



**ZERO BRINE**

## **10.5 Stakeholder consultations**

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<sup>1</sup> **R**=Document, report; **DEM**=Demonstrator, pilot, prototype; **DEC**=website, patent fillings, videos, etc.; **OTHER**=other

<sup>2</sup> **PU**=Public, **CO**=Confidential, only for members of the consortium (including the Commission Services), **CI**=Classified

## Executive Summary

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This report provides a concise overview of stakeholder consultation events conducted as part of the ZERO BRINE project (Task 10.2).

The report is structured into five sections. The first introduction section discusses the aim of the stakeholder consultation events and contextualizes them within the overall objectives of the ZERO BRINE project. In particular, this relates to establishing trust and collaborative capacity across the stakeholders while gathering insights to inform the iterative co-design of the circular business model for the large scale-demonstration in the Botlek area of Rotterdam Port (task 8.1).

The second section goes into more detail by outlining the specific objectives, process and outcomes of the first stakeholder consultation event, which took place in March 2018 at the faculty of Applied Sciences of the TU Delft. In particular, the outcomes consisted of gathering the preliminary stakeholder inputs needed to define the circular business model for the large-scale demonstration (task 8.1). At the same time, while collecting these preliminary stakeholder inputs, a tool for circular business model co-design was also developed and iteratively refined, to be used in the following event and in task 8.1 to inform circular business model co-design.

The third section outlines the specific objectives, process and outcomes of the second stakeholder consultation event, which took place during the second yearly project meeting in Barcelona, hosted by EURECAT in September 2019. Specifically, outcomes consisted in further advancing business model co-design using the aforementioned tool as a support.

The fourth section outlines the specific objectives, process and outcomes of the third stakeholder consultation event, which took place during the 5<sup>th</sup> European Water Innovation Conference in Zaragoza, Spain on 11 December 2019. Outcomes related to the ongoing work of the project, the views of the European Commission, and wider exploitation of the project results on behalf of all stakeholders.

The fifth and last conclusion section briefly reiterates the overall outcomes of the three events, explaining how they have been used to inform the execution and delivery of task 8.1. In particular, the three events led to the conclusion that the implementation of a circular business model in the Botlek area of the Rotterdam Port would not be feasible at this stage, due to regulatory, economic and technical conditions. Therefore, a fourth stakeholder was not performed. As an alternative, it was decided to list current barriers, as well as drivers and opportunities in view of a future circular business model. This additional work was carried out within of task 8.1 (see D8.2 for more detail).

# Contents

<b>Executive Summary .....</b>	<b>3</b>
<b>List of figures.....</b>	<b>5</b>
<b>List of tables .....</b>	<b>5</b>
<b>1. Introduction .....</b>	<b>6</b>
<b>2. First stakeholder consultation .....</b>	<b>7</b>
2.1 Objective .....	7
2.2 Process.....	7
2.3 Outcomes .....	10
<b>3. Second stakeholder consultation.....</b>	<b>13</b>
3.1 Objective .....	13
3.2 Process.....	14
3.3 Outcomes .....	15
<b>4. Third stakeholder consultation .....</b>	<b>16</b>
4.1 Objective.....	16
4.2 Process.....	16
4.3 Outcomes.....	17
<b>5. Conclusion.....</b>	<b>18</b>
<b>References.....</b>	<b>19</b>

## List of figures

---

Figure 1: One of the presentations carried out in the first phase of the workshop.....	8
Figure 2: Adapted version of the sustainable business model canvas. Based on Bocken et al., 2015. ..	9
Figure 3: A business model concept produced by one of the three groups during the co-creation session .....	11
Figure 4: Improved tool template developed to support the ZERO BRINE stakeholders in co-designing the circular business model for the large-scale demonstration .....	12
Figure 5: ZERO BRINE partners involved in the second stakeholder consultation event .....	13
Figure 6: A business model concept produced by one of the five groups during the workshop.....	15
Figure 7: Third ZERO BRINE stakeholder consultation event.....	18

## List of tables

---

Table 1: List of stakeholders involved in the first consultation event .....	7
Table 2: List of stakeholders involved in the first consultation event .....	14

## 1. Introduction

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This report provides an overview of stakeholder consultation events conducted as part of the ZERO BRINE project (Task 10.2).

The ZERO BRINE project aims to introduce a new combination of technologies and an innovative business model. This is functional to transform the supply and value chains of water and minerals as part of the transition toward a Circular Economy. This kind transformation may require radical changes in the current ways stakeholders operate within the aforementioned supply and value chain. Some stakeholders may find the transformation challenging and lose benefits from it. In particular, the companies producing virgin salts and minerals may perceive a circular value chain as a potential threat, which might reduce their sales volumes. Therefore, consulting these stakeholders, along with all those actively developing the ZERO BRINE solution is an essential part of the project. Indeed, the overarching purpose of stakeholder consultation events is fostering discussion, building trust and providing all the parties involved with the opportunity of becoming actively engaged in the project. This is in turn functional to ensure a successful implementation of the ZERO BRINE project, as a fundamental milestone in the transition toward new ways of producing and using water and minerals in Europe, within the emerging Circular Economy paradigm.

Three stakeholder consultation events have been performed throughout the ZERO BRINE project. The first event took place in March 2018, taking place at the faculty of Applied Sciences of the TU Delft. The second stakeholder consultation event took place in September 2019, during the second yearly project meeting in Barcelona. The third stakeholder consultation event took place at the European Water Innovation Conference 2019 on 11 December in Zaragoza, Spain. The coming sections of this report provide more detail around each one of these events, explaining its objective, the process employed to realize it, and its final outcomes.

## 2. First stakeholder consultation

### 2.1 Objective

The first stakeholder consultation event took place in March 2018 at the faculty of Applied Sciences of the TU Delft.

The objective of this first event was to provide relevant stakeholders with an initial collective contact opportunity, enabling them to jointly discuss the project with a focus on policy, technical and business aspects. A particular focus was placed on exploring collaborative business model ideas for material recovery that could inform the development of the Circular business model for the large-scale demonstration in the Botlek area of the Port of Rotterdam (Task 8.1). To this end, the stakeholders listed in Table 1 below were invited and took part in the event.

**Table 1:** List of stakeholders involved in the first consultation event

No	Organization	Name
1	Europiren	Cristinel Degeratu
2	Sealeau	Fred Govaert
3	Sealeau	Dimitris Xevgenos
4	TU Delft (IDE)	Brian Baldassarre
5	TU Delft (IDE)	Giulia Calabretta
6	TU Delft (TPM)	George Tsalidis
7	DCMR	Koen de Kruif
8	DCMR	Hans Gerritsen
9	Akso Nobel	Thijs de Groot
10	ISPT	Menno Plantega
11	PlantOne	Gabriel Tshin
12	RVO	Corinne van Voorden
13	RHDHV	Steve Lemain
14	Evides Industriewater	Wilbert van den Broek

### 2.2 Process

The stakeholder consultation event unfolded as a half-day workshop consisting of three phases.

The first phase was based on a set of presentations to contextualize the ZERO BRINE project touching upon relevant policy, technical and business aspects. Specifically, Sealeau made a presentation to

introduce the stakeholders to the project and its relevant aspects. Followed a presentation by RHDHV, who discussed technical and strategic issues related to emerging business models centered on “servitizations” and “take back systems” for the chemical industry. Followed a presentation by Evides Industriewater upon its specific case and role within the ZERO BRINE project. Furthermore, two presentations were provided, respectively by DCMR and RVO, elaborating on relevant policy aspects and the status quo in The Netherlands as a “Circular Economy Hotspot” (<https://hollandcircularhotspot.nl>). Finally, a presentation performed by TU Delft, enabled the involved stakeholders to become familiar with the circular economy and business model concepts from a theoretical standpoint.

**Figure 1:** One of the presentations carried out in the first phase of the workshop

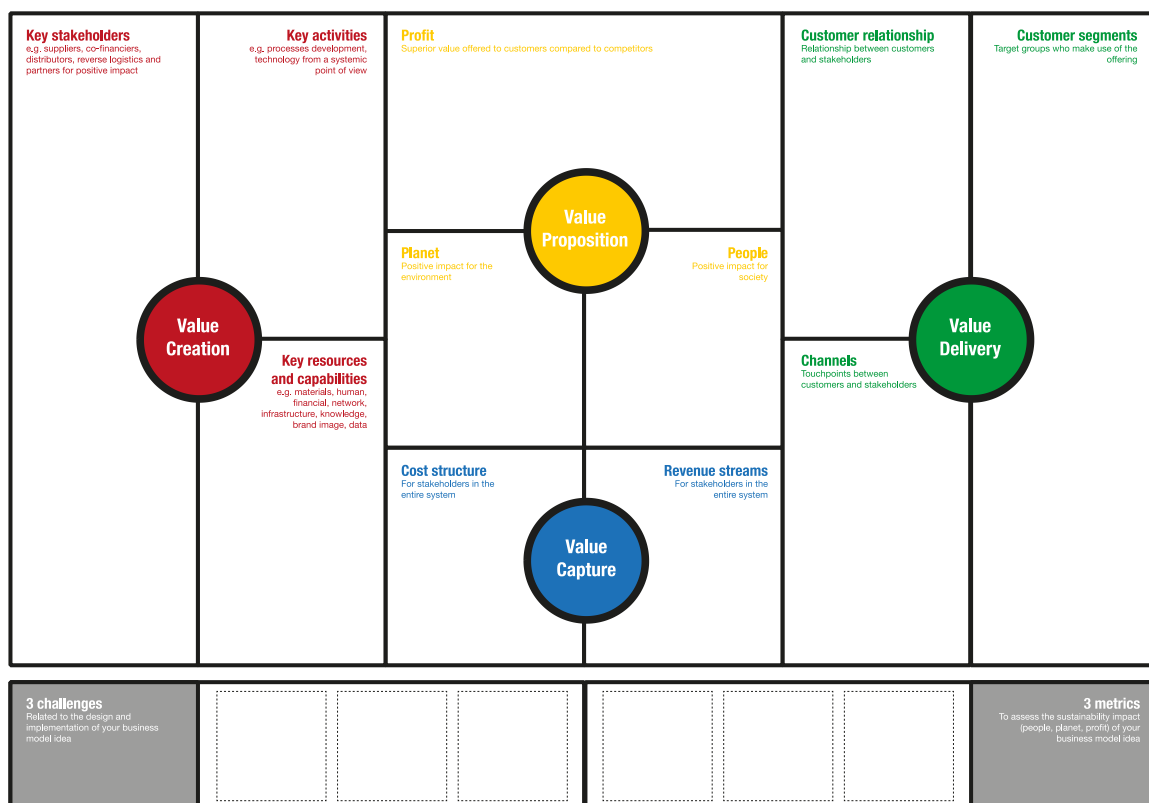


After introducing the stakeholders to the policy, technical and business aspects through the presentation, the second phase of the event was based on a co-creation session. Co-creation sessions are a qualitative research and design method that allows the collective generation of tangible solutions and well as scientific knowledge functional to address an empirical problem (E. Sanders & Stappers, 2008; L. Sanders & Stappers, 2012). In particular, this method can also be applied by organisations to collectively engage in business experimentation aimed at solving innovation challenges (while generating mutual trust and improving collaboration performance across the parties involved) nonetheless related to societal and environmental issues (Baldassarre, Calabretta, Bocken, &



Jaskiewicz, 2017; Bocken, Boons, & Baldassarre, 2019). As part of this session, involved stakeholders were given the opportunity to jointly explore and discuss collaborative business model ideas for material recovery that could inform the development of the Circular business model for the large-scale demonstration in the Botlek area of the Port of Rotterdam (Task 8.1). This effort was supported by a co-creation tool, namely an adapted version of the “sustainable business model canvas” (Bocken, 2015). This is a poster template that enables multiple stakeholders to collectively define and discuss business model concepts that can contribute to a Circular Economy, using post-it notes while brainstorming around the same table. To this end, involved stakeholders were split into three separate working groups.

**Figure 2:** Adapted version of the sustainable business model canvas. Based on Bocken et al., 2015.



Finally, the third and last phase of the workshop consisted of a plenary discussion, where the consulted stakeholders provided their feedback and reflections upon the event.

## 2.3 Outcomes

In line with the overall goal of task 10.2, the high-level outcome of the first stakeholder consultation events, has been to establish mutual trust and understanding toward the definition of a circular business model for implementing the ZERO BRINE technology upon project completion. Specifically, a first circular business model concept was discussed in terms of the following pillars: (a) a value proposition aimed at concurrently generating economic value and measurable environmental benefits; (b) a value creation and delivery system characterized by the collaboration between multiple stakeholders, reverse logistics and valorization of waste streams, stakeholder-centered service provision as well as the sharing of land, infrastructure and information; and (c) a value capture mechanism characterized by cost structures, multiple (and recurring) revenue streams and long term strategic benefits shared across participating stakeholders; value missed and destroyed opportunities for key stakeholders including society and the environment.

Within the framework laid out through the aforementioned pillars, the following foundational elements emerged. The first element was the selection of a specific test bed location within the Port of Rotterdam; PlantOne would provide this. The second element was the provision of waste heat on behalf of PlantOne. The third element was the provision of industrial wastewater as a main input for the ZERO BRINE process technology, which would be on behalf of Evides Industriewater. The fourth element was that Europiren may play the role of reselling the magnesium recovered through the ZERO BRINE process to end customers. The fifth element was related to the question about the ownership of the ZERO BRINE process technology. The latter remained an open question, pointing out for the need of future work to co-define a suitable solution with the stakeholders involved.

In addition, the first stakeholder consultation event also helped to refine the adopted “sustainable business canvas” tool (Bocken, 2015) into an improved version to further support the collaborative definition of the circular business model for the large scale demonstration in Botlek. Figure 4 below shows the template of this improved tool, which was used in the second stakeholder consultation event as well as in other individual stakeholder interviews and activities part of task 8.1.

**Figure 4:** Improved tool template developed to support the ZERO BRINE stakeholders in co-designing the circular business model for the large-scale demonstration

## CIRCULAR BUSINESS MODEL for the Botlek case

Created by Brian Baldassarre



<p><b>WHAT IS THE IDEA?</b></p> <p>What do you offer?</p> <p>Who will use it / buy it?</p> <p>Why will they use it / buy it?</p>	<p><b>HOW DO WE MAKE IT HAPPEN?</b></p> <p>Who is involved?</p> <p>What does he do?</p> <p>What does he get out of it?</p> <p>What can go wrong?</p>
<p><b>WHY IS IT CIRCULAR?</b></p> <p>What is the circular impact of the project (and what is the business case behind it)?</p> <p>How do you measure (environmental and / or social) impact?</p>	<p><b>HOW DOES IT WORK?</b></p> <p>Step 1</p> <p>Time</p>

The tool is intended for the co-design business models by defining the underlying value proposition as well as related value creation, delivery and capture mechanisms (Osterwalder et al., 2010). The circular value proposition element of the business model is embedded in the top left quadrant of the template, which prompts stakeholders to co-define the backbone of the circular business model idea. The circular value creation element of the business model is embedded in the bottom right quadrant of the template. In line with a multi-stakeholder perspective necessary in a circular business model, this element can be used to list all the stakeholders involved in the business model and to detail their role. The circular value delivery element of the business model is embedded in the top right quadrant of the template, which, in line with effectuation theory, prompts stakeholders to co-define a way to bring the value proposition to users and/or customers by planning a sequence of actions unfolding in time, and that can be executed with know-how and resources already available in the project. Finally, the circular value capture element of the business model is embedded in the bottom left quadrant of the template, which prompts task force stakeholders to discuss the financial aspects. A more detailed description of this tool is presented in the report of task 8.1 (see D8.2 for more detail).

Finally, the event was functional to inform the development of the academic conference paper listed below:

Xevgenos, D., Baldassarre, B., Bocken, N., Calabretta, G. (2018). Industry Water Production & Circular Economy Business Modelling. Model innovation and user-driven innovation: A process for sustainable value proposition design. Conference Industrial Water 2018 - DECHEMA-Haus, Frankfurt, Germany

### 3. Second stakeholder consultation

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#### 3.1 Objective

The second stakeholder consultation event took place in occasion of the second yearly project meeting in Barcelona, hosted by EURECAT in September 2019.

The objective of this second event was to consolidate and advance the work already started with the first event. The aim was to further discuss and co-define the circular business model for the large-scale demonstration, in collaboration with all the ZERO BRINE project beneficiaries present at the event.

**Figure 5:** ZERO BRINE partners involved in the second stakeholder consultation event



**Table 2:** List of stakeholders involved in the second consultation event

No	Organization
1	Europiren
2	Sealeau
3	TU Delft
4	NTUA
5	UNIPA
6	SUT
7	FACSA
8	Revolve Media
9	UNIABDN
10	Lenntech
11	IVL
12	TYPSA
13	IQE
14	Evides Industriewater
15	ISPT
16	Witteween+Bos
17	TUBITAK
18	CTM
19	DLR
20	ARVIA
21	WssTP
22	Huntsman

## 3.2 Process

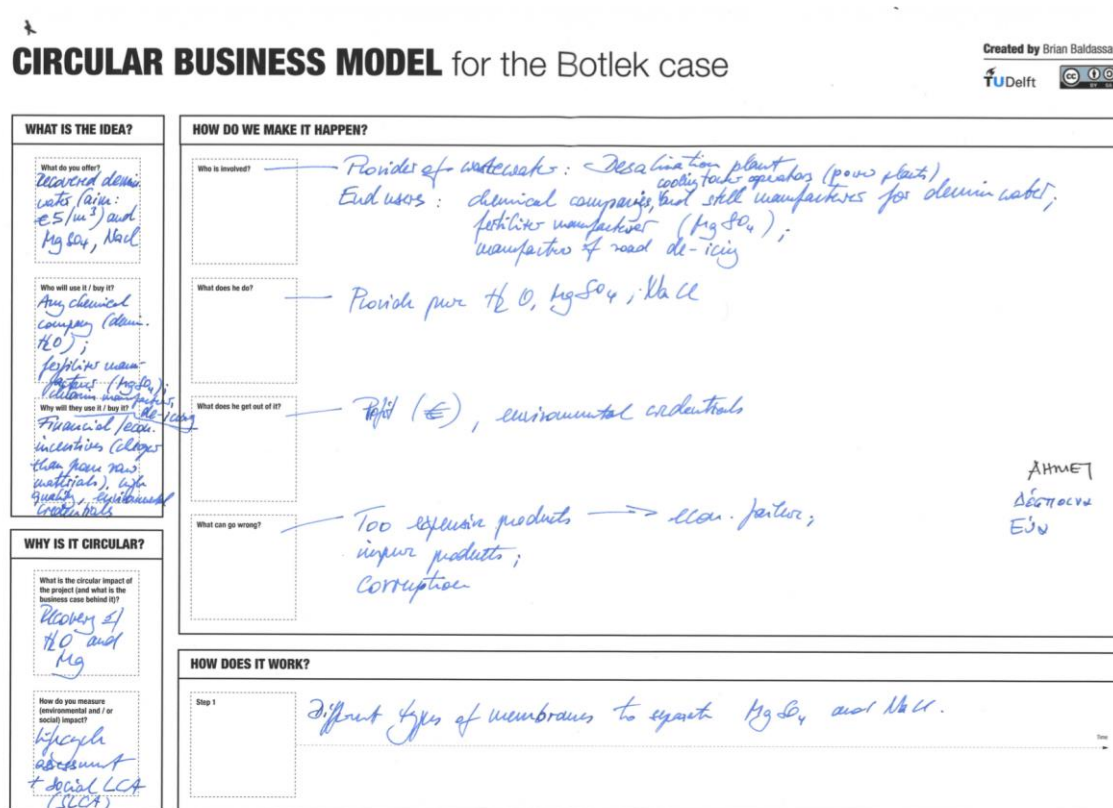
The stakeholder consultation event unfolded as a two-hour workshop. During the workshop twenty participants from ZERO BRINE partner organisations worked in five groups of four members, each focusing on co-defining a potential business model for the large-scale demonstration. To this end, they used as a support the improved version of the circular business modeling tool already developed as one of the main outcomes of the first stakeholder consultation event (see Figure 4).



### 3.3 Outcomes

The outcomes of the workshop include five different versions of the tool template generated by the five groups. Although none of the groups were able to map a full business model concept on paper, given the uncertainties involved in that stage of the project, altogether the five templates provided relevant insight to eventually inform a unified and integrated design. Figure 6 below, shows one of the five templates, while the insights that emerged across all 5 templates are briefly summarized in the next paragraph.

Figure 6: A business model concept produced by one of the five groups during the workshop



The first insight informing the design of the circular business model for the large-scale demonstration was that at the core of this business model, there could be a ZERO BRINE Task Force. In other words, this could be a spin-off of the ZERO BRINE project, launched by some of the key project stakeholders, who would collaborate to commercially exploit project results by selling to potential customers. The second insight related to the need of specifying with more detail the customer segment. As an initial idea, the customer segment could be companies in the process industry who are willing to treat their wastewater flows while recovering raw materials. In this regard, it emerged that EVIDES could collaborate both as a member of the task force, and as potential archetypical client, that could provide valuable insights concerning the targeted segment. Further discussions on this point were considered

necessary. The third insight was related to the need of further detailing the value proposition provided by the task force to these potential clients. In particular, the discussion revolved around whether it would be more appropriate to provide the ZERO BRINE solution (as a “modular technology system”) to clients through a leasing model or rather through a one-off sale model. Relatedly, the fourth insight concerned both the value proposition and the revenue streams for the task force. However, an important open question remained around who would take care of putting back on the market the recovered raw materials, as well as who would profit from their sale. An informed strategy in this regard could not yet be defined due to uncertainties around the quality and purity of the raw materials that would be recovered during the large-scale demonstration. A fourth insight related to identifying what would be the main source of competitive advantage of the task force, in front of competing solutions. This was identified around the high-energy efficiency of the process for raw material recovery, compared to existing solutions based primarily on evaporation. Finally, a last and crucial insight was related to the need of supporting the task force in the start-up phase, potentially through external investors.

## 4. Third stakeholder consultation

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### 4.1 Objective

The third stakeholder consultation event “From waste to resource: Redesigning the value and supply chain of water and minerals in process industries” took place at the 5<sup>th</sup> European Water Innovation Conference in Zaragoza, Spain on 11 December 2019 and was co-organised by EURECAT, FACSA, IQE, REVOLVE and SEALEAU.

The objective of this event was to identify challenges, needs and solutions associated with brine in process industries with companies, policy makers and research institutions mid-way of WP2 process. Process industries are a major source of brine – complex saline-impaired effluents that are a serious threat to the environment and costly for companies to manage. Yet brine consists of many resources such as minerals, salts, and metals and water. During this workshop, ZERO BRINE aimed to demonstrate the circular economy solution and mid-term results for the brine generated by industries recovering high quality water, salts, minerals, metals, and heat for reuse in industrial applications. The aim was to discuss with EASME, companies, organisations, universities and research institutes how this innovative technology is applicable and scalable to a broad range of industries.

### 4.2 Process

The stakeholder consultation event unfolded in three phases. The event was opened by Miguel Cano, IQE who are running the ZERO BRINE pilot plant in Zaragoza. During the first phase ZERO BRINE presented its approach and mid-term results. Dimitris Xevgenos, SEALEAU introduced the project



with the presentation “Introduction to redesigning the value chain of water and minerals in process industries – the ZERO BRINE approach”. Followed by Miguel Cano who presented the first results of the ZERO BRINE pilot plant in the silica factory IQE. Elena Zuriaga, FACSA presented the ZERO BRINE case studies and their potential to scale.

The aim of the second phase was to showcase perspectives from other EU projects in the field of resource recovery and water. Xavier Martinez Llado, NextGen Water Solutions presented “NEXTGEN project: Towards the next generation of water systems and services for the circular economy.” EASME Project advisor Blanca Saez Lacave presented “Resource Recovery in EU funded projects”, demonstrated the H2020 support to circular economy and gave an overview about related EU projects.

The objective of the third phase was to discuss and consult with EASME, NextGen Water Solutions and the 36 participants along the supply chain on the “Challenges and solutions for brine in process industries in Spain and Europe” in the format of a round table moderated by Vanessa Wabitsch, REVOLVE. Amongst the participating organisations were Cener, Suez Water Technologies & Solutions, VDEh Research institute, Dupont Water Solutions, Aquavida, Universidade Nova, Samca, Universidad of Zaragoza, Ciemat Plataforma Soloar de Almeria, Isle Utilities, Quimica del Cinca, smart4tech.

## 4.3 Outcomes

During this consultation ZERO BRINE got inputs from a broad range of stakeholders to tackle the challenges and solutions for treating industrial wastewater and bringing circular innovation technologies to the market. The European Commission shared their key priorities and importance of exploitation of the results which were applied in the execution of the pilot plants, policy briefs as well as business modelling.

A brief summary of the event was demonstrated via [this video](#) that is share on the ZERO BRINE website as well as via ZERO BRINE social media channels.

Figure 7: Third ZERO BRINE stakeholder consultation event



## 5. Conclusion

This report provides an overview of the three stakeholder consultation events conducted within the ZERO BRINE project. At a high level, they consist of establishing trust and collaborative capacity across stakeholders. More specifically, these results provide preliminary stakeholder insights to inform the development of a circular business model in the Botlek area of Rotterdam Port, as part of task 8.1. In this regard, the insights of the first event illustrated how different project stakeholders might contribute to the value proposition, creation, delivery and capture elements of such a business model (see section 2.3 for more detail). The insights of the second event consisted in further specifying stakeholder roles and collaboration dynamics (see section 3.3 for more detail). Insights from the third event were more widely related to the exploitation of the project results on behalf of all stakeholders, as well as related views of the European Commission (see section 4.3 for more detail). Ultimately, the combined result and conclusion from the three events was that the implementation of a circular business model in the Botlek area of the Rotterdam Port would not be feasible at this stage, due to regulatory, economic and technical conditions. Therefore, a fourth stakeholder consultation was not performed. As an alternative, it was decided to list current barriers, as well as drivers and opportunities in view of a future circular business model. This additional work was carried out within of task 8.1 (see D8.2 for more detail).

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