Scouting of European innovative solutions in the context of water as a circular economy resource

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INTRODUCTION

Droughts and water scarcity are becoming an increasing concern in Europe, with around 20% of the European territory and 30% of the total population already affected by water stress. With rising levels of global warming, water scarcity is projected to become more severe and frequent, especially in southern and western-central Europe [Christensen and Christensen, 2007, Gampe et al., 2016].

In most EU member states, water systems follow a linear model which corresponds to the exploitation and degradation of non-renewable water resources. Current adaptation options which focus on saving water and enhancing efficiency might not be sufficient in the future to manage the increasing demand and reduced water availability due to climate change.

To overcome these challenges, the concept of a Circular Economy has emerged as a response to the current unsustainable linear model of "take, make, consume, and waste". A circular economy offers an opportunity to recognize and capture the full value of water. However, the transition toward a circular economy of water is a long and complex process due to the existence of technical, economic, social, and regulatory barriers.

OBJECTIVES OF THE BOOST'IN PROJECT

The **overarching goal of the BOOST-IN project** is to implement a successful strategy that promotes the types of technological changes, governance schemes, shifts in mindset and organizational structures the water sector needs to become circular. This will be achieved through an effective transfer of innovative Water Circular Economy Solutions and initiatives to further close water cycles, reuse water, and recover energy, nutrients, and other by-products from unconventional water sources, based on real-life experience in the circular economy.

However, implementation of these changes still faces several barriers (e.g. technological, economic, knowledge, social perception) that need to be overcome. BOOST-IN intends to tackle these barriers by an effective identification of innovative Water Circular Economy Solutions, selecting them through a specifically designed dynamic funnel method, and promote the transfer these solutions to potential end-users such as local authorities, water utilities, and industry stakeholders to further close and improve the water cycle. The funnel model is a multicriteria analysis method used to assess the outcomes and innovations of R&D projects with the purpose of selecting innovative solutions that align with specific criteria for each project/user activity.

BOOST-IN aims to bridge the gap between R&D outcomes and market implementation by providing the necessary tools and support to bring these innovations to fruition.

The project will develop and apply this approach in six Regions of Opportunity (ROp) evenly distributed across Europe (Andalusia in Spain, Peloponnese in Greece, Lower Saxony in Germany, Bretagne and Pays de la Loire regions in France, Emilia-Romagna in Italy and Srednogorie in Bulgaria) by organization of co-creation workshops to rise public awareness and support for solution implementation and overcome barriers, as well as through the design of specific risk management plans.

To promote and boost the successful market uptake of circular solutions and maximize the impact, the project will provide **expertise on suitable business models** and **develop standardized quality criteria**, as well as **facilitate the links between solution providers and potential investors.**

SCOUTING AND CHARACTERIZATION FRAMEWORK

Dynamic funnel model

The funnel model is a multicriteria analysis method used to assess the outcomes and innovations of research and development (R&D) projects. In BOOST-IN, its purpose is to guide the selection of innovative solutions collected through a public call for applicants, using a step-by-step evaluation process and ensuring that assessment criteria at each step align with the specific needs of each activity planned within the project to boost market uptake. As shown in Figure 1, R&D initiatives and innovations were scouted from various sources and then filtered through the funnel process:

- At least 500 solutions were scouted from across Europe,
- Initial assessment and characterization of a large number (>250) of solutions,
- At least 200 solutions at an advanced level of development were characterized and included in the Water Europe Marketplace,
- Impact assessment of 30 selected solutions,
- Selection of 24 case studies as input for co-creation process on social aspects and policy assessment and recommendations in Regions of Opportunity (ROp),
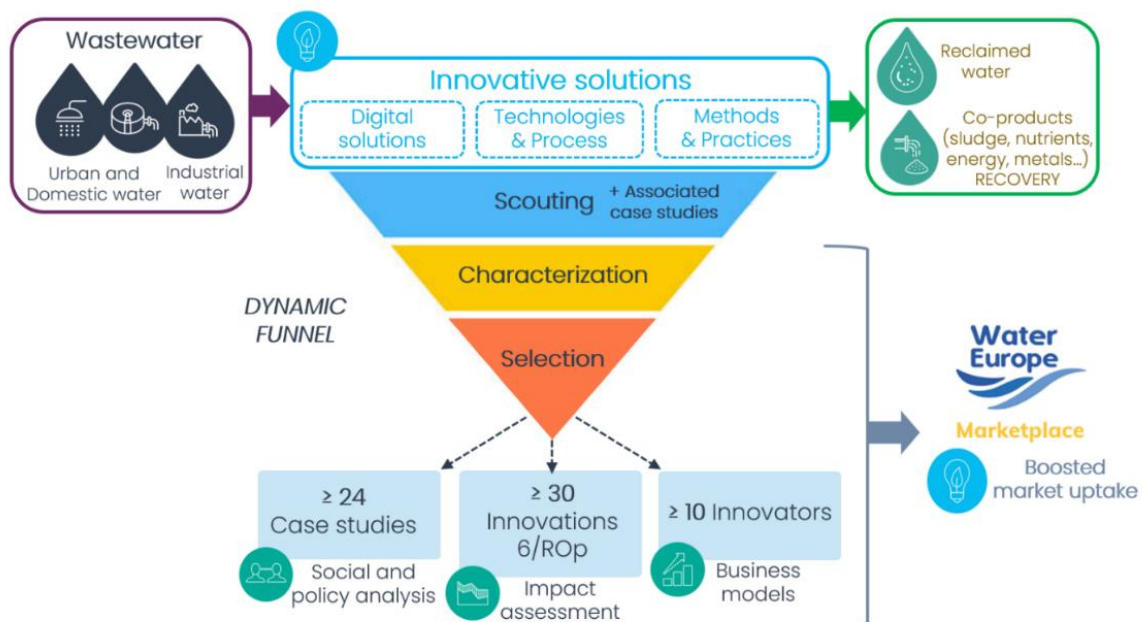- In-depth assessment of 10 solutions for business model development.

Figure 1: Funnel methodology applied to boost innovative circular water solutions

Selection criteria

The selection criteria for each activity are crucial for ensuring the relevance and quality of the solutions:

- **Marketplace Listing:** Solutions must have a Technology Readiness Level (TRL) of 9, indicating they are proven in operational environments. Additionally, a comprehensive case study is required to illustrate implementation success.
- **Business Model Development:** Solutions should align with identified sectoral challenges and demonstrate a willingness to develop their business models further based on market and regional needs.
- **Impact Assessment:** Solutions will be evaluated based on their relevance to sectoral challenges, the quality of their case studies, and their overall impact on the target regions.
- **Social and Policy Analysis:** Solutions should have a TRL of 7 or higher and provide insights into challenges faced during regulatory approvals. They must also offer diverse geographical and technological perspectives.

QUESTIONNAIRE AND SCOUTING PROCESS

The BOOST-IN project has conducted a scouting process through a public call across various media platforms and utilize existing networks to gather a wide range of submissions via an online questionnaire. The call will highlight the benefits to innovators of participating and request them to fill in a brief online questionnaire.

An online questionnaire has been designed to gather essential information from solution providers. Key considerations in the design are:

- Conciseness: The questionnaire is brief to encourage higher completion rates.
- Alignment with Criteria: Questions are aligned with the selection criteria to ensure relevant data is collected.
- User Experience: The questionnaire will be available in English and structured to be intuitive and easy to complete.

The purpose of the public call for innovative solutions was to develop a database of at least 5200 innovative solutions in the European circular water economy sector from which targeted analysis, assessments, collaboration, and co-creation, and workshop activities can be implemented.

The information gathered during this scouting process will be used to short-list solutions to be selected for future project activities.

The BOOST-IN project is looking for:

- Innovative technologies and processes for different types of water reuse, and the recovery of energy and different materials (e.g. nutrients, metals, etc.) from different water sources (i.e. municipal and industrial wastewater, greywater, stormwater, etc.),
- Digital solutions related to the circular water economy,
- Training and advisory materials related to the circular water economy.

DATABASE STRUCTURE AND MANAGEMENT

The database serves as the core repository for all solution-related information. It has been designed to gather data from the online questionnaire and manage it securely, to allow for data export in Excel format for ease of access and collaboration and to be flexible to accommodate new information and changes as needed.

Data from the questionnaire will be managed using standard encryption protocols to ensure security. The database will be regularly updated and categorized based on project needs, including tracking communications and managing additional data fields.

MAPPING OF SOLUTIONS

The scouting process will terminate at the end of 2024 but may continue into 2025 in order to obtain the most comprehensive set of solutions possible. An initial mapping of the preliminary results will be presented at the conference, showing the spatial and thematic variation of the solutions within the database.

ACTIVITY METHODOLOGY

There are three key activities that the BOOST-IN project will develop in relation to the solutions collected in the database:
- Business Model Development,
- Impact Assessment (environmental and economic),
- Social and Policy Analysis.

The methodology of the impact assessment activity will be presented at the conference.

CONCLUSIONS

The BOOST-IN comprehensive framework for scouting, characterizing, and managing innovative solutions was developed within the six first months of the project. The framework includes the Dynamic Funnel Model, which guides the selection process through various stages, each with specific criteria and objectives. The questionnaire and public call strategies were designed to attract and gather high-quality solutions, while the database management approach ensures efficient data handling and accessibility. This structured approach aims to foster the development and scaling of circular economy solutions in the water sector, driving forward the project's goals and contributing to sustainable water management practices.

AKNOWLEDGMENTS

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