SMART
WaterDomain

Organisational Decision-Making in Water Reuse for Smart Cities (SMART-WaterDomain)

SMART WATER-DOMAIN DECISION SUPPORT TOOL

2024

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ABOUT THE SMART WATER PROJECT

Water scarcity, exacerbated by the ongoing effects of climate change, poses ever-increasing and formidable challenges to not only the sustainability of global economies and societies but also to the very essence of life on our planet. The consequences of rising temperatures, altered precipitation patterns, and more frequent extreme weather events are becoming alarmingly evident, significantly impacting the availability and distribution of freshwater resources. Reusing wastewater (WW) in agricultural and industrial domains offers a promising strategy to alleviate water stresses and enhance sustainable water management. However, the widespread adoption of wastewater reuse faces complexities ranging from technical limitations to societal acceptance.

In particular, the industrial sector has been slow to adopt water reuse practices, despite the growing urgency to do so. Industries often lag in incorporating water reuse technologies into their value chains and embracing water reuse as an integral component of their smart water management approach. Thus, there is a pressing need to encourage and facilitate the adoption of fit-for-purpose water reuse within these sectors.

The SMART-WaterDomain project emerges as a pivotal bridge, facilitating the exchange of technology and know-how among the IT sector, industry, and the wider community. Its overarching aim is to address the existing gap between theoretical technical capabilities and the actual application of these solutions within socio-political and cultural contexts. By fostering synergy between stakeholders, the project seeks to overcome barriers to adoption, drive innovation, and promote sustainable practices.

At its core, SMART-WaterDomain not only focuses on technological advancement but also prioritizes the dissemination and integration of water reuse practices as part of a smart water management strategy. The project recognizes that successful adoption is not solely dependent on technological progress; it involves understanding and navigating the social, political, and cultural dimensions that influence decision-making processes.

The SMART-WaterDomain aims to address the growing challenges by bridging the gap between technological capabilities and their application in socio-political and cultural contexts. Through pilot studies across European countries (Germany, Poland, Slovakia) and Japan, critical stakeholders engage in the development of autility operational framework.

The project capitalizes on cutting-edge digital decision support and monitoring tools, which leverage real-time data and climate change projections. The advanced framework will serve as a demonstrative platform for implementing water reuse practices in diverse contexts. By integrating digital decision support and monitoring tools, stakeholders will gain access to data-driven insights, enabling them to make informed and precise decisions. The use of real-time data and projections will empowers industries and agricultural entities to optimize their water usage, effectively mitigating the impact of water scarcity and climate variability.

The project's key objective is to develop a systematic framework to facilitate the uptake of smart reuse of wastewater (WW) resources and serve as an assessment mechanism for companies to integrate these techniques into their value chains

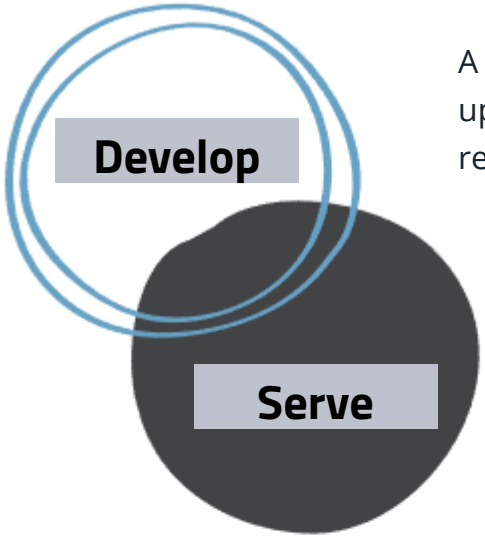
The SMART-WaterDomain puts a particular emphasis on elaborating how an increased uptake of reused wastewater in industrial/agricultural value chains can serve as a technique for reducing demands for freshwater, equalizing the distribution of water to reflect global demographic changes and increase environmental resilience.

With pilot studies carried out across Europe (Germany, Poland, Slovakia) and Japan, the project will develop a utility operational framework with critical stakeholders to produce digital decision support and monitoring tools that utilise real-time data and climate change projections.

The project's outcomes are expected to demonstrate how the systematic framework can be used in practice, drawing from expert evaluations and end-user experiences. The project aims to enhance the implementation of strategies that would increase the acceptance of water reuse practices for the local economy and society.

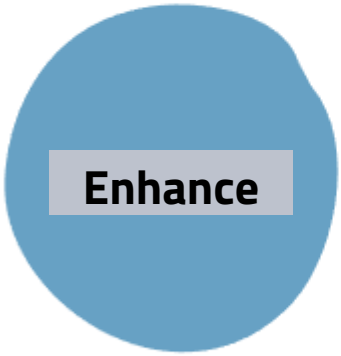
OUR GOAL

Our goal is to support the development of efficient and sustainable water management systems that optimize the quality and quantity of water at stages of its supply, discharge, reclamation and resource recovery.



A systematic framework to facilitate the uptake of smart reuse of wastewater (WW) resources

As an assessment mechanism for companies to integrate these techniques in their value chains



The adoption of fit-for-purpose reuse water in the industrial/agricultural sector

A framework for organisational decision-making processes for companies and utilities to facilitate the uptake of water reuse practices in their operations

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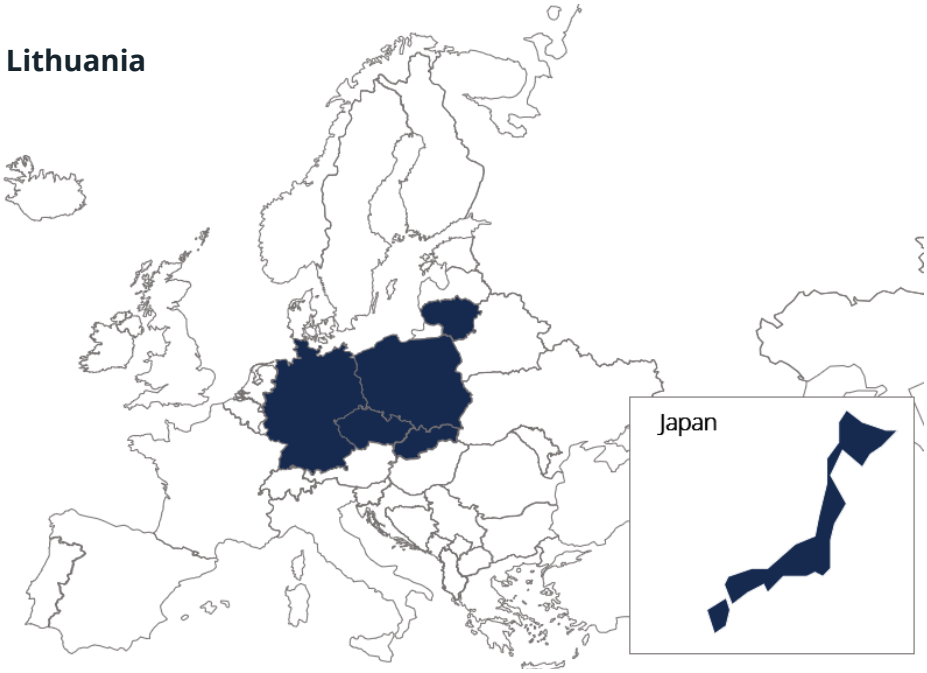

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INTRODUCTION

Organisations in all sectors are increasingly under pressure to reduce the negative environmental impact of their activities. This applies to:

- businesses involved in production or service activities,
- and to public administrations tasked with meeting the livelihood needs of their residents.

One of the critical resources is water. The challenges posed by ongoing climate change have resulted in dwindling water resources and an imbalance in nature can have far-reaching consequences for all organisations. It is, therefore the responsibility of every entity to protect water resources. In order to do this, the responsible parties should:

- analyse the current situation,
- understand the scale of the impact on water resources,
- and prepare a plan that takes into account the savings in the amount of water used by using available solutions, such as closing the loop.

The SMART WaterDomain Decision Support Tool is designed to support the water resources management process. The Tool:

- Facilitates the analysis of the current state and provides directions for future improvement activities.
- Helps to understand the relationship between operations and water resources, assess their relevance and identify risks associated with deterioration of water quantity or quality.
- Prepares organisations for non-financial reporting (ESG), which will involve an increasing number of entities in the coming years.
- Can be used by any type and size of the company or public entity.

Additionally, organisations implementing sustainability principles are beginning to require environmental data disclosure from their cooperating partners (e.g. within supply chains). Willingness to share such data is increasingly becoming a criterion for building and sustaining partnerships.

The process of data collection requires some resources and knowledge about the activities happening in the organisation and its value chain. The SMART WaterDomain Decision Support Tool is one of the approaches that can be used to collect, evaluate, and manage water-related information. It is possible to use it as a separate tool or integrate it with broader non-financial data management processes.

Moreover, the legal environment becomes more focused on checking the current state of the environment and evaluating the activities undertaken by the organisations. The regulations are and will continuously become stricter. It poses companies to set the frameworks for resource management integrated with their financial situation. Additionally, the implementation of a preventive approach to minimisation of resource consumption and setting environmentally friendly solutions brings concrete economic benefits to the undertakings. The resource efficiency is beneficial for all the interested parties.

How to use the tool?

The idea behind the solution developed was to make it intuitive. Persons filling in the form can give one of two answers (Yes/ No). Depending on the selection, they receive additional information related to a given aspect. In addition, the tool has been supplemented with universal information, making it easier to understand each element of the analysis. Before starting the analysis, it is recommended to read the description preceding the answer to the question.

GLOSSARY

ESG

ESG stands for Environmental, Social, and Governance. It is a framework used to evaluate the performance and impact of a company or organisation in these three key areas. ESG factors are used to assess how well an entity is managing its environmental and social responsibilities, as well as how effectively it is governed. These factors have gained significant importance in investment decisions, corporate strategies, and sustainability reporting. ESG considerations have gained prominence as investors, consumers, regulators, and other stakeholders increasingly recognise the importance of sustainable and responsible business practices. Companies that perform well in ESG areas are often seen as being better equipped to manage risks, build long-term value, and contribute positively to society and the environment.

Environmental dimension of ESG - this category focuses on a company's impact on the environment. It includes considerations such as:

- Carbon emissions and energy usage
- Pollution and waste management
- Reducing waste generation, including solid waste and wastewater
- Climate change adaptation and mitigation strategies
- Biodiversity and natural resource management

Social dimension of ESG - the social dimension encompasses how a company interacts with and impacts people, communities, and society as a whole. Key aspects of social factors include:

- Labor practices and human rights
- Employee health and safety
- Diversity, equity, and inclusion
- Community engagement and relations
- Consumer protection and product safety

Governance dimension of ESG - governance relates to the systems, structures, and processes that guide an organisation's decision-making and operations. It includes elements such as:

- Board composition and independence
- Executive compensation
- Transparency and disclosure practices
- Anti-corruption measures
- Shareholder rights

Closing the water cycle

re-using water in a closed technological cycle. Water conservation in the implementation of the closed-loop economy is mainly achieved by saving water in production and service activities and by increasing available water resources and water retention.

Materiality analysis

a process/tool for examining the impact an organisation has on a resource (e.g. water). It is usually done on two levels: internally and externally -> the table below.

Characteristics	Internal Materiality Analysis	External Materiality Analysis
Focus	Internal materiality analysis primarily focuses on the organisation's internal perspective. It involves evaluating ESG issues based on their potential impact on the organisation's operations, strategy, and financial performance.	External materiality analysis shifts the focus outward and looks at ESG issues from the perspective of external stakeholders, such as investors, customers, regulators, communities, NGOs, and industry peers.
Scope	This analysis considers how ESG issues could directly affect the organisation's business model, supply chain, products or services, employee relations, and other internal aspects.	This analysis considers how ESG issues are perceived by stakeholders and how they might impact the organisation's reputation, stakeholder relationships, and broader societal context.
Sources of Information	Internal materiality analysis often relies on internal data, such as financial reports, operational metrics, risk assessments, and internal stakeholder perspectives (such as employees and management). It involves understanding how ESG issues align with the organisation's goals and values.	External materiality analysis relies on external stakeholder engagement, surveys, feedback mechanisms, industry benchmarks, and external reporting frameworks. It aims to capture the viewpoints, concerns, and expectations of stakeholders who have an interest in the organisation's behaviour and impact.
Purpose	The purpose of internal materiality analysis is to identify ESG issues that are most relevant to the organisation's core operations and long-term success. This helps the organisation prioritise resources and efforts to address these issues in a way that aligns with its business strategy.	The purpose of external materiality analysis is to understand the ESG issues that are of greatest concern to stakeholders outside the organisation. This helps the organisation align its sustainability efforts with external expectations and enhance transparency and accountability.

Product life cycle a technique to assess the environmental aspects and potential environmental impacts associated with a product.

Environmental aspect a specific element or component of an organisation's activities, products, or services that has the potential to interact with or impact the environment. These aspects can be positive or negative and can include various interactions with the natural world.

Environmental impact	the effect that human activities, products, or services have on the natural environment. These impacts can be both positive and negative and can vary in scale from local to global. Understanding and assessing environmental impacts is essential for making informed decisions about sustainable practices, resource management, and minimising harm to ecosystems and the planet as a whole.
Risk	the likelihood that a specific event will occur and have an adverse impact on the operations of an organisation.
Stakeholder	a group or individual that can influence or is influenced by an organisation's activities. Stakeholders include such groups that enter into direct relationships with an entity, e.g. through contracts as in the case of suppliers, as well as indirect relationships, e.g. through interest in activities as in the case of NGOs or the media.
Supply chain	a network of organisations between which links have been established relating to the flow of material goods, services, capital and information at all stages of the flow, from initial suppliers to end-of-life waste generation.
Total water withdrawal	=Surface water (total) + groundwater (total) + seawater (total) +produced water (total) + third-party water (total).
Value chain	a concept used in business and economics to describe the sequence of activities that an organisation goes through to create, deliver, and capture value in the form of products or services. The value chain encompasses all the processes, functions, and activities that contribute to the production and distribution of goods or services from the initial raw materials to the final customer. It helps businesses identify areas where they can add value, enhance efficiency, and improve their competitive advantage.
Water consumption	= Total water withdrawal - Total water discharge
Water footprint	the total volume of water required to produce a given product, covering the entire process of its creation from the primary raw materials through their processing to the final product. And the amount of water that would be needed to dilute the pollutants generated throughout this process to an acceptable level.
Wastewater	any type of water that has been affected by human use, making it unsuitable for immediate re-use without treatment. It typically includes substances such as human waste, food scraps, oils, soaps, and chemicals. Wastewater originates from a variety of sources, including homes, businesses, industries, and stormwater runoff. It generally requires treatment to remove harmful substances before it can be safely discharged back into the environment or re-used. The treatment process varies depending on the composition and level of contaminants in the wastewater.

#1	Criterion	Examples of practices to be considered / Activities to be carried out under the criterion
	Does the organisation know the sources for the water resources it uses?	The water resources analysis is concerned with identifying ALL of the types of water the organisation uses, specifically: • Surface water, • Groundwater, • Seawater, • Produced water, • Third-party water.
	If you answer "YES" to the question above	**If you answer "NO" to the question above**
	Analyse the current water sources your organisation uses. Consider the possibilities for using them in the future against a backdrop of increasing demand for water resources and climate change issues.	Gather information on the water sources used by your organisation and in your value chain. Pay particular attention to water use in locations that are at risk of water stress and the possible challenges of using a similar amount of water in the future.

Information on the source of the water in question can be obtained from the company responsible for supplying water to your organisation. If your organisation has investments planned that may affect the volume of water demand, it is worth ensuring in advance that you have a continuous supply of the resource.

#2	Criterion	Examples of practices to be considered / Activities to be carried out under the criterion
	Does the organisation monitor the amount of water used for industrial processes?	The organisation should know the amount of water consumed for processes. This information is available on appropriate measurement devices installed in organisations. Another source of information is data from water consumption bills. The organisation should also know how much water goes into the sewage. The amount of water consumed has two main aspects: water withdrawal (for the processes, evaporation, etc.) and water discharge. The calculation makes it possible to calculate the amount of water the organisation uses.
	If you answer "YES" to the question above	**If you answer "NO" to the question above**
	If you know how much water you are consuming, you can move on to planning water conservation measures.	Check your facility's monthly water use. Determine the water intensity of your processes. Develop a water use forecast for each process.

Knowing the amount of water you take in and the amount that will be used for business operations will allow you to determine the extent of the environmental impact your organisation has in society and prepare you to develop water conservation plans. In addition, knowing the water intensity of your processes will make it easier to benchmark yourself against other organisations in your industry or look for good practices to minimise consumption.

#2

#3	Criterion	Examples of practices to be considered / Activities to be carried out under the criterion
	Does the organisation take water conservation measures in its operations?	Depleting water resources, prolonged droughts and sudden events are making water resources critical for all types of organisations. If you want to ensure that you can achieve your business goals, it is worth ensuring that you integrate conservation into your business strategies.
	If you answer "YES" to the question above	**If you answer "NO" to the question above**
	By managing water resources in an informed and responsible manner, the organisation is able to respond to current events, adapt to identified challenges and control the process more effectively.	In reviewing its resources and knowing the risks associated with water management, each organisation should consider setting targets to reduce the amount of water used by increasing the efficiency of its operations, adopting techniques and methods that allow for recovery and re-use, and effectively treating wastewater. A rational approach to water management can bring economic and environmental benefits.

The integration of the environmental dimension, in this case concerning water resources, into the strategy will facilitate the management of processes and will allow the opportunities and benefits of rational water management to be assessed, as well as the real risks associated with the increasing pressure on the environment. When setting targets to reduce water consumption, it is worth defining the specific values the organisation intends to achieve, assessing their reality and relevance, and determining the time when the target will be achievable. The previous steps in this tool will be helpful in setting targets.

#3

#4	Criterion	Examples of practices to be considered / Activities to be carried out under the criterion
	Has the organisation conducted a materiality analysis for water resources used in business operations?	The materiality analysis estimates the ALL impacts (direct and indirect) of the organisation on ALL types of water resources (Surface water, Groundwater, Seawater, Produced water, Third-party water) throughout the value chain. Additional questions that can help address this criterion: • Do you know that the water resources are finite? • What if there will be no more water to sustain your company's operations?
	If you answer "YES" to the question above	**If you answer "NO" to the question above**
	Remember to periodically perform a materiality analysis. The current situation is very dynamic and can affect the quantity and quality of water resources at your disposal. An ongoing assessment of the situation will allow you to react quickly and adapt to changing conditions. This is particularly important for those organisations for which water resources are critical to the continuation of business operations both within the organisation and its value chain.	Perform a water resource materiality analysis taking into account current and planned resource use. In the analysis, it is worth considering the areas of activity where water is a key (non-replaceable) resource for both the organisation and its value chain as well as the direct and indirect impacts the organisation has or may have on the resource through its activities.

To better understand the concept of materiality, see the examples below.

#4

Internal Materiality Analysis	External Materiality Analysis
Step 1: Identification of Relevant Internal Departments: Identify the internal departments and functions within XYZ Beverages that are directly involved in or affected by water usage. These might include Operations, Production, Supply Chain, Facilities, Environmental Health and Safety, and Finance.	**Step 1: Identification of Stakeholders:** Identify key stakeholders relevant to water usage, such as investors, customers, employees, regulatory authorities, local communities, and NGOs focused on water conservation.
Step 2: Data Collection: Gather data on water usage from each relevant department. This includes: • Water consumption data for different processes (e.g., production, cleaning, cooling). • Water sourcing information (e.g., location, quantity, quality). • Wastewater discharge data and treatment practices.	**Step 2: Identification of Water-Related Aspects:** Identify water-related aspects within the company's operations that could have environmental, social, or financial impacts. These aspects might include: • Water sourcing: Wells, local water supplies, and potential reliance on water-stressed regions. • Water usage: Water consumption in production, cleaning, cooling, and other processes. • Wastewater discharge: Effluent quality and treatment practices before discharge. • Supply chain impacts: Water usage in raw material production (e.g., agricultural inputs).
Step 3: Quantitative Assessment: Quantify the water usage for each process and department. Calculate the water footprint of different products or production lines based on the data collected.	**Step 3: Assessment of Relevance:** Assess the significance of each water-related aspect by considering its potential impact on the company's operations, reputation, and stakeholder interests. For example: • Water sourcing from water-stressed regions could impact local communities and the company's social license to operate. • High water consumption in production could lead to higher operational costs and environmental concerns.
Step 4: Impact Assessment: Assess the potential impacts of water usage within the company's operations. Consider factors such as: • Environmental impacts: Effects on local water bodies, ecosystems, and water availability. • Financial impacts: Cost implications of high water consumption and potential regulatory fines. • Operational impacts: Risks associated with water scarcity or supply disruptions.	**Step 4: Stakeholder Engagement:** Engage with stakeholders to gather insights into their concerns and expectations related to water resources. Conduct surveys, interviews, or focus groups to understand their viewpoints.
Step 5: Benchmarking and Best Practices: Compare the company's water usage data with industry benchmarks and best practices. Identify areas where the company's water consumption is relatively high and opportunities for improvement.	**Step 5: Prioritisation:** Prioritise the water-related aspects based on their significance. Aspects with higher potential impacts and stakeholder interest should receive greater attention in the materiality analysis.

Internal Materiality Analysis	External Materiality Analysis
Step 6: Integration with Strategy: Integrate the findings of the internal materiality analysis into the company's water management strategy. Develop action plans to address areas of concern and implement water-saving measures.	**Step 6: Reporting and Strategy Development:** Use the results of the materiality analysis to guide the company's reporting, strategy, and action plans. For example: • The company could set water usage reduction targets in line with stakeholder expectations and global water conservation goals. • Sustainability reports could highlight the company's efforts to source water responsibly and reduce its water footprint.
Step 7: Reporting and Communication: Communicate the results of the analysis and the company's water management efforts to internal stakeholders, such as senior management and relevant departments. This fosters awareness and collaboration.	**Step 7: Monitoring and Review:** Regularly review and update the materiality analysis as circumstances change, new data becomes available, and stakeholder priorities evolve.
Step 8: Monitoring and Continuous Improvement: Regularly monitor water consumption, track progress toward water reduction goals, and make adjustments to strategies and practices as needed.	

An organisation should know to what extent and in what processes it depends on the water resource it affects. Conducting a study at the internal level and with stakeholders gives information on how much water is a relevant resource in the studied organisation, considering its impact on the resource. This facilitates the implementation of measures to minimise the risks associated with the use of water resources in business operations. Materiality analysis is a multidimensional process that helps to understand the positive and negative impacts on the environment. When addressing water resources, companies and stakeholders should consider all aspects of their operations that may affect the quality or quantity of the water used for business or municipal purposes. Moreover, it's worth assessing how the water resources used by the organisations impact on the financial situation and what would happen if the resources is at risk of scarcity. The materiality analysis is usually prepared as an integrated method to analyse the overall situation of the organisation, taking into account the positive effects it has on resource savings and the negative impacts related to consumption.

#5	Criterion	Examples of practices to be considered / Activities to be carried out under the criterion
	Has the organisation conducted a risk analysis for water resources?	Risk analysis makes it possible to identify, assess and manage the aspects that are most likely to cause negative consequences for both the organisation and the environment. The risk analysis complements the materiality analysis. Do not forget to include the risk related to the water availability in the region you operate (e.g. if the region is subject to water stress). Include the information about water quality through the value chain. Additional questions that can help address this criterion: • Are there any operations which may decrease the quality or quantity of the water? • What kind of activities cause the higher risks? • Is water management a material issue for public administration? • Have you ever checked the regional data to assess the water-related risks?
	If you answer "YES" to the question above	**If you answer "NO" to the question above**
	Remember that risk analysis should be a process, and once done, it should be updated to identify new risks and opportunities for compensation.	Remember that water resources are drastically dwindling! Perform a risk analysis for your company's water resources. A risk analysis will allow your organisation to prepare for the challenges of increasing water stress, which can disrupt the continuity of your organisation's operations. A strategic approach to this area will facilitate the business decision-making process, taking into account the potential financial, social and environmental consequences.

To better understand the concept of risk, see the examples below.

#5

Company: XYZ Beverages

Water-Related Risk Assessment

1. Water Scarcity Risk:

Risk Description: The company sources water from an area with increasing water scarcity due to climate change and over-extraction.
Potential Impact: Reduced availability of water could disrupt production, increase costs due to water shortages, and harm the company's reputation if stakeholders perceive it as contributing to local water stress.
Mitigation Strategies: Develop a contingency plan for alternative water sources, invest in water-efficient technologies, and engage with local communities and regulators to promote responsible water use.

2. Regulatory Compliance Risk:

Risk Description: The company's wastewater discharge exceeds local regulatory limits, leading to potential fines and reputational damage.
Potential Impact: Regulatory violations could result in financial penalties, legal actions, and negative perceptions among stakeholders.
Mitigation Strategies: Enhance wastewater treatment processes, monitor discharge quality regularly, ensure compliance with local regulations, and invest in technologies that minimise pollutants in wastewater.

3. Supply Chain Risk:

Risk Description: A major supplier of a key ingredient is located in a region with water-related vulnerabilities, leading to potential disruptions in the supply chain.
Potential Impact: Supply chain disruptions could affect production schedules and product availability, leading to financial losses and reputational damage.
Mitigation Strategies: Implement a diversified sourcing strategy, collaborate with suppliers to enhance their water management practices, and conduct regular assessments of supplier vulnerabilities.

4. Reputation Risk:

Risk Description: The company is perceived by stakeholders as not taking sufficient steps to conserve water resources.
Potential Impact: Negative public perception could lead to decreased consumer trust, reduced sales, and difficulty attracting environmentally conscious investors.
Mitigation Strategies: Communicate transparently about water management efforts, share progress on water reduction goals in sustainability reports, and engage with stakeholders to demonstrate commitment to water stewardship.

5. Climate Change Risk:

Risk Description: The increasing frequency of extreme weather events due to climate change could disrupt water availability and impact the company's operations.
Potential Impact: Production interruptions, damage to facilities, and increased water-related costs due to extreme weather events.
Mitigation Strategies: Assess climate-related vulnerabilities, develop disaster response plans, and invest in resilient infrastructure to mitigate the impact of extreme weather events on water resources.

Materiality analysis and risk analysis provide insight into the scale of an organisation's impact on water resources, including across the value chain. As part of the risk analysis, it is necessary to:

- define the purpose and extent of water use,
- the location of its use,
- situations that may affect access to the resource, the place of extraction, the source of the resource, its quality and the environmental elements related to the impact on the extracted water resource (types of risks),
- develop a risk matrix,
- plan the objectives for minimising and mitigating the risks identified.

The risk analysis should take into account the financial dimension and the possible losses that will occur in a situation of water shortage or inferior quality.

#6	Criterion	Examples of practices to be considered / Activities to be carried out under the criterion
	Does the organisation undertake water conservation activities in its local community?	Doing business, directly affects the local community. In the case of water resources, this can have both positive and negative consequences. Do you know that water provides many ecosystem services? It determines the quality of fresh water. It's worth remembering that social engagement and common actions toward the environment enhance biodiversity and contribute to water savings. Some examples of water conservation activities in the local community could be: • Community education workshops; • Public awareness campaigns; • School programs; • Community gardens; • Water audits; • Rainwater harvesting; • Community cleanups; • Partnerships with NGOs and local governments; • Demonstration projects.
	If you answer "YES" to the question above	**If you answer "NO" to the question above**
	If your organisation currently carries out activities for and with the local community, it is worth looking at the social and environmental impact they bring. When setting goals for building relationships with the local community, it is worth considering their level of knowledge of water resources; the organisation's capacity to engage in joint activities; or their ability to financially support community-based activities, including those carried out by third sector organisations. Getting involved strengthens the potential outcomes and builds trust in the organisation. Do not give up on information and education activities.	Working together to protect water resources in the local community brings great value to each party. If you are just starting to build relationships with stakeholders, make yourself known. If you already have experience of working together in another area but the organisation has not carried out activities in the water field, it is worth finding an NGO with which to start joint projects. Organisations that enter into dialogue with the local community can explore their needs and expectations and respond effectively in the years to come. Water resources are a public good, so planning activities that may interfere with the local community (bearing the consequences of business decisions) must be done with the active participation of all stakeholders.

When not all business areas have targets for water conservation, it is worthwhile to confront the current situation with future plans and apply the analyses mentioned earlier to develop an action plan that expands the management area while fitting in with the previously adopted course of action. Consider developing a policy/action plan or strategy to facilitate the management of environmental aspects.

#7	Criterion	Examples of practices to be considered / Activities to be carried out under the criterion
	Does the organisation know the amount of wastewater produced?	The volume of wastewater produced in a company is directly related to the volume of water intake. The volume of industrial wastewater can be reduced by introducing wastewater recovery/ water re-use systems.
	If you answer "YES" to the question above	**If you answer "NO" to the question above**
	For a better understanding of the potential environmental impact of the company, find out the amount of wastewater in the various production processes.	Find out about the amount of wastewater produced across the company and individual production processes.

Companies are increasingly establishing cooperation with the local community in order to learn about their needs and expectations regarding, among other things, environmental aspects. In industries that rely on water, such as agriculture, cooperation takes particular importance. Entering into a dialogue with those representing the local community allows one to understand the way the community functions and to establish common goals and objectives for the protection of water resources in the area.

#7

#8	Criterion	Examples of practices to be considered / Activities to be carried out under the criterion
	Does the organisation take pre-treatment measures for wastewater?	Industrial wastewater treatment can be based on the action of pretreating the wastewater before it is discharged into the sewerage system, treating the wastewater to the requirements that allow it to be discharged into a receiving water body. Pre-treatment (otherwise known as primary treatment) mainly uses mechanical processes, which involve the removal of solids from the wastewater. It is used to prepare wastewater that is sent to further treatment stages.
	If you answer "YES" to the question above	**If you answer "NO" to the question above**
	Explore options for less water-intensive technologies/equipment. If you are already taking steps to reduce the amount of water used and pre-treatment, consider whether there are additional ways to achieve better treatment results and re-use treated wastewater.	Consider the possibility of introducing wastewater pre-treatment processes. Use available tools and solutions such as Best Available Techniques. Research what wastewater pre-treatment methods work in your industry. Check the applicability of the solutions in your organisation.

The planning of activities related to the reduction of the environmental burden of an activity should take into account both input and output interventions. In the case of process exit analysis, it is worthwhile to refer to already available solutions such as: the Best Available Techniques (BAT) Reference Document for Common Waste Water and Waste Gas Treatment/Management Systems in the Chemical Sector, depending on the industry sector.

#8

#9	Criterion	Examples of practices to be considered / Activities to be carried out under the criterion
	Does the organisation require its suppliers to act in the area of water conservation?	The water footprint provides a broader perspective on the actual consumption of water resources at all stages of a product's life cycle. This means that the actual environmental impacts have to be analysed not only within a single organisation but along its entire value chain, taking into account both suppliers and end-consumers who, through the way a product/service is used, can increase negative influence on the environment. Additionally, organisation should consider the amount of water used by consumers of offered products/services.Think about the water wasted in the value chain related to the wastewater and water used for unsold or unused products.
	If you answer "YES" to the question above	**If you answer "NO" to the question above**
	Resource conservation requires awareness and action at every link in the supply chain. Verify if suppliers are using water-efficient technologies.Offer them a dialogue on how they can mutually support each other in meeting environmental targets related to the amount of water used, ways to reduce water consumption and methods of wastewater treatment.	Introduce water conservation requirements as an essential element at every stage in the supply chain. Build awareness and make a real impact on the quality of water resources. Introduce measures to monitor the water footprint of the company and/or the products/services offered.

The organisation should ensure clear communication of expectations towards its suppliers by including them in its purchasing policies or supplier selection criteria, among other things. An additional element is to educate both suppliers and customers of the products offered about the importance of water resources and the need to protect them. In partnership arrangements, in cooperation with suppliers, organisations can set common reduction targets.

	Criterion	Examples of practices to be considered / Activities to be carried out under the criterion
#10	Does the organisation have solutions in place to close the water loop?	The benefits that an organisation can gain from closing the loop are: • measurable benefits in terms of economic benefits of reducing the amount of water used, • the amount of wastewater discharged, • reducing the environmental costs associated with the activity.
	If you answer "YES" to the question above	**If you answer "NO" to the question above**
	Consider whether there are still processes in your organisation where it is possible to close the water cycle. Try to achieve the highest possible percentage of water recovery.	Consider the feasibility of introducing closed water circuits in the production process; estimate the costs of plant conversion and the benefits of saved water, paying particular attention to environmental impacts.

Closing water cycles in production processes means diverting used water for treatment and returning it to the production process, which at the same time means huge savings and does not burden the environment with additional wastewater loads. Possible closing cycles include re-using process water after treatment in local treatment systems; re-using treated municipal wastewater to feed industrial process systems; using treated rainwater, social wastewater, cooling water and drainage water to supplement process cycles; selective capture of wastewater for co-treatment.

#10

#11	Criterion	Examples of practices to be considered / Activities to be carried out under the criterion
	Does the organisation have systems in place to re-use treated wastewater?	Taking into account the water resources crisis, legislators are looking for solutions to limit the depletion of water resources and introducing solutions to enable the re-use of water, e.g., for agriculture. Water resources that are 'reclaimed water' must meet certain composition and quality requirements.
	If you answer "YES" to the question above	**If you answer "NO" to the question above**
	Consider whether there are still processes in your organisation where wastewater re-use is possible. If so, consider applying this solution on a wider scale.	Consider whether there are processes in your organisation where wastewater re-use is possible. If so, consider applying this solution on a wider scale.

Grey water (grey wastewater), after being subjected to appropriate processes, can be used in a closed cycle, e.g. for production purposes that do not require the supply of water quality for human consumption, social purposes (toilet flushing), cleaning purposes (washing of hall surfaces, maintenance of machinery), as well as maintenance of green areas around the plant. Another way of saving resources is the recovery of heat from such wastewater, which contributes to reducing the energy intensity of buildings and translates into an EP energy indicator value (an indicator of annual demand for non-renewable primary energy for heating, ventilation and hot water in a building expressed in kWh/(m² year)). The benefits that an organisation can realise from such an approach to wastewater management include the recovery of up to 80% of water, with consequent economic benefits (reduced expenditure on purchasing water from external sources) and environmental benefits (reduced negative impact on the environment, mainly on water resources by reducing their exploitation and pollution as a result of discharging wastewater/process water to the receiving water body).

#11

#12	Criterion	Examples of practices to be considered / Activities to be carried out under the criterion
	Does the organisation discharge directly into the sewer system?	The most common way for a company to manage its industrial wastewater is to pretreat it and then discharge it into the sewer system. This solution is a conscious renunciation of the potential that wastewater brings with it.
	If you answer "YES" to the question above	**If you answer "NO" to the question above**
	Consider the possibility of using wastewater as a raw material for process water. Think about the possibility of building an on-site wastewater treatment plant, from which the treated wastewater returned to the process water cycle, which will reduce the economic outlay for purchasing water from other sources.	If your organisation is not very advanced in water conservation measures, it is worthwhile to carry out a feasibility study for potential solutions, including the possibility of using treated wastewater as a raw material for process water. Such an approach will enable you to reduce the economic outlay for purchasing water.

Water resources are diminishing. This can cause challenges in securing sufficient water required for production processes, especially during prolonged and hydrological droughts. Organisations should therefore, consider options for wastewater treatment and re-use, which will reduce water abstraction at source, relieving pressure on the ecosystem and reducing the risk of process interruption.

#12

To understand better the presented criterions and recommendations, have a look at the examples presenting the following logical chain: "Product -> Value chain -> Water footprint -> Materiality - > Risk -> Mitigation - possible water re-use"

Example product: Bottled Drinking Water

Value chain:

1. Inbound Logistics: Sourcing and transporting water from natural sources (springs, wells, etc.) to the production facility.
2. Operations: Purifying, filtering, and bottling the water.
3. Outbound Logistics: Distributing bottled water to retailers, stores, and other distribution points.
4. Marketing and Sales: Branding, packaging, advertising, and sales efforts to promote the product.
5. Service: Providing customer support and addressing any concerns related to bottled water.

Water footprint: The water footprint of bottled drinking water includes the amount of water used in each stage of the value chain, from sourcing to distribution. This includes the water consumed directly (e.g., in production processes) and indirectly (e.g., in packaging materials manufacturing).

Materiality:

Water Sourcing: Materiality in terms of water sourcing relates to where the water used for bottling comes from. It involves assessing the sustainability and responsibility of the source. Considerations include:

- The volume of water extracted from the source and its impact on the local ecosystem.
- The sustainability of the aquifer or water source to ensure it can support ongoing use without depletion.
- Adherence to local water rights and regulations to prevent overuse or conflicts with local communities.

Water Efficiency: Efficient water use materiality focuses on the quantity of water used in the bottling process. It includes:

- Reducing water wastage during the manufacturing process, such as rinsing, cleaning, and sterilising bottles.
- Implementing water recycling and re-use strategies to minimise the amount of water needed for production.
- Monitoring and optimising the water-to-product ratio to ensure minimal waste.

Risk:

- Water Scarcity Risk: Dependence on water sources could become a risk if the water supply is affected by droughts or contamination.
- Regulatory Risk: Regulations on plastic usage and waste management could impact packaging materials.
- Reputation Risk: Concerns about plastic waste and environmental impact might lead to negative public perception.

Mitigation - possible water re-use:

- Condensation Collection: In the production process, water vapor could be captured and treated for re-use.
- Cleaning and Rinsing: Wastewater generated during cleaning and rinsing processes could be treated for re-use in non-potable applications.

Example product: Smartphone

Value chain:

1. Inbound Logistics: Procurement of raw materials such as metals, minerals, plastics, and electronic components.
2. Operations: Assembly, manufacturing, and testing of the smartphone components.

3. Outbound Logistics: Distribution to retailers, online platforms, and stores.
4. Marketing and Sales: Advertising, branding, and sales efforts to promote the smartphone.
5. Service: Customer support, repair services, and software updates.
Water footprint: The water footprint of a smartphone includes the water used in various stages of its production, such as mining and processing raw materials, manufacturing, and cooling during production processes.

Materiality:

Water Use in Manufacturing: Materiality in smartphones production includes assessing the amount of water used during the manufacturing process, especially in the semiconductor fabrication and electronics assembly stages.

- Companies can implement water recycling and re-use systems to reduce freshwater consumption.
- Evaluating the environmental impact of water use and implementing strategies to minimise it.

Supply Chain Water Footprint: Materiality extends to the entire supply chain, including the extraction of raw materials like metals (e.g., aluminium, copper) and rare earth elements.

- Assessing the water footprint of raw material extraction and encouraging suppliers to adopt responsible water management practices.
- Promoting the use of recycled materials to reduce the need for new resource extraction and associated water use.

Risk:

- Supply Chain Risk: Dependence on minerals from water-intensive mining regions could lead to supply disruptions due to water scarcity issues.
- E-Waste Risk: Inadequate disposal and recycling of smartphones could contribute to electronic waste problems.
- Regulatory and Compliance Risk: Regulations on hazardous substances and electronic waste disposal could impact production and distribution.

Mitigation - possible water re-use:

• Cooling Water: Water used for cooling manufacturing processes could be treated and re-used within the facility.
• Landscape Irrigation: If available, treated wastewater from the facility could be used for landscaping or non-potable purposes.

Example product: Cotton T-shirt

Value chain:

1. Inbound Logistics: Procurement of raw cotton from farms.
2. Operations: Spinning, weaving, and dyeing the cotton fabric; cutting and sewing the fabric into t-shirts.
3. Outbound Logistics: Distribution to retailers, online platforms, and stores.
4. Marketing and Sales: Branding, labelling, and advertising efforts to promote the t-shirts.
5. Service: Customer support, handling returns, and addressing inquiries.

Water footprint: The water footprint of a cotton t-shirt includes the water used in growing and processing cotton, as well as the water consumed in dyeing and finishing processes during manufacturing.

Materiality:

Water Use in Cotton Farming: Materiality for cotton t-shirts involves evaluating the water consumption in cotton farming, which is a water-intensive crop.

• Promoting more efficient irrigation methods or rain-fed cotton farming to reduce water use.
• Encouraging sustainable cotton farming practices that minimise the environmental impact of water consumption.

Water Use in Textile Processing: Materiality extends to the water-intensive dyeing and finishing processes in textile production.

• Implementing water recycling and treatment systems in textile factories to reduce freshwater use.
• Using environmentally friendly dyeing techniques that require less water.

Risk:

• Water Scarcity Risk: Dependence on water for cotton cultivation in water-scarce regions could lead to supply disruptions.
• Social Risk: Poor labour practices or human rights violations within the supply chain could impact the company's reputation.
• Regulatory Risk: Regulations on chemical usage, waste disposal, and worker safety could affect production processes.

Mitigation - possible water re-use:

• Dyeing Process: Wastewater from the dyeing process could be treated and re-used within the facility for non-potable purposes.
• Agricultural Water Management: In cotton farming, efficient irrigation practices could reduce water usage.

Example product: Cotton T-shirt

Value chain:

1. Inbound Logistics: Procurement of raw cotton from farms.
2. Operations: Spinning, weaving, and dyeing the cotton fabric; cutting and sewing the fabric into t-shirts.
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4. Marketing and Sales: Branding, labelling, and advertising efforts to promote the t-shirts.
5. Service: Customer support, handling returns, and addressing inquiries.

Water footprint: The water footprint of a cotton t-shirt includes the water used in growing and processing cotton, as well as the water consumed in dyeing and finishing processes during manufacturing.

Materiality:

Water Use in Cocoa Farming: Materiality in chocolate bars includes assessing the water footprint of cocoa farming, which often occurs in regions with high water stress.

- Encouraging sustainable cocoa farming practices that use water more efficiently.
- Supporting cocoa farmers in water-scarce regions through community water management projects.

Water Use in Chocolate Manufacturing: Materiality also extends to water use during chocolate processing, such as cocoa bean fermentation and chocolate production.

- Implementing water-efficient manufacturing processes, reducing water wastage, and optimising water use.
- Considering the environmental and social consequences of water use in cocoa processing.

Risk:

- Supply Chain Risk: Dependence on cocoa production regions prone to water scarcity or climate-related challenges could lead to supply disruptions.
- Deforestation Risk: Unsustainable cocoa farming practices can contribute to deforestation and ecosystem degradation.
- Reputation Risk: Concerns about child labour, unethical practices, or environmental impact could damage the brand's reputation.

Mitigation - possible water re-use:

- Cleaning Processes: Wastewater generated during cleaning processes could be treated and re-used within the facility for cleaning or non-potable purposes.
- Irrigation Practices: Sustainable irrigation practices could be employed in cocoa farming to optimise water use.

For all these products, companies can analyse their water use materiality by evaluating and optimising water consumption at various stages of their supply chain, from raw material extraction to manufacturing and processing. This not only reduces the environmental impact but can also positively affect local communities and ecosystems by promoting responsible water management practices.

Remember that the complexity of the value chain, water footprint, materiality assessment, and risk analysis would vary based on the specifics of the product, the organisation's practices, and the regulatory environment in the region.

It's important to note that water re-use practices depend on various factors, including the quality of the treated water, local regulations, infrastructure availability, and cost-effectiveness. Please keep in mind that those are simplified examples, and the actual value chain, water footprint, materiality assessment, and risk analysis for the product(s) would involve more detailed and specific considerations.

SMART WATER-DOMAIN DECISION SUPPORT TOOL

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