormwater management
- Flood prevention & response to storms/heavy rains
- Improving energy efficiency in water treatment
- Recovering materials for the circular economy (nutrients)

3. Water-smart society (All LLs)

"Societies are water-smart when they generate societal well-being via sustainable management of water resources. In water-smart societies, well-informed citizens and actors across sectors engage in continuous co-learning and innovation to develop an efficient, effective, equitable and safe circular use of water and the related resources. This is achieved by adopting a long-term perspective to ensure water for all relevant uses, to safeguard ecosystems and their services to society, to boost value creation around water, while anticipating change towards resilient infrastructure." (B-WaterSmart definition)

3.1. **Regarding water governance in your region, which of these areas you think need to be improved to ensure the adoption of water-smart solutions, if any?** [check the three most important]

- Transboundary cooperation (international rivers)
- Coordination across scales (EU, national, regional, local)
- Intersectoral integration (e.g. across water, environment and energy policy)
- Trade-offs between sectors with competing water demands
- Transparency of information available
- Data & monitoring on use of water resources
- Decision mechanisms based on river basins (appropriate scales)
- Communication and stakeholder engagement
- Trust & communication between institutions
- Regulatory frameworks & legislation
- Financing and affordability of solutions

3.1.1. Would you like to make any additional comments? _____

3.2. **To what extent do you agree that the implementation of water-smart solutions may have an impact on the water tariff?** [Likert scale, rank from 1 (strongly disagree) to 5 (strongly agree][6]

- *Strongly agree*
- *Agree*
- *Neutral*
- *Disagree*
- *Strongly disagree*

3.3. **Are you aware of any plans to adopt water-smart solutions at your organisation over the next 5 years?** [check all that apply]

- Reclaimed water from WWTP (wastewater treatment plants)
- Reclaimed process water (internal efficiency measures)
- Energy efficiency technology
- Stormwater solutions
- Sludge valorisation
- Nutrient recovery
- Smart meters
- Digital tools (e.g., decision-support; demand management)
- Online platforms for information and communication (Lisbon survey only)
- Other
- Not applicable

[6] Question only included for LLs Alicante, Bodø and Venice

3.4. **What have been your main sources of information of water-smart solutions over the last 5 years?** [please check the two most important]

- Peers and professional networks
- Media (TV, radio, press)
- Specialised media (e.g., sectoral magazines)
- Direct mailing (e.g., newsletters)
- Social media
- Stakeholder events (such as Communities of Practice)
- Professional and academic conferences
- Professional role (employer)
- Family and friends
- Other

4. Water Reuse (LLs Alicante, East Frisia, Lisbon, Venice)

Definition: Water reuse, also known as water recycling or water recovery, is the process of treating and reusing wastewater for various purposes, such as irrigation and industrial processes.

4.1. **What are the key challenges that have to be addressed first when implementing water-smart solutions for water reuse in your region?** [choose the two most relevant]

- Costs of infrastructure
- How costs are shared
- Resistance to adoption by end-users
- Issues of water governance (scale of implementation; share of responsibility; intersectoral policy integration)
- Acceptance by the public
- Other
- Not relevant for this region

4.2. What is the most relevant purpose for water reuse in your region? [please choose the two most relevant]

- Agriculture
- Food industry
- Other industries
- Watering green areas (e.g., public parks)
- Washing streets
- Drinking water supply
- Other

4.3. From 1 to 5, what role do you think water reuse will play in managing water scarcity problems in your region by 2030? [1 least important to 5 most important]

4.4. From 1 to 5, what role do you think water reuse will play in your sector of activity in 2030? [1 least important to 5 most important]

5. Water circularity: from waste to resource (LLs Alicante, Bodø, Venice)

5.1. What by-products from the urban water cycle would you be willing to use or implement? [check up to 3 options]

- Electricity
- Biogas
- Fertilisers
- Reclaimed water
- Disinfectant
- Not applicable

5.2. **Would you be willing to support a labelling system that certifies the circular use of water resources in certain products or services?** [Likert scale, rank from 1 (don't support) to 5 (strongly support)]

- *Strongly supportive*
- *Supportive*
- *Neutral*
- *Non-supportive*
  Strongly against

6. Nature-based solutions and stormwater (LLs Alicante, Bodø, Lisbon, Venice)

6.1. **What nature-based solutions do you consider to be applicable to stormwater management in your region?** [please choose the two most relevant][7]

Floodable parks
Rain gardens
Constructed wetlands for water treatment
Other sustainable drainage systems (SUDS)
Water retention for aquifer recharge
Other? Which?

6.2. How important do you think NBS will be for climate adaptation in your region, over the next decade? [please choose one number 1 to 5, from 1 – least important – to 5, most important]

6.3. How could stormwater reuse be further implemented/expanded in the agriculture sector? [please choose the two most relevant]

- Financial incentives
- State public funding
- Public-private partnerships
- Fiscal benefits
- Other? Which?

6.4. How can the costs of new infrastructure be financed?

- Private/public partnerships
- Private investors/
- Municipalities
- State/public funds
- Other? Which?

[7] Question framed differently in the Lisbon survey. This survey asked respondents what would be the main service provided by NBS in the LL territory, including tackling heatwaves and preventing floods, as well as storing water to help manage water scarcity.