WP 9 Framework conditions for innovation

Maria Loizidou, Despina Bakogianni
NTUA

The ZERO BRINE project (www.zerobrine.eu) has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 730390.

ZERO BRINE

Partners Involved

National Technical University of Athens

TU Delft

UNIVERSITY OF ABERDEEN

SEALEAU

REVOLVE

UNIVERSITÀ DEGLI STUDI DI PALERMO

OBJECTIVES

- To address potential **legislative barriers** for the market uptake of the ZERO BRINE products and processes developed (including End-of-waste criteria)
- To examine the **relevant BREFs** and provide **suggestions** for the updates
- To develop **minimum quality standards** (requirements) for salt reuse in different applications (end-markets).
- To **assess the environmental impacts** associated with brine discharge through field surveys of environmental quality
- The above information will be used to draft a proposal for an **Innovation Deal**

Tasks of WP9

Task 9.1: Policy review and assessment – Assessment of the possibility to apply for Innovation Deal

(Start Month: M1, End Month: 42)

- Sub-task 9.1.1: Policy review - Transfer of experience from waste management to wastewater management sector (Lead Partner: NTUA, Partners involved: TU DELFT, SEALEAU)
- Sub-task 9.1.2: Assessment of the possibility to apply for an Innovation Deal to the European Commission (Lead Partner: TU DELFT, Partners Involved: NTUA, WssTP, SEALEAU)

Task 9.2: Development of quality standards – Field surveys for environmental impacts quantification

(Start Month: M1, End Month: 48)

- Subtask 9.2.1: Development of quality standards (Lead Partner: TU DEFLT)
- Subtask 9.2.2: Assessment of environmental impacts associated with brine discharge (Lead Partner: UNIABD)

Gantt Chart for WP 9 (*after M18*)

	M19	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
	2018	2019												2020												2021				
	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
Task 9.1																														
Sub-task 9.1.1																								**D9.2**						
Sub-task 9.1.2																														
Task 9.2																														
Sub-task 9.2.1																														**D9.3**
Sub-task 9.2.2																	**D9.1**													

D9.1: Report on environmental impacts from brine discharge [M35] **UNIABDN**

This report will include the results of subtask 9.2.2, where the environmental impacts associated with brine discharge will be assessed.

D9.2 : Report on policy review and assessment / suggestions for BREF update [Month 42] **NTUA**

This report will include a mapping and review of relevant legislation, as well as recommendation for the update of relevant BREFs.

D9.3 : Quality standards [Month 48] **TU DELFT**

This report will include quality standards for salt reuse in different applications/end-markets

ZERO BRINE

Sub-task 9.1.1: Policy review - Transfer of experience from waste management to wastewater management sector

M1-M42, Lead Partner: **NTUA**

- Review of BREF documents[1] has been concluded. Suggestion for BREFs update will be started after the first results of the operation of the pilot plants.
- Review of EU relevant policy framework. Key policies affecting the wide application of ZERO BRINE products and processes:
  - ✓ EU Circular Economy package - Europe as the world leader of the circular economy;
  - ✓ Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH regulation No. 1907/2006);
  - ✓ End of waste criteria (Waste Framework Directive, 2008/98/EC).
- Review of national policies: Netherlands, Spain, Poland, Greece and Turkey. (Concluded for Greece)
- Review of financial instruments (next months)
- Input on Policy Briefs (WP10)

[1]Large Volume Inorganic Chemicals - Solids and Others industry (2007), Production of Chlor-alkali (2014), Textiles Industry (2003) and Management of tailings and Waste-Rock in Mining Activities -MTWR (2009).

ZERO BRINE

Sub-task 9.1.1: Policy review - Transfer of experience from waste management to wastewater management sector

M1-M42, Lead Partner: **NTUA**

Enablers	Barriers
-EU Circular Economy Package -EoW criteria -Financial Instruments -New (innovative) business models -Extended producer responsibility -Best Available Techniques (BAT) and BAT Reference documents (BREFs) -Exceptions from REACH registration	-Difficulties on the market application of secondary raw materials -Prices of recovered materials -Lack of information/trust -Obstacles through administrative complications

Initial Recommendations

Stakeholders involvement from the start of the recovery process (stakeholder awareness/engagement)

Communication between recovery operators with downstream users of the supply chain of recovered substances for data sharing

Availability of information for the safe use of recovered substances from the recovery operators to the downstream users

Standardization of requirements

Use of Substance Information Exchange Forum (SIEF), available in ECHA.

Multi-stakeholder platforms to allow further collaboration

Expand schemes such as Extended Producer Responsibility and eco-design

ZERO BRINE

Sub-task 9.1.2: Assessment of the possibility to apply for an Innovation Deal to the European Commission

M1-M48, Lead Partner: **TU Delft**

- Data from sub-task 9.1.1 and from task 9.2 will be used to draft a proposal for an Innovation Deal
- TU Delft has already prepared a short introduction about the Innovation Deal. (early stage)
- End-of-Waste criteria and quality protocols will be developed at a later stage.

Innovation deal

Societies will have to face two major challenges in the coming decades, the economic and social adaptation to climate change and an economic and social development with more expensive energy resources. Therefore, the expected economic and social costs will be significant, and the development of new technologies will be a focal part of the solution. In addition, in Europe innovative research is performed but at the time of implementing innovation, regulatory barriers are often identified. As a result, in order for European Commission to foster this change within the circular economy package, the Innovation Deal was developed.

The concept of Innovation Deal was based on the successful platform of Green Deal implemented by the Dutch central government. The Green Deal approach is an accessible way for all relevant stakeholder organizations, such as companies, local and regional government and interest groups, to work with the central government on green growth and social issues. The aim of the approach is the removal of barriers in order to help sustainable initiatives get off the ground and accelerate this process. Central government plays a key role in this area. So far Green Deals have been reached in several industrial sectors, such as food, pharma, mobility, events organization, etc.

So far two Innovation Deals have been signed. One concerns a sustainable waste water treatment and another is about recycling electric vehicles. The Innovation deal of the wastewater treatment concerned overcoming legislative barriers. This deal focused not only on addressing the impact of water scarcity, but on recovering nutrients from the waste water as well. The second Innovation Deal concerned the waste management of electric vehicles batteries.

In Zero Brine project aiming for an Innovation Deal should be a perquisite. The reason for this is that the project is not only in direct alignment with the circular economy principles, but its aim is to modify the treatment trains of the process industry in order to reduce the water consumption and recover valuable materials for the chemical industry. In addition, some of these material are already classified as critical raw materials and European Commission regards them as crucial for Europe's economy.

ZERO BRINE

Sub-Task 9.2.1: Development of quality standards
M13-M48, Lead Partner: **TU Delft**

First identification of industrial salt (mainly NaCl) consumers → different needed requirements for salt reuse

Industry name	Location	Type of salt used
Nouryon (AkzoNobel)	Delfzijl	Sodium chloride (NaCl)
AkzoNobel	Botlek	Sodium chloride (NaCl)
Teijin	Delfzijl	Calcium chloride ($CaCl_2$)
Bio-Energiecentrale	Delfzijl	Sodium chloride (NaCl)
AnQore	Chemelot	Ammonium sulfate ($(NH_4)_2SO_4$)
Jellice	Emmen	Sodium chloride (NaCl)
SABIC	Bergen op Zoom	Sodium chloride (NaCl)

Impurity	Recommended Maximum Level
SO_4^{2-}	1%
Mg^{3+} Ca^{2+}	0.5%

Quality requirements for salt reuse according to EVIDES

ZERO BRINE

Sub-Task 9.2.1: Development of quality standards
M1-M48, Lead Partner: **TU Delft**

TU Delft has started developing different indicators for evaluating the business cases of ZERO BRINE project.

Aspect	Stakeholder categories	Subcategories	Indicators	Data
Social	Local community	Job creation	Number of added jobs	Manual and mechanized working hours
Environmental	-	Land use	Improved infrastructures	Square meter (m^2)
			Improved access to health and education	
			Expropriation, population displacement and resettlement	
			Forceful acquisition of land	
			Limited access to land and consequent impact on livelihood, food insecurity, and loss of protected areas	
Economic – Environmental	-	Added value for local industries	Environmental benefits in terms of impacts, e.g. Global Warming	
Social	Health and safety	Specialized industry development	GRI LA8, education training, etc.	Hours of training and years of education

ZERO BRINE

Sub-Task 9.2.2: Assessment of environmental impacts associated with brine discharge
M12-M35, Lead Partner: **UNIABD**

- Reduction of EVIDES case study operational capacity → difficult to ascribe any observable changes of the benthic communities and the ecological quality of the environment due to the implementation of the ZERO BRINE system.
- Based on the reconnaissance site visit observations, *Brittanniëhaven* is a dead end area of an intense industrial activity. Effluents from other industries are expected to obscure the interpretation of the water and sediment monitoring results. No adequate baseline data exist in this area in order to assess the baseline conditions that were existed before the operation of the EVIDES plant.

Change of sampling site:

Sampling of water and sediment will be conducted around the discharge area of the EVIDES demineralization water plant, operating in the "Hartel Kanaal" (Dolfijnweg) area since 2018 (more isolated area with minimal pressures from other sources). → Useful background information necessary for the assessment of ZERO BRINE technology benefits to the environment in future applications.

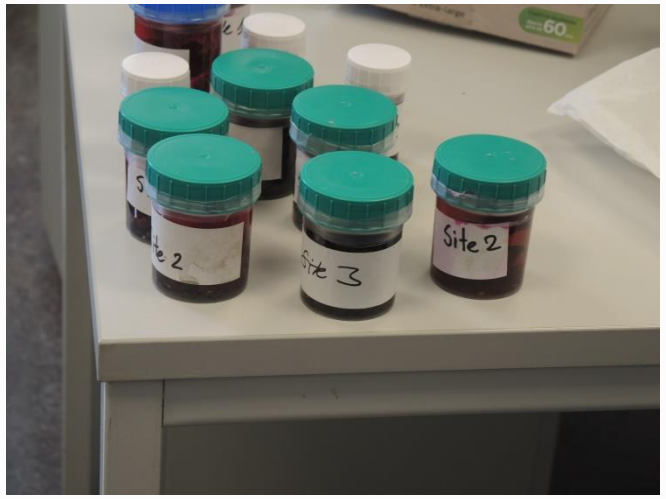
ZERO BRINE

Task 9.2.2: Assessment of environmental impacts associated with brine discharge
M12-M35, Lead Partner: **UNIABD**

First mission:16-18 September 2019.

Small tender of the Port of Rotterdam used for the sampling of water and sediment around the brine impacted area

One reference point was sampled outside the brine impacted area. The average depth: appr. 5 m.



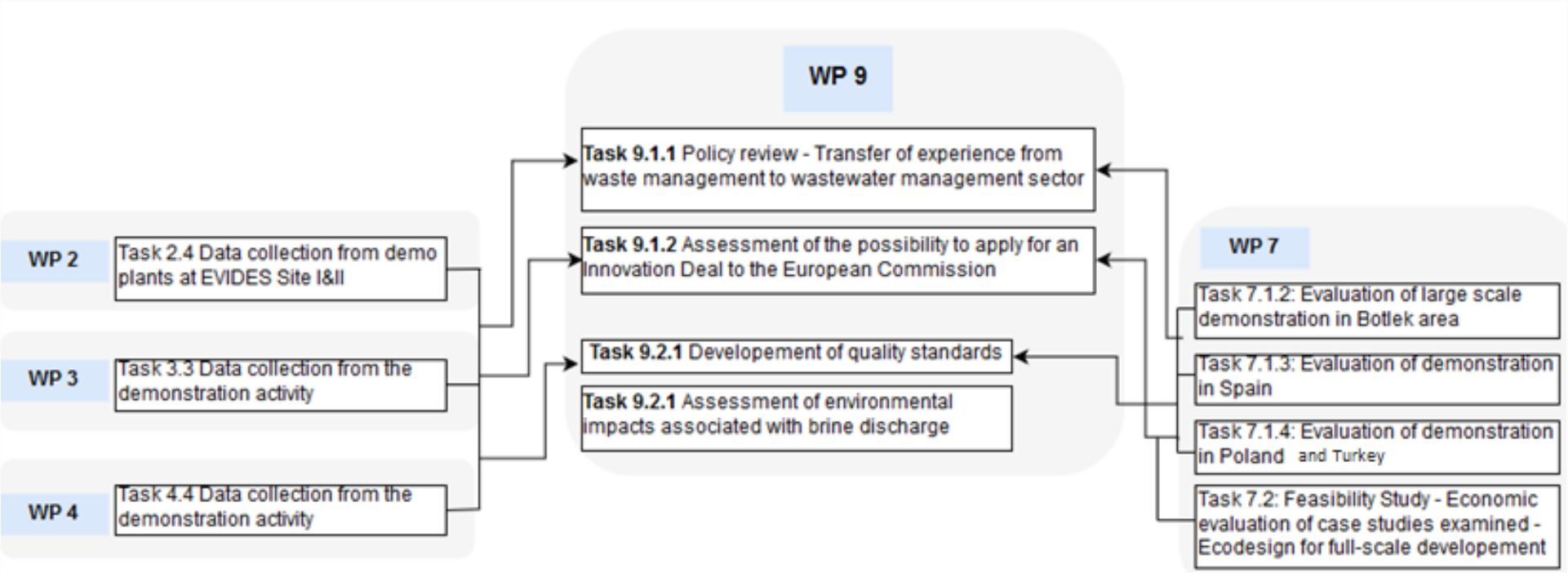
Samples were prepared and preserved for laboratory analysis (pH, EC, TDS, NH_4^+, NO_3^-, NO_2^-, PO_4^{3-} and benthic invertebrates communities as bioindicators).

ZERO BRINE

Thank you for your attention!

www.zerobrine.eu @zero_brine_
#ZeroBrine

Dependencies from othe WPs



- ✓ Major dependencies from the outputs of other WPs
- ✓ For the implementation of WP9 no delays are foreseen.
- ✓ The due date of the deliverables will be as originally planned and presented in the GA.

Sub-task 9.1.1: Policy review - Transfer of experience from waste management to wastewater management sector
M1-M42, Lead Partner: **NTUA**

Legislation/ Regulation *[**TIP**: This is an incomplete list of **EU legislation** applicable to or influencing the application of the ZERO BRINE products – please indicate in the space **'other EU legislations'** any additional EU legislation and add rows if needed. Please feel free to add in the spaces **'national'**, **'regional'** and **'local legislations/policies'** additional legislation at the national, regional and local level].*	Barrier *[**TIP**: Please report in details if specific aspects of these legislations contain regulatory obstacles for this value chain].*	Driver *[**TIP**: Please report in details if specific aspects of these legislations contain regulatory drivers for this value chain].*	Possible recommendations to address regulatory obstacles and, support regulatory drivers *[**TIP**: if you have any proposal for how to address these obstacles, please explain here].*