ZERO BRINE

Data Management Plan
(2nd version)

June 2018

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.

Deliverable 1.2	Data Management Plan
Related Work Package	WP1 – Project Management
Deliverable lead	TU DELFT
Author(s)	Amir Haidari (TU DELFT), Dimitris Xevgenos, Innovation Manager of ZERO BRINE project (SEALEAU)
Reviewer	Kees van der Heijden, Data Steward, Civil Engineering Faculty, TU DELFT Jasmin K. Böhmer, Research Data Officer, TU Delft
Contact(s)	a.h.haidari@tudelft.nl / d.xevgenos@gmail.com
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Approved by	Roelof Moll
Website	www.zerobrine.eu
Name of researcher(s) with roles	

[1] **R**=Document, report; **DEM**=Demonstrator, pilot, prototype; **DEC**=website, patent fillings, videos, etc.; **OTHER**=other

[2] **PU**=Public, **CO**=Confidential, only for members of the consortium (including the Commission Services), **CI**=Classified

History of changes			
Version	Date	Description / Change	Author(s)
0.1	28 Dec. 2017	First draft	Amir Haidari (TU Delft)
0.2	14 Jan. 18	Made some suggestion and minor changes in the text	Kees van der Heijden (TU Delft)
0.3	30 Jan. 18	Second draft	Dimitris Xevgenos (SEALEAU)
0.4	1 Feb. 18	Minor changes in text and layout	Dimitris Xevgenos (SEALEAU) Amir Haidari (TU Delft)
0.5	7 Feb. 18	Made some suggestions and minor changes in the text	Jasmin K. Böhmer, (TU Delft)
0.6	23 Feb. 2018	Complete the subversion part and add initial findings about differences between subversion and DataverseNL	Amir Haidari (TU Delft)
0.7	26 Feb. 18	Changed the text and layout	Amir Haidari (TU Delft)
1.0	25 May 2018	Update deliverable with data management per Work Package (Sections 3, 4)	Dimitris Xevgenos (SEALEAU)
1.1	8 June 2018	Changes in the text	Dimitris Xevgenos (SEALEAU)
1.2	13 June 2018	Changes in the text after receiving reviewer report from Jasmin Bohmer	Dimitris Xevgenos (SEALEAU)
2.0	02 July 2018	Minor changes after receiving feedback from partners during 2nd GA meeting	Dimitris Xevgenos (SEALEAU)

The ZERO BRINE project has received funding from the European Commission under the Horizon 2020 programme, Grant Agreement no. 730390.

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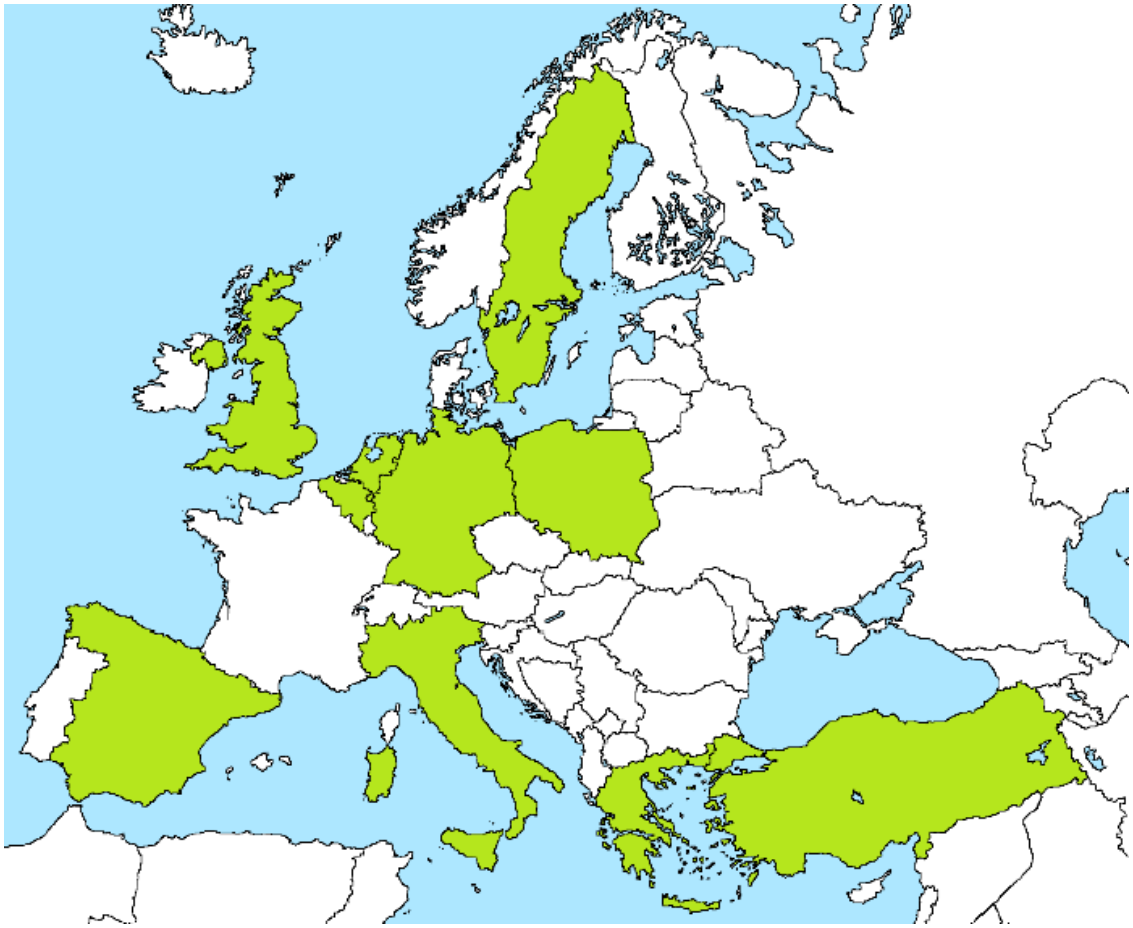
1 Overview of the project

The ZERO BRINE project aims to facilitate the implementation of the Circular Economy package and the SPIRE roadmap in various process industries by developing necessary concepts, technological solutions and business models to redesign the value and supply chains of minerals and water while dealing with present organic compounds in a way that allows their subsequent recovery.

These resources will be recovered from saline impaired effluents (brines) generated by the process industry while eliminating wastewater discharges and minimizing the environmental impacts of industrial operations through brines (ZERO BRINE). ZERO BRINE brings together and integrates several existing and innovative technologies to recover products of high quality and sufficient purity to represent good market value.

A large-scale demonstration plant will be tested in the Energy Port and Petrochemical cluster of Rotterdam Port by using the waste heat from one of the factories in the port. The quality of the recovered products will be aimed to meet local market specifications. Additionally, three large-scale pilot plants will be developed in other process industries in Poland, Spain, and Turkey, providing the potential for immediate replication and uptake of the project results after its successful completion.



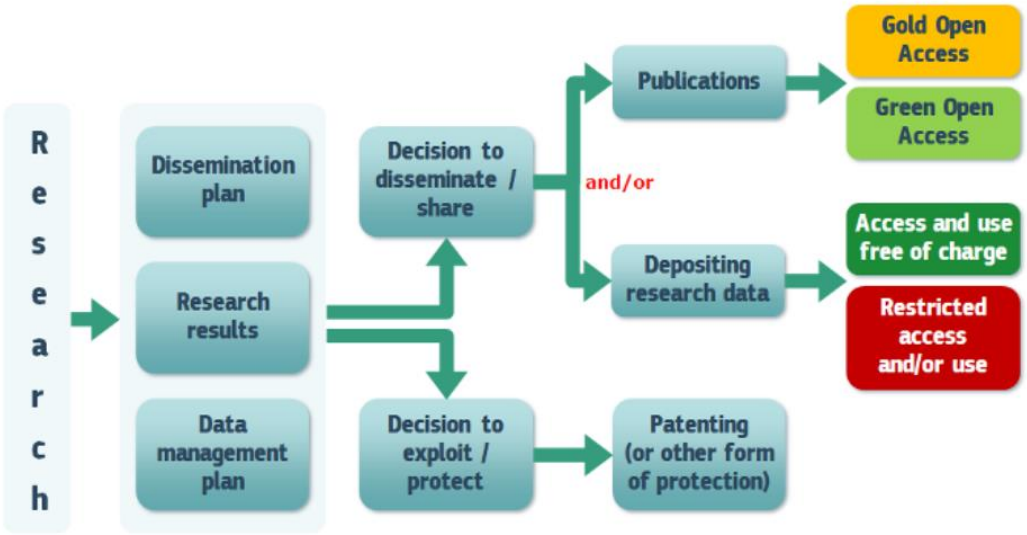
No	Participant organisation name (Short Name)	Country
1	TECHNISCHE UNIVERSITEIT DELFT (TU DELFT)	NL
2	NATIONAL TECHNICAL UNIVERSITY OF ATHENS (NTUA)	GR
3	FUNDACIO CTM CENTRE TECNOLOGIC (CTM)	ES
4	Witteveen+Bos Raadgevende ingenieurs B.V. (WITTEVEEN+BOS)	NL
5	UNIVERSITA DEGLI STUDI DI PALERMO (UNIPA)	IT
6	POLITECHNIKA SLASKA (POLSL)	PL
7	SOCIEDAD DE FOMENTO AGRICOLA CASTELLONENSE, S.A. (FACSA)	ES
8	SEALEAU B.V. (SEALEAU)	NL
9	EUROPEAN WATER SUPPLY AND SANITATION TECHNOLOGY PLATFORM (WssTP)	BE
10	REVOLVE MEDIA (REVOLVE)	BE
11	THE UNIVERSITY COURT OF THE UNIVERSITY OF ABERDEEN (UNIABDN)	UK
12	LENNTECH BV (LENNTECH)	NL
13	IVL SVENSKA MILJOEINSTITUTET AB (IVL)	SE
14	TECNICA Y PROYECTOS SA (TYPSA)	ES
15	INDUSTRIAS QUÍMICAS DEL EBRO, S.A. (IQE)	ES
16	EVIDES INDUSTRIEWATER BV (EVIDES)	NL
17	TUBITAK Marmara Research Center (TUBITAK)	TR
18	HUNTSMAN (EUROPE) BVBA (HUNTSMAN)	BE
19	DEUTSCHES ZENTRUM FUER LUFT - UND RAUMFAHRT EV (DLR)	DE
20	Europiren B.V. (EUROPIREN)	NL
21	Arvia Technology Limited (ARVIA)	UK
22	STICHTING PUBLIC PRIVATE PARTNERSHIP INSTITUTE FOR SUSTAINABLE PROCESSTECHNOLOGY (ISPT)	NL

2 Scope of the deliverable

Data management is an important aspect of each project as it ensures long-term preservation and accessibility of data during the project and after the project has ended. The objectives of this deliverable are to describe how the data will be generated or used within ZERO BRINE project, how they will be collected, managed, stored and made available during the project, and how they will be shared upon completion of the research project. In addition, the data management plan can reduce the risk of data loss or other threats that could render the data illegible or unusable (e.g. the obsolescence of software).

The management of the data produced during the project will ensure open access, as stipulated in Article 29.3 of the Grant Agreement, taking also in consideration the "as open as possible, as closed as necessary" principle, to ensure that the project results that can be further exploited in the future commercially e.g. through patenting. Thus, the project will seek for a balance between openness and protection of information, commercialisation and Intellectual Property Rights (IPR), privacy concerns, security etc. In case, project partners need to keep specific parts of their research data closed, the reasons for not giving access will be described explicitly in this data management plan.

Following also the letter from the European Commission with Ref(Ares) rtd.ddgl.a.6(2017)1430458/27.03.2017, we are currently working on the route to be used for scientific publications, which is either self-archiving (also referred to as "green" open access) or open access publishing (also referred to as "gold" open access).



Source: http://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/open-access-data-management/open-access_en.htm

Figure 2-1: Different routes of management of data generated during ZERO BRINE project

During the ZERO BRINE project, various (big) data will be collected such as case studies, results from simulations and analysing samples, log data, etc. This deliverable is considered a dynamic document that will be updated over the course of the project. The DMP will be updated at least once a year, differentiating the data that can be openly accessible from the project outcome. The Innovation Manager will be responsible for coordinating the knowledge management activities, including data management.

The content of data management plan will be reconsidered during the finalisation of this deliverable. The changes will be decided by the project management.

In this deliverable, first, the specific means of data collection per work package (WP) are presented in Section 1. Then, data storage and backup using the system provided by 4TU.datacentre for Research Data and managed by project manager from TU DELFT, as the main tools for storage and exchange of data, is presented in Section 4. Finally, this report deals with the data integrity; i.e. we describe how to deal with data documentation (Section 0), data access (Section 0), sharing and reuse (Section 7), as well as data preservation (Section 0) and with this regard we pay a particular attention to the privacy of participants in surveys and simulations (Section 9).

3 Data collection

This section describes the methods of data collection for each work package as indicated by the work package leaders. For each work package, the following items are checked and described, as far as applicable.

Type of data

In ZERO BRINE project, the following type of data will be documented:

- *Observational data*: this type of data will be captured real-time and, typically, cannot be reproduced exactly, which makes the strategies applied for documentation of this type of data extra important. Therefore, a careful and elaborated preparation of the way that data will be captured (instruments, calibration, conditions and observation method) is crucial before recording this type of data. Once this type of data is captured, all subsequent steps (filtering, aggregation, processing, analysis and visualization) will be reproducible.
- *Experimental data*: this type of data will be achieved from the laboratory analysis or from used equipment. This type of data can be reproduced most of the time, but the reproduction may be expensive. Also, for this type of data, a thorough and elaborated preparation is needed before the capturing. The steps after the capturing are reproducible for this type of data.
- *Simulation data*: this type of data will be obtained from models. The reproducibility of this data is subjected to knowing the input, version control of the input and software code as well as information about running environment such as operating system, release date, software dependencies, etc.
- *Derived or compiled data*: this type of data will be obtained from data mining or statistical analysis. The reproducibility of this data is subjected to a good documentation of original data.
- *Metadata*: metadata are information about the data. The reproducibility of metadata depends on the availability of the original data that metadata give information about.

Data can also be classified in the following three (3) broad categories: (a) Input or “raw data”; (b) Processed or “research-ready” data; and (c) Output or “Publication-ready” data.

Data collection process

This is provided by Work Package in the sections below.

Version control

Versioning is important for long term-research data management where metadata and/or files are updated over time. For scientific projects wherein different parties are involved, it is more efficient that the data storage system is with version control function to prevent losing of data. A version control system (or revision control system) is a system that tracks incremental versions (or revisions) of files and, in some cases, directories over time. Of course, merely tracking the various versions of a user's (or group of users') files and directories isn't very interesting in itself. What makes a version control system useful is the fact that it allows you to explore the changes which resulted in each of those versions.

Other information

Information regarding the file format, software used, reproducibility, estimated size of data etc. is provided by work packages below. This information was collected by the work package leaders for the respective WPs. The results are also summarized in Table 3-1.

3.1 Work Package 1

The information was collected by the Work Package leader (Roelof Moll/ TU DELFT) through the use of questionnaires. The results are summarized below.

Pre-existing data

Grant Agreement, Consortium Agreement, TSAT Agreement.

Source of pre-existing data

Project proposal preparation.

Conditions for use of pre-existing data

Data is available for internal use within ZERO BRINE; no specific conditions applicable.

Type of data collected

Agenda and minutes of meetings.

Aim of this data

Project coordination.

Process of data collection

Generation internally.

Format of data collected

☑	.doc / .docx	☐	Photo formats	☐	.txt
☑	.xls / .xlsx	☐	Video formats	☐	.csv, .tab
☑	.ppt / .pptx	☐	.xml	☐	.sgm / .sgml
☑	.pdf	☐	Others	☐	.nc, .cdf

Estimated size of data

500 MB.

Software needed to create/process/visualize the data

Standard Microsoft software.

Storage of data

DataVerse as successor to SURFDrive. SURFDrive will still be used for minutes of meetings related to the organization of the Work Packages (non confidential data).

Access to data

ZERO BRINE partners only.

Conditions for access to data

n/a.

Partners contributing to this data

Work Package leaders.

Latest update

2 May 2018.

3.2 Work Package 2

The information was collected by the Work Package leader (Henri Spanjers/TU DELFT) through the use of questionnaires. The results are summarized below.

Pre-existing data

- ☑ Field measurements
- ☑ Observations
- ☑ Laboratory measurements
- ☐ Software
- ☑ Surveys
- ☑ Models
- ☑ Personal communications
- ☐ Others

Source of pre-existing data

Evides Industriewater and WP1.
Experimental campaign carried out at UNIPA in order to assess the possibility to produce Magnesium Hydroxide using natural waste brines.
Pre-existing data from the evaporator that has been developed by NTUA in the framework of SOL-BRINE project (LIFE09 ENV/GR/000299).

Conditions for use of pre-existing data

By permission of Evides Industriewater confirmed by email communication, as defined under the Grant Agreement. Some of the information are obtained from already published papers. NTUA was a partner of the SOL-BRINE project and therefore has access on the associated deliverables.

Type of data collected

- ☑ Field measurements
- ☑ Observations
- ☑ Laboratory measurements
- ☑ Software
- ☑ Surveys
- ☑ Models
- ☑ Personal communications
- ☑ Others

Others: Information about site infrastructure. Collection of data through surveys will be done by LENNTECH.

Aim of this data

Design, preparation, construction and operation of pilot plants. Improvement of technologies used in the pilots. Development of business plan and market analysis for the Botlek case (WP8). Stakeholder analysis (WP10). Bench scale tests using the existing technologies.

Process of data collection

Direct personal communication with leader WP1. Obtaining permission from Evides Industriewater to perform on site measurements. Several experiments will be conducted at UNIPA at different operating conditions. The data will be analysed in order to tune the devices for the final set-up of the MF-PRFR prototype.

Format of data collected

- ☑ .doc / .docx
- ☑ .xls / .xlsx
- ☑ .ppt / .pptx
- ☑ .pdf
- ☑ Photo formats
- ☑ Video formats
- ☐ .xml
- ☑ Others
- ☑ .txt
- ☑ .csv, .tab
- ☐ .sgm / .sgml
- ☐ .nc, .cdf

Others: AutoCAD format: .dwg

Estimated size of data

5 - 9 GB

Software needed to create/process/visualize the data

MS Office, Adobe Acrobat Pro, PHREEQC simulation platform, text editors such as notepad, image editing softwares, AutoCAD.

Storage of data

Data is saved in electronic format, at research institute with regular backup on the Dataverse.NL (each WP2 partner (i.e. LENNTECH, NTUA, UNIPA, ARVIA, TU DELFT) separately.

Access to data

WP2 partners (LENNTECH, NTUA, UNIPA, ARVIA, TU DELFT, EVIDES): full access.
Other consortium partner: upon permission of WP2 leader.
Partners outside consortium: upon permission of project coordinator.
Some data presented on deliverables 2.1, 2.3 and 2.6 will be public.

Conditions for access to data

Under the conditions of the Consortium Agreement and Data Management Plan.

Partners contributing to this data

LENNTECH, NTUA, UNIPA, ARVIA, TU DELFT, EVIDES.

Latest update

11 May 2018.

It must be mentioned that further details for the management of data produced in the framework of WP2 are provided in **Deliverable 2.7** entitled **"Database of data collected during WP2 demonstration activity"**.

3.3 Work Package 3

The information was collected by the Work Package leader (Krzysztof Mitko) through the use of questionnaires. The results are summarized below.

Pre-existing data

- ☑ Field measurements
- ☑ Observations
- ☑ Laboratory measurements
- ☑ Software
- ☐ Surveys
- ☑ Models
- ☑ Personal communications
- ☑ Others

Source of pre-existing data

Laboratory measurements, models, and laboratory practices will come from previous projects and laboratory test predating the ZERO BRINE. Data from previous dissertations and open literature will be used.

Conditions for use of pre-existing data

Data is confidential and for research purposes only. Usage may require permission from the partner representative.

Type of data collected

- ☑ Field measurements
- ☑ Observations
- ☑ Laboratory measurements
- ☐ Software
- ☐ Surveys
- ☐ Models
- ☑ Personal communications
- ☑ Others

Others: Bench-scale test results, pilot-scale test results, models used for plants design, detailed plant designs.

Aim of this data

Realization of WP3 tasks: demonstration of circular economy principles in coal and textiles industry. Additionally, the data will the base for LCA and economical analysis performed in other WPs

Process of data collection

Laboratory tests: data is collected in the lab notebooks and transferred to a computer file (Excel or plain text) or directly written to the computer.

Models: data is saved as Excel files or R source code.

Plant design: data is saved as electronic files.

Plant run: data is collected in the notebooks and transferred to a computer file or (if the equipment allows it) signals from the measuring devices are directly recorded onto a USB drive.

Format of data collected

- ☑ .doc / .docx
- ☑ .xls / .xlsx
- ☑ .ppt / .pptx
- ☑ .pdf
- ☑ Photo formats
- ☑ Video formats
- ☐ .xml
- ☑ Others
- ☑ .txt
- ☐ .csv, .tab
- ☐ .sgm / .sgml
- ☐ .nc, .cdf

Others: .r (R script file), .graffle (OmniGraffle vector drawing file)

Estimated size of data

2.5 – 20.5 GB.

Software needed to create/process/visualize the data

Excel, Word, R Studio, OmniGraffle, Origin, Visio

Storage of data

All project data is stored on the task leader's computer. Data is backed up on a two USB drives stored in separate physical locations. Additionally, it is saved in DataVerse repository

Access to data

Data is confidential and for WP3 participants only.

Conditions for access to data

The non-disclosure conditions of the Consortium Agreement apply.

Partners contributing to this data

SUT, TUBITAK, UNIPA, SEALEAU, TU DELFT (Applied Sciences Faculty).

Latest update

13 June 2018.

It must be mentioned that further details for the management of data produced in the framework of WP2 are provided in **Deliverable 3.2** entitled **"Database of data collected during WP3 demonstration activity"**.

3.4 Work Package 4

The information was collected by the Work Package leader (Sandra Meca/CTM) through the use of questionnaires. The results are summarized below.

Pre-existing data

- ☑ Field measurements
- ☐ Observations
- ☑ Laboratory measurements
- ☐ Software
- ☐ Surveys
- ☐ Models
- ☐ Personal communications
- ☐ Others

Source of pre-existing data

Data from wastewater composition obtained from analytical measurements and quality control process of IQE.
Data about IQE production process.
Data from waste heat streams available at IQE.
Experimental data produced in previous projects performed in collaboration between IQE and CTM related to wastewater concentration using Reverse osmosis.
Experience gained during:

- LIFE project REMEMBRANE LIFE11 ENV/ES/626.
- LIFE project SOL-BRINE.

Dissertations on EFC of TU Delft, and open literature

Conditions for use of pre-existing data

Knowledge acquired in previous projects will be used to optimize the technologies to treat IQE's wastewater.

Type of data collected

- ☑ Field measurements
- ☑ Observations
- ☑ Laboratory measurements
- ☐ Software
- ☐ Surveys
- ☑ Models
- ☐ Personal communications
- ☐ Others

Aim of this data

Physico-chemical characterization of the effluent generated in the production process of precipitated silica

Obtaining reverse osmosis or nanofiltration membranes from old membranes that will allow to concentrate the sodium sulphate solution with the lowest energy consumption.

Obtaining information about performance of the technologies developed in the project:

Comparison of evaporation (MED) over Eutectic Freeze Crystallization for the recovery of Na2SO4/benchmarking

Developing of waste recovery strategies.

Process of data collection

Laboratory and field measurements, observations: Data collection in a notebook. Data transcription from the notebook to electronic file (usually excel). Regular security copies performed.

Pilot plant monitoring: sensor signal recorded through scada and saved in the PC. Regular security copies performed.

The responsible of the experiment will collect it and save it in the server of its company and then data will be sent to WP leader.

Models: data collection from software and data saved in electronic files.

Format of data collected

☑	.doc / .docx	☑	Photo formats	☑	.txt
☑	.xls / .xlsx	☐	Video formats	☑	.csv, .tab
☐	.ppt / .pptx	☑	.xml	☐	.sgm / .sgml
☑	.pdf	☐	Others	☐	.nc, .cdf

Estimated size of data

<10 GB

Software needed to create/process/visualize the data

Microssoft Office, Matlab, SCADA

Storage of data

Data is saved in electronic format in servers and regular security copies are performed.

Data is saved in electronic format, at research institute with regular backup on the Dataverse.NL.

Access to data

Only partners of WP4 can access to the data. In addition the access will be restricted as a function of involved partners in each task.

Confidential

Conditions for access to data

Only partners of WP4 can access to the data.

Partners from interlinked WP will ask the required data and data providers will give consent under confidential condition.

Partners contributing to this data

Regeneration membranes process: CTM, TYPSA, *NF/RO pilot plant operation*: CTM, TYPSA, IQE, EFC: TUDelft (Applied Science) , CTM, IQE, *Evaporation*: Sealeau, CTM, IQE, *EDBP*: CTM

Latest update

25/05/2018

It must be mentioned that further details for the management of data produced in the framework of WP2 are provided in **Deliverable 4.6** entitled **"Database of data collected during WP4 demonstration activity"**.

3.5 Work Package 5

The information was collected by the Work Package leader (Massimo Moser/DLR) through the use of questionnaires. The results are summarized below.

Pre-existing data

- ☑ Field measurements
- ☑ Observations
- ☑ Laboratory measurements
- ☑ Software
- ☑ Surveys
- ☑ Models
- ☑ Personal communications
- ☐ Others

Source of pre-existing data

- Bibliographical data from previous works about technology modelling
- Previous research projects
- (consulting) companies

Conditions for use of pre-existing data

- Only previous project partners can access the data

Type of data collected

- ☑ Field measurements
- ☑ Observations
- ☑ Laboratory measurements
- ☑ Software
- ☐ Surveys
- ☑ Models
- ☑ Personal communications
- ☐ Others

Aim of this data

- Data are used to validate the technology model developed
- Analyse the performance of CrIEM and PFR reactors and elaborate on future strategies for implementation
- Data is used to regenerate membranes for other brine samples.
- Refurbishment & minor design modifications on the MED / CrIEM / EFC, obtaining information about performance of the equipment used
- Development of Brine Excellence Centres

Process of data collection

Data collection in a notebook. Data transcription from the notebook to electronic file (usually excel). Data collection from software and data saved in electronic files. Pilot plant REM-TYP measurements and monitoring.

Format of data collected

- ☑ .doc / .docx
- ☑ .xls / .xlsx
- ☑ .ppt / .pptx
- ☑ .pdf
- ☑ Photo formats
- ☑ Video formats
- ☐ .xml
- ☐ Others
- ☑ .txt
- ☑ .csv, .tab
- ☐ .sgm / .sgml
- ☐ .nc, .cdf

Estimated size of data

3 - 30 GB

Software needed to create/process/visualize the data

- Word
- Excel
- Notepad
- Image Editing
- Matlab
- Python environment
- RCE
- Labview

Storage of data

Data is saved in electronic format, at research institute with regular backup on the Dataverse.NL.

Access to data

Confidential, only Members of the consortium can access to this data

Conditions for access to data

The data is confidential and available for the members of the consortium upon request

Partners contributing to this data

DLR, CTM, SUT, LENNTECH, FACSA, TYPSA, NTUA, SEALEAU, UNIPA

Latest update

25 May 2018

3.6 Work Package 6

The information was collected by the Work Package leader (Menno Plantenga/ISPT) through the use of questionnaires. The results are summarized below.

Pre-existing data

- ☑ Field measurements
- ☑ Observations
- ☑ Laboratory measurements
- ☐ Software
- ☑ Surveys
- ☑ Models
- ☑ Personal communications
- ☑ Others

Source of pre-existing data

(1) Emission registration reports from Dutch industry, (2) Projects carried out by Dutch industry on brine treatment, (3) Database with data from desalination plants. Pre-existing ontologies, available Online. Brine effluent characteristics: GA,scientific reports, BREF documents, Pollutant release and Transfer register for the Netherlands ("emissieregistratie" RWS); reposrts of the e-Symbiosis project; previous LIFE project coordinated by NTUA.

Conditions for use of pre-existing data

This data will be made available to WP6 partners. For data not released yet to the public domain, consent from ISPT needs to be obtained prior to use anonymized data derived from original data.

Type of data collected

- ☑ Field measurements
- ☑ Observations
- ☑ Laboratory measurements
- ☐ Software
- ☑ Surveys
- ☐ Models
- ☑ Personal communications
- ☑ Others

Aim of this data

Recording of brine effluents generated by the Dutch industrial and desalination sector; input provided by brine producers for improving the handling of produces brines and enhance circularity of minerals and water. Data will be used to fill the database for the OPB tool and use these in the workshops foreseen in the project to be organized in 5 Dutch indutrial regions, and as start to enabke wider use of the OBP. Analyses for the knowledge model and OBP development. Communication and dissemination about the OBP

Process of data collection

Desk research (for the two available public databases) & interviews and verification of confidential data shared in ISPT relevant projects; OBP platform and use of questionnaires; interaction with consortium partners

Format of data collected

- ☑ .doc / .docx
- ☑ .xls / .xlsx
- ☑ .ppt / .pptx
- ☑ .pdf
- ☑ Photo formats
- ☑ Video formats
- ☐ .xml
- ☑ Others
- ☑ .txt
- ☑ .csv, .tab
- ☐ .sgm / .sgml
- ☐ .nc, .cdf

Others: Modeling software specific formats, ai, mp4

Estimated size of data

Unknown at this time - size will grow as more users register. For now a maximum of 1 GB is guesstimated

Software needed to create/process/visualize the data

Office Programs (Excel / Powerpoint etc.) and maybe GIS software
Data collection: MS Excel, Word, Power Point
Processing QGIS
Specifically for the OBP the tools for processing and visualizing the data will be especially developed; existing tools will not be used for this particular part.
Video Program, image programsxxx

Storage of data

Data is saved in electronic format, at research institute with regular backup on the Dataverse.NL.

Access to data

WP6 partners / Confidential

Conditions for access to data

Consent from ISPT or SEALEAU

Partners contributing to this data

WP6 partners

Latest update

18 May 2018

3.7 Work Package 7

The information was collected by the Work Package leader (Steve Harris/IVL) through the use of questionnaires. The results are summarized below.

Pre-existing data

- ☑ Field measurements
- ☑ Observations
- ☑ Laboratory measurements
- ☑ Software
- ☐ Surveys
- ☑ Models
- ☑ Personal communications
- ☑ Others

Source of pre-existing data

WP5 activities within Zero Brine, previous projects, desalination companies, literature. From site operator of conventional treatments. The LIFE project REMEMBRANE LIFE 11 ENV/ES/626 and operation of pilot plants after optimization of themselves (final configuration of treatment scheme) or as-build designs. PhD Dissertation / SOL-BRINE project deliverables. Design works and 2 plants. Preliminary results made with MF-PFR and CrlEM using natural brines. Experimental campaign carried out at UNIPA in order to assess the possibility to produce Magnesium Hydroxide using natural waste brines.

Conditions for use of pre-existing data

Partner in the projects and therefore has access to the associated deliverables. Operational data coming from operator will be confidential and will be used under this condition. In some cases free.

Type of data collected

- ☑ Field measurements
- ☑ Observations
- ☑ Laboratory measurements
- ☑ Software
- ☑ Surveys
- ☑ Models
- ☑ Personal communications
- ☐ Others

Aim of this data

DLR will use the simulation platform developed in Task 5.3 to obtain concrete figures about energy and mass balances, as well as critical cost figures regarding the operating costs (OPEX).
Perform both environmental LCA, social LCA and economic assessments.
Data will be used to create a reverse osmosis membrane from old membranes that will allow to concentrate the sodium sulphate solution with the lowest energy consumption.
Achievement of valorisation of material, mainly salt from brine, utilisation of excess heat.
SEALEAU participates in Task 7.3, where the Environmental Technology Verification is foreseen. SEALEAU will provide the required input for the ETV related to MED-SEALEAU technology.
Physico-chemical characterization of the effluent generated in WP4.
TYPSA will use the as-build design of IQE pilot plant (type of equipment, treatment scheme etc) to obtain CAPEX and technical suggestions to industrial scale plant project
Information on brine and concentrate streams. For the proof of concept of the idea in order to remove/recovered minerals from waste industrial brine

Process of data collection

During simulations data will be generated. The persons responsible for the simulations will collect it and save it on the server of their companies and then the data will be sent to the WP leader.

Excel data collection sheet is developed, and a telephone conversation held to discuss key aspects such as technical issues, system boundaries and data sources etc. A questionnaire will be developed from this and sent to partners to complete. Design of the MED evaporator. Monitoring of the construction procedure.
Several experiments will be conducted at UNIPA at different operative conditions. The data will be analized in order to tune the devices for the final set-up of the MF-PFR and CrIEM prototypes.

Format of data collected

☑	.doc / .docx	☑	Photo formats	☑	.txt
☑	.xls / .xlsx	☐	Video formats	☑	.csv, .tab
☐	.ppt / .pptx	☐	.xml	☐	.sgm / .sgml
☑	.pdf	☑	Others	☐	.nc, .cdf

Estimated size of data

Approximately 12 stakeholders with no more than 1 GB each but most likely less at around 500 MB each.

Software needed to create/process/visualize the data

Python simulation environment, RCE for the coupling of modules, Microsoft Office, Excel datasheets will be created to visualize and process the data. Visio. LCA software – GaBi and Simapro. Aspen Plus. Adobe Reader. RStudio. Text editors such as notepad.

Storage of data

Data is saved in electronic format, at research institute with regular backup on the Dataverse.NL. Cloud account such as Dropbox.

Access to data

Confidential, only Members of the individual WP's or the consortium in some cases can access the data.

Conditions for access to data

The data is confidential and available for the members of the consortium. Under the non-disclosure conditions of the Consortium Agreement.

Partners contributing to this data

TU DELFT, NTUA, CTM, WIT+BOS, UNIPA, SUT, FACSA, IQE, SEALEAU, IVL, TYPSA and TUBITAK

Latest update

May 2018

3.8 Work Package 8

The information was collected by the Work Package leader (Dimitris Xevgenos/SEALEAU) through the use of questionnaires. The results are summarized below. It must be mentioned that these results refer to Task 8.1 of ZERO BRINE project, since the rest (sub)tasks start at a later stage of the project implementation.

Pre-existing data

☐	Field measurements	☑	Surveys
☑	Observations	☑	Models
☑	Laboratory measurements	☑	Personal communications
☐	Software	☑	Others

Source of pre-existing data

- *TU DELFT* (Applied Sciences): Theoretical models from scientific publications about business modelling for the circular economy.
- *UNIPA*: Experimental campaign carried out at UNIPA in order to assess the possibility to produce Magnesium Hydroxide using natural waste brines. The pre-existing data refer to preliminary results made with a MF-PFR using natural brines.
- *SEALEAU*: SME Phase 1 project "GReen Desalination" (Grant Agreement No 674455), SOL-BRINE project (LIFE09 ENV/GR/000299), PhD Dissertation and market reports;
- *LENNTECH*: theoretical data based on surveys and personal communications;
- *TYPSA*: The feasibility study from the LIFE project REMEMBRANE LIFE11 ENV/ES/626.
- *EVIDES*: operational data regarding waste streams, quality specifications, approximate costs for chemicals

Conditions for use of pre-existing data

- *TU DELFT* (Applied Sciences): The models are published in academic journals and can be used when properly referenced.
- *UNIPA*: Data is published in two papers
- *SEALEAU*: By permission of SEALEAU confirmed by email communication
- *EVIDES*: Available for this project

Type of data collected

☑	Field measurements	☑	Surveys
☑	Observations	☑	Models
☑	Laboratory measurements	☑	Personal communications
☑	Software	☑	Others

Others: In-depth interviews with key stakeholders in the project.

Aim of this data

To study the economic mechanisms and governance related to the large-scale demonstration of the project and develop a circular economy business model.

Process of data collection

- *TU DELFT* (Applied Sciences): Face-to-face interviews
- *UNIPA*: Several experiments will be conducted at UNIPA at different operative conditions. The data will be analized in order to tune the devices for the final set-up of the prototype.

- *SEALEAU*: Interviews with partner stakeholders, as well as with identified external stakeholders having specific expertise e.g. Royal Hashkoning DHV regarding the "Leasing Chemical" concept that was implemented in the "TAKE BACK CHEMICALS" project. The stakeholder consultation events (Task 10.2) is also instrumental for the collection of data from the stakeholders. Literature review.
- *TYPSA*: During experimentation data will be generated. The responsible of the experiment will collect it and save it in the server of its company and then data will be sended to WP leader.
- *EVIDES*: Data will be gathered by online measurements, sampling and logging of observations.

Format of data collected

☑	.doc / .docx	☑	Photo formats	☐	.txt
☑	.xls / .xlsx	☑	Video formats	☑	.csv, .tab
☑	.ppt / .pptx	☐	.xml	☐	.sgm / .sgml
☑	.pdf	☑	Others	☐	.nc, .cdf

Others: Audio files of the interviews (mp3).

Estimated size of data

~ 4 GB.

Software needed to create/process/visualize the data

Microsoft Office, Adobe Creative Suite, Software for qualitative data analysis (e.g., Atlas) - to be decided, Product manufacturer available softwares.

Storage of data

Data is saved in electronic format, at research institute with regular backup on the Dataverse.NL.

Access to data

Confidential, Only Task 8.1 partners have access to this data.

Conditions for access to data

Under the conditions of non-disclosure agreement signed by all partners within the project's Consortium Agreement. With reference to interview data will be only made available to the stakeholders involved in Task 8.1 of WP8 and can be shared only with the written consent of the individual interviewees.

Partners contributing to this data

Task 8.1 partners (TU DELFT, EVIDES, SEALEAU, LENNTECH, TYPSA, UNIPA).

Latest update

22 May 2018.

3.9 Work Package 9

The information was collected by the Work Package leader (Maria Loizidou/NTUA) through the use of questionnaires. The results are summarized below.

Pre-existing data

- ☑ Field measurements
- ☑ Observations
- ☑ Laboratory measurements
- ☐ Software
- ☑ Surveys
- ☑ Models
- ☑ Personal communications
- ☑ Others

Source of pre-existing data

- EU Legislation and Country Legislation.
- BREF Documents.
- Grant Agreement.
- Documented data (publication in journal).
- SOL-BRINE project reports.
- Experimental campaign carried out at UNIPA in order to assess the possibility to produce Magnesium Hydroxide using natural waste brines.
- Mailing list from WssTP network.
- Literature and reports reporting benthic environmental quality in Rotterdam Harbour, the surrounding North Sea and other areas in Europe where the outfalls of desalination plants are to be surveyed.

Conditions for use of pre-existing data

Most of the data are public. WssTP is currently working to ensure that data that will be used are under the new GDPR guidelines.

Type of data collected

- ☑ Field measurements
- ☑ Observations
- ☑ Laboratory measurements
- ☐ Software
- ☑ Surveys
- ☑ Models
- ☑ Personal communications
- ☑ Others

Aim of this data

- To perform a policy review and identify the existing legal and policy framework regulating the application of the developed innovative ZERO BRINE products and processes.
- To assess the possibility to apply for an Innovation Deal to the EC.
- To develop framework conditions for implementing ZERO BRINE solutions and in particular policy conditions (including possible financial instruments that may be suggested from experience with the waste management sector).
- To assess the environmental impacts (specifically, on the seabed communities) of conventional vs. ZERO BRINE-based desalination plants; to compare any changes in benthic communities before and after the establishment of ZERO brine technology.
- To proof the concept of the idea in order to remove/recovered minerals from waste industrial brine.

- To perform a policy review and identify the existing legal and policy framework. Finally, the possibility for applying for an Innovation Deal will be assessed.
- To identify the recovered materials and evaluate them qualitatively.
- To create registration form for ZERO BRINE events.
- To disseminate the results of the project to policy makers.

Process of data collection

- Internal meetings, interviews, data collection by WP9.
- Through literature review and assessment of the legal and policy framework and personal communication with experts in policy making.
- Action plan for exchanging information regarding the local framework of the countries where demonstration activities will be implemented.
- Evaluation (sorting & counting of animals and algae) of samples from the seabed: Use of benthic corers, Van Veen or Smith Mac-Intire grab to collect sediment from Rotterdam port in various depths and in proximity to the brine disposal location. Use of sieve (0.5mm mesh) and store them in Rose 33inimi and 4% formaldehyde- sea water.
- Several experiments will be conducted at UNIPA at different operative conditions. The data will be analyzed in order to tune the devices for the final set-up of two prototypes. The best operative conditions will be chosen in order to guarantee the quality of the final products (magnesium hydroxide and calcium hydroxide) and to minimize the environmental impact.
- Registration for the events: through a Registration form software.
- Through literature and personal communication with experts in policy making.
- Some input data will come from other work packages, such as WP2, WP3, WP4 and WP7.

Format of data collected

☑	.doc / .docx	☑	Photo formats	☐	.txt
☑	.xls / .xlsx	☑	Video formats	☑	.csv, .tab
☑	.ppt / .pptx	☐	.xml	☐	.sgm / .sgml
☑	.pdf	☑	Others	☐	.nc, .cdf

Estimated size of data

100 GB

Software needed to create/process/visualize the data

- Normal Microsoft office software package (mainly: Word, Power Point, Excel)
- Adobe Reader
- Adobe Photoshop
- Stereomicroscope
- Microscope
- Benthic fauna identification keys
- PRIMER software
- BENTIX/ AMBI software
- Jotform
- Mailchimp
- Video program, Image program

Storage of data

Data is saved in electronic format, at research institute with regular backup on the Dataverse.NL.

Access to data

- WP9 partners (TU Delft, NTUA, UNIPA, SEALEAU, WssTP, Revolve Media, UNIABDN) will have full access.
- Data presented on deliverables will be public.
- Confidential documents generated by the partners involved will be available after their consent.
- In case the data collected is expected to be publish, it will be prior consent.

Conditions for access to data

Under the conditions of the Consortium Agreement and Data Management Plan. No conditions for WP9 partners.

Partners contributing to this data

WP9 partners: NTUA, TU DELFT, UNIPA, SEALEAU, WssTP, Revolve Media, UNIABDN

Latest update

18 May 2018

3.10 Work Package 10

The information was collected by the Work Package leader (Stuart Reigeluth/REVOLVE) through the use of questionnaires. The results are summarized below.

Pre-existing data

- ☑ Field measurements
- ☑ Observations
- ☐ Laboratory measurements
- ☑ Software
- ☐ Surveys
- ☐ Models
- ☑ Personal communications
- ☑ Others

Source of pre-existing data

Mostly SOL-BRINE project (LIFE09/ENV/GR/000299) and data from LCA data sets., International databases, e.g. Eurostat

Conditions for use of pre-existing data

Under license, SOL-BRINE data: Consent from SEALEAU representative, GDPR guidelines

Type of data collected

- ☑ Field measurements
- ☐ Observations
- ☑ Laboratory measurements
- ☑ Software
- ☑ Surveys
- ☐ Models
- ☑ Personal communications
- ☑ Others

Aim of this data

Communicating and disseminating results of Zero Brine to key stakeholder groups as well as increasing possibilities for follow-up investment

Process of data collection

Results from Zero Brine work:

> Results from pilot projects, work packages, OBP, BEC

>Review LCA datasets from data providers, e.g. Ecoinvent. Obtain data from bench scale and pilot tests from case studies

-Through stakeholder consultation events (Task 10.2)

Participation in conferences and high level dissemination and business events (Task 10.5) and other events

Through a registration form software; through newsletters

Format of data collected

- ☑ .doc / .docx
- ☑ .xls / .xlsx
- ☑ .ppt / .pptx
- ☑ .pdf
- ☑ Photo formats
- ☑ Video formats
- ☐ .xml
- ☑ Others
- ☐ .txt
- ☐ .csv, .tab
- ☐ .sgm / .sgml
- ☐ .nc, .cdf

Estimated size of data

8 GB

Software needed to create/process/visualize the data

Video program, Office programs, Adobe programs, image programs, LCA software GaBi and SimaPro, OmniGraffle, Apple Keynote/Pages, Jotform, Mailchimp

Storage of data

Data is saved in electronic format on data storage systems of the contributors to WP10.

Access to data

Staff the contributing partners have access. The data include public (communication material, visuals and graphics, press releases) and confidential data (stakeholder database).

Public data is shared on the Zero Brine website and on twitter.

Conditions for access to data

Public and confidential data

Partners contributing to this data

REVOLVE, SEALEAU, TU Delft, WsstP and all consortium partners contribute with their data and results.

Latest update

25 May 2018

Table 3-1: Expected data in different work pack of ZERO BRINE project

WP No.	Type of data	Format	Software	Data size	Specific character	Can it be reproduced?
WP1	DOCUMENTS	.DOC .PPT .XLS .PDF	MS, ADOBE	500 MB	-	Yes
WP2	Field measurements, observations, laboratory measurements, software, Surveys, models, personal communications,	Doc./docx, .xls /.xlxs, .ppt,.pdf, photo, Video, .txt, .csv, .tab, .dwg	MS Office, Adobe Acrobat Pro, PHREEQC simulation platform, text editors such as notepad, image editing software, AutoCAD	5-9 GB	-	Yes
WP3	**Observational** data, experimental data, simulation data, metadata	doc/docx xls/xlsx pdf txt photos (jpg, png, gif etc.) r (R script) graffle (vector drawing) vsd/vsdx (vector drawing)	MS Office, plain text editors, GNU R, RStudio, OmniGraffle, Origin, Visio	2-20 GB	-	The simulation data is fully reproducible (source code and non-classified data sets will be provided), the observational and experimental data will follow the best scientific practices of reproducibility
WP4	Raw data, processed and output	.doc/.docx .xls/.xlsx .pdf Photo formats .txt/.csv/.xml	Microsoft Office Matlab	<10Gb	-	No
WP5	Laboratory measurements	.docx, .xlsx, .pdf, .txt, .csv, Photos	Matlab, Excel, Word, LabView, R	1-10 GB	-	
	Field measurements	.docx, .xlsx, .pdf,	Word, Excel,	1-10 GB		

WP No.	Type of data	Format	Software	Data size	Specific character	Can it be reproduced?
		.txt, Photos, videos	Notepad, Image Editing, R, OmniGraffle vector drawing			
	Software, Models, Bibliographical data from previous works about technology modelling	.docx, .xlsx, .pdf, .txt,	Word, Excel, Python, RCE, Matlab	1-10 GB		
WP6	Simulation data Derived and compiled data Metadata	doc/.docx .xls/.xlsx .ppt .pdf Photo formats Video formats .txt .csv, .tab	- Office programs (MS Excel, Word, Power Point, etc.) - Adobe programs - Image programs - Video program - QGIS (for processong; OBP related) - For the OBP special tools will be developed for processing and vizualizing the data; existing tools will not be used for this - Maybe GIS software is needed	1 GB max	consent is needed from WP6 partners to share and distribute data outside the ZB consortium partners	Yes
WP7	Field measurements Observations Laboratory measurements Software Models	.doc/.docx .xls .pdf Photo format Others .txt	LCA: GaBi, Simapro Aspen, Python, RCE, Excel, Visio, Adobe Reader, RStduio, Notepad	<6GB	Primarily non-personal data, but in some cases, such as interview data, it may refer to individuals.	Yes

WP No.	Type of data	Format	Software	Data size	Specific character	Can it be reproduced?
	Personal communication Others	csv				
WP8 (Task 8.1)	Field measurements Surveys Observations Models Laboratory measurements Personal communications Software Others	.doc / .docx .xls / .xlsx .ppt / .pptx .pdf Photo formats Video formats .csv, .tab Others	Microsoft Office, Adobe Creative Suite, Software for qualitative data analysis (e.g., Atlas) - to be decided, Product manufacturer available softwares.	~4 GB	Personal data, consent from the interviewees needed	
WP9	Field measurements, Observations, Laboratory measurements, Surveys, Personal communications, Others (legislation)	.doc/.docx , .xls/.xlsx , .ppt , .pdf , Photo formats, video formats, .csv, .tab,	MS Excel, Word, Power Point Adobe Photoshop Video program Image program Adobe Reader Stereomicroscope Microscope Benthic fauna identification keys PRIMER software BENTIX/ AMBI software	~200 GB	-	
WP10	Communication material, reports, graphics, videos	docx, xls, jpg, png, ai, mp4, mp3, pdf	Word, Indesign, etc.	~9 GB	Personal data, consent from the interviewees needed	Yes
WP11	Report	.pdf, .docx	Pdf reader, MS office	200 MB	N/A	Yes

4 Data storage and backup

Storage media and location

ZERO BRINE involves collaboration with 22 partners and a large amount of data is being and will be generated. To manage such quantities of data and allow the partners (and other researchers) to share them with each other, suitable storage media should be used that comply with European privacy legislation.

The following storage media are NOT appropriate for storing the data generated in ZERO BRINE project:

- Cloud storage, such as Dropbox and Google Drive,
  These are popular services by general public and not appropriate for sensitive data storage. If cloud storage is used for storage of a part of data their service level agreements should be studied before using them;

- Local drives, cloud storage and external portable storage devices
  These are storage facilities that do not fall under surveillance of this data management plan. Local drives such as PCs and Laptops are convenient for short-term storage and data processing. However, relying on local drives for storing master copies should not be encouraged, unless backup of data is made through networked drives regularly; and

- External portable storage devices, such as external hard drives and USB drives,
  These are very common among individual researchers and students because they are convenient, cheap and portable. However, they are not recommended for long-term storage as their longevity is uncertain and they can be easily damaged or lost.

The consortium partners will deposit the data generated by the project in the data archive provided by the 4TU.Center for Research Data (4TU.ResearchData in short) belonging to TU Delft. A **Data Lab** will be established in order to store data generated during the project, to share this data with project partners, to process them and to visualise them. A data lab is a secure online environment (with or without screening) for storing, processing and sharing dynamic research data, digital tools and software, visualisations and other items with fellow researchers. DataverseNL is one of the possibilities offered for 4TU-ResearchData as a type of Data Lab.

This data repository can be accessed here: https://data.4tu.nl/repository/

DataverseNL (see also here)
DataverseNL is an open source application that makes research data accessible to others. DataverseNL is specifically designed to store, back-up, organise, annotate and share research data with colleagues all over the world. This open source application can grant multiple individuals controlled access to data. DataverseNL provides for the following:

- Organization of data files in dataverses and datasets
- Addition of metadata and documentation
- Version management
- Management of access rights
- Easy collaboration with fellow researchers or project partners, beyond university or research institute

- Centralized professional storage and backup

Figure 4-1: the looks of ZERO BRINE data storage page using DataverseNL

Once a dataset is published, any metadata or file changes (e.g. by uploading a new file, changing file metadata, adding or editing metadata) will be tracked in dataverseNL versioning feature. The authorized users can view what has exactly changed starting from the originally published version to any subsequent published version. The DataverseNL uses git for version control and GitHub for hosting. Subversion is an alternative data storage system to DataverseNL.

Subversion repository hosts by TU DELFT:

Subversion of shortly SVN is a powerful open-source version control system that is typically used to manage the collections of files that make up software projects. However, a SVN repository may actually be used for managing any collection of files that are changed or modified over time. Conceptually, a SVN repository is similar to a folder or directory on your computer that may contain a collection of assorted, but related, files and directories. In fact, a SVN repository is typically used to store all the files and directories that make up a single project, or perhaps even a collection of interrelated projects. However unlike a normal folder on your computer that stores only the most recent copy of a collection of files, a SVN repository also stores the history of those files.

Figure 4-2: the looks of ZERO BRINE data storage page using subversion repository

SURFDrive is a temporary storage medium used by ZERO BRINE for storage and sharing of data management part of the project.

SURFDrive (see also here)
SURFdrive allows you to store, synchronise and exchange 100 GB of research data safely and easily with third parties. You have easy access to your data files from any device. SURFdrive complies with Dutch and European privacy legislation. The data is stored safely in the Netherlands and is never made available to third parties, which is a marked advantage over services like Dropbox.

Storage of data in ZERO BRINE:
At the moment, ZERO BRINE uses SURFDrive storage, which is provided by TU DELFT for the data storage for storage of management data. However, the capacity of the SURFDrive will not suffice all produced data during the ZERO BRINE project (see Table 4-1). DataverseNL will be the storage system to be used in ZERO BRINE project.

Table 4-1: comparing possibilities of data storage

Name	Subversion	dataverseNL	Surf drive
Capacity storage	6TB	100GB/person	250GB
Version control	Automatic	Automatic	
Permission control	Login by account holder and control by admin	Login by account holder and control by admin	Link sharing
User friendly	Learning steep	Yes	Yes
Synchronisation	Down and upload	Down and upload	Automatic
Special software	Yes	http based	Yes
Costs	Free	50 / year	Free
Archiving	Yes / 6 years	15 years /	Yes

Back up location and frequency

The tables below provide the expected data storage and back-up location and frequency by Work Package.

Table 4-2: Expected data storage and back up in WP1

Data	Storage medium and location	Backup location	Backup frequency
Processed data	DataverseNL and SURFDrive	DataverseNL and SURFDrive	Continuous

Table 4-3: Expected data storage and back up in WP2

Data	Storage medium and location	Backup location	Backup frequency
Raw data	Storage medium at each technology	DataverseNL	Once a day during the measurements and once in two weeks outside the measurements period

Data	Storage medium and location	Backup location	Backup frequency
Processed data	DataverseNL	Storage medium at each technology	Once in two weeks
Models/code	DataverseNL	Storage medium at each technology	Once in a month
Informed consents	Dataverse NL / WP1	Surfdrive TU Delft / WP1	Once in a month

Table 4-4: Expected data storage and back up in WP3

Data	Storage medium and location	Backup location	Backup frequency
Raw data	Researcher's computer, task leader's computer, portable USB drives, laboratory notebooks	1. Task leader's office at SUT 2. Task leader's home outside the SUT	Backup drives are connected for a few hours every day and incremental backup is performed every 1 h; hourly snapshots are kept for a week, daily snapshots are kept for a month, weekly snapshots are kept indefinitely. Previous versions of files can be recovered when required
Processed data			
Models/code			
Informed consents	If applicable, paperwork is kept at the SUT's archives. Scanned version is kept with the other data and subjected to the same treatment		Paperwork is kept indefinitely in the SUT's archives, electronic version - see raw/processed data and models/code
Other	See raw/processed data and models/code		See raw/processed data and models/code

Table 4-5: Expected data storage and back up in WP4

Data	Storage medium and location	Backup location	Backup frequency
Raw data	Partners server/ DataverseNL	DataverseNL	-

Table 4-6: Expected data storage and back up in WP5

Data	Storage medium and location	Backup location	Backup frequency
Raw data	laboratory PCs		Daily
Processed data	laboratory PCs / servers		Regularly

Data	Storage medium and location	Backup location	Backup frequency
Models/code	servers		Automatic, real-time

Table 4-7: Expected data storage and back up in WP6

Data	Examples	Storage medium and location	Backup location	Backup frequency
Raw data	interviews, copies of input from other databases, reference docs, etc.	storage medium as selected by the project (DataverseNL, Subversion or SURFdrive)	DataverseNL or Subversion (or the storage medium as selected by the project)	every update, or policy as selected by the project
Processed data	applies to NTUA	DataverseNL or local storage in an external drive as selected by project partner NTUA	DataverseNL	every 15 days
Models/code	applies to NTUA	DataverseNL or local storage in an external drive as selected by project partner NTUA	DataverseNL	every 15 days
Informed consents	NDA and other contract of approval notes which might apply to technosuppliers, end users etc; stream composition information shared within ZB in line with consent obtained from information providing party	SURFDrive (or storage medium as selected by the project)	DataverseNL or Subversion (or the storage medium as selected by the project)	every update, or policy as selected by the project
Other	project documentation	SURFDrive (or storage medium as selected by the project)	DataverseNL or Subversion (or the storage medium as selected by the project)	Policy as selected by the project

Table 4-8: Expected data storage and back up in WP7

Data	Storage medium and location	Backup location	Backup frequency
Raw data	Personal computers, and local institute servers	Institutes own backup – secure drive or 2 USB drives Dataverse.NL	Daily and monthly on Dataverse NL server
Processed data	Personal computers, and local institute servers	Institutes own backup – secure drive or 2 USB drives Dataverse.NL	Daily and monthly on Dataverse NL server
Models/code	Personal computers, and local institute servers	Institutes own backup – secure drive or 2 USB drives Dataverse.NL	Daily and monthly on Dataverse NL server
Informed consents	Personal computers, and local institute servers	Institutes own backup – secure drive or 2 USB drives Dataverse.NL	Daily and monthly on Dataverse NL server

Table 4-9: Expected data storage and back up in WP8

Data	Storage medium and location	Backup location	Backup frequency
Raw data	Personal computers and DataverseNL	DataverseNL	Continuous
Processed data			
Models/code			
Informed consents			

Table 4-10: Expected data storage and back up in WP9

Data	Storage medium and location	Backup location	Backup frequency
Raw data	In computer and external drive of each partner involved and in WP9 folder in ZERO BRINE DataverseNL.	external drive & “DataverseNL”	Once a month
Processed data	In computer and external drive of each partner involved and in WP9 folder in ZERO BRINE DataverseNL.	external drive & “DataverseNL”	Once a month
Models/code	-	-	-

Data	Storage medium and location	Backup location	Backup frequency
Informed consents	ZERO BRINE DataverseNL.	external drive & “DataverseNL”	When required
Other	-	-	-

5 Data documentation

This section describes how data will be documented to help new members of the team and future (secondary) users understand and reuse it. A simple file identification system is prepared to upload files to selected system (DataverseNL) and to communicate on files amongst consortium/work package partners. The same identification system is used for files that are uploaded to the EU participants portal.

Below more information are provided regarding the type of documentation that will accompany the data to help secondary users to understand and reuse the data, as well as information regarding the identification of the data.

Meta-data

Along with the data files, metadata records will be produced to describe and contextualize the data. Both descriptive and substantive metadata will be produced:

- ✓ **Descriptive metadata** are indispensable for the preservation, retrieval and re-use of datasets. These provide answers to questions concerning the person creating the data, the subject of the data, the type of file, geographic information and other aspects. In other words, metadata are 'data about data'. Metadata make use of international standards for data exchange. This ensures that the information and the associated dataset can be found by search engines. The descriptive metadata that will be produced are listed in Table 5-1.

- ✓ **Substantive metadata** is important primarily for the user of the data. For example, consider a codebook that tells how the data should be read or interpreted. In many cases, such information is added in the form of Readme.txt files or similar descriptions

Table 5-1: Descriptive metadata that will be included in the documentation of ZERO BRINE data

Creator*	Main researchers involved in producing the data.
Title*	Name or title by which the dataset is known.
Contributor	Institution where the data was created or collected. A person or organization responsible for making contributions to the dataset.
Publisher*	A holder of the data (including archives appropriate) or institution which submitted the work. Any others may be listed as contributors.
Publication year*	The year when the data was or will be made publicly available.
Date created*	Date the resource itself was put together; this could be a date range or a single date.
Description*	Concise description of the contents of the dataset. Describe the research objective, type of research, method of data collection and type of data.
Subject	Subject, keyword, or key phrase describing the resource.
Temporal coverage	Indicate the dates to which the data refer. Enter the year, or beginning and ending dates.
Spatial coverage	Describe the geographic area to which the data refer (e.g. municipality, town/city, region, country). The geographic coordinates of the area may be included, if desired.
Identifier	4TU.ResearchData automatically assigns a DOI to a dataset once the entire deposit procedure has been completed. In some cases, a dataset may be known by one or more other (persistent) identifiers.
Language*	The primary language of the resource. When no language is added, 4TU.ResearchData will automatically assign 'English'.

Link to publication	Include the web addresses or DOIs for any publication, important internal reports or other datasets that are related to your dataset.

File naming & Identifiers

In ZERO BRINE project, an identifier is used as a reference number or name for a data object and forms the key part of our documentation and metadata. Table 5-2 shows the codes that can be used for making identifiers. Table 5-3 includes some identifier as examples to the codes mentined in Table 5-2.

Table 5-2: Codes for identification of files

Description	Deliverables	Meetings	Conferences / Events
First letters	ZEROBRINE	ZEROBRINE	ZERO BRINE
Underscore	_	_	_
Next letters	Deliverable number [Dx.y] [x=WP number, y=deliverable number]	Type of document (i.e. Agenda, Minutes, Presentation). In case of presentations, mention WP number as well.	Event title
Underscore	_	_	_
Next letters	Short explanatory title for the document	Location and date of the meeting separated by underscore	Location and date of the meeting separated by underscore
Underscore		_	_
Next letters		Short name of organisation and initials of presenter	Short name of organisation and initials of presenter
Underscore	_	_	_
Last letters	"v" and number of revision of this specific report [v0.1=draft version, v1.0=final version]	"v" and number of revision of this specific report [v0.1=draft version, v1.0=final version]	"v" and number of revision of this specific report [v0.1=draft version, v1.0=final version]

Table 5-3: Examples of file identification

Type of File	Code	Example
Deliverable	[ZEROBRINE_Dx.y_Title_v0.1]	ZERO BRINE_D1.2_DataManagmentPlan_v0.1
Meeting	[ZEROBRINE_Type of Doc_Location_YYYYMMDD (_Organisation/Initials)_v0.1]	ZERO BRINE_Agenda_Delft_20171208_v0.1
		ZERO BRINE_Minutes_Delft_20171213_v0.1
		ZERO BRINE_WP2_Presentation_Delft_20170615_CiTG/TUD_v0.3
Presentation	[ZEROBRINE_Event_Location_YYYYMMDD_Initials/Organisation_v0.1]	ZERO BRINE_Desalination2015_Amsterdam_20181220_CiTG/TUD_v1.0

In addition to the standard identification system provided and used by ZERO BRINE project, more options are available for documentation of public files:

- The project deliverables that are indicated as public regarding the dissemination level in the Grant Agreement (Code: PU), will have the same system identification as uploaded files through the EU participants portal

- In the case of presentations and publications on conferences or other public media used for dissemination, the identification system of the organisers of the event or the medium that is publishing will be followed.
- In some cases, the University will also publish the data to make retrieval for potential users even easier. In this case, the University will use Digital Object Identifiers (DOIs) (see also below “Long-term data preservation”).
- Public files are also available through the website made for ZERO BRINE project and through the 4TU.Centre for Research Data.

Documentation may include details on the methodology used, analytical and procedural information, definitions of variables, vocabularies, units of measurement, any assumptions made, and the format and file type of the data by considering how this information and are captured and where they are recorded.

Following good research practice rules, data documentation will be added as a Readme.txt file (a plain text file) to the folder where the corresponding datasets are saved.

Long-term data preservation

To be useful over the long-term, identifiers are made unique through including the preface ZB and persistent to not being change over time. The emerging identifier standard for publicly available datasets is the Digital Object Identifier (DOI). 4TU.ResearchData will automatically assign a DOI to a dataset that allow easy citation and discoverability.

6 Data access

Large quantities of digital data will be generated and analysed in all work packages by the project partners. This section describes the authorized access to the data, which is collected and managed during the research. In general, results are owned by the party that generates them. In the cases that data are generated by two or more parties, the data ownership is jointly shared among consortium partners. Commercial exploitation of data is not yet discussed.

6.1 Copyright and Intellectual Property Rights issues

Intellectual property generated within the ZERO BRINE project will be protected by patents, if appropriate, and its management will be regulated in compliance with the final consortium agreement and the intellectual property agreement among the partners.

Three levels are considered for the copyright and foreground intellectual property that will be created in the course of the project.

- Individual and joint intellectual property, which belongs to individual partners or is jointly owned by partners working in a particular task and is restricted to those partners. The appropriate and ethical process in line with owner guidelines and (National) Standards be will be followed in the case of individual and joint intellectual property.
- Generic intellectual property, which can be used by all partners of the consortium. Some of the generic intellectual property will be made more widely available to European academics, SMEs and other industrial organizations. The Intellectual Property Use and Dissemination Committee (IPUDC) has the task to extract the generic knowledge of foreground IP. Any revisions to this consortium agreement will be made through discussions within the General Assembly of ZERO BRINE project.
- Publicly available intellectual property includes data that will be made available with no restrictions for instance documents that will be published at conferences or data that will be made available on the public website. The Intellectual Property Use and Dissemination Committee (IPUDC) shall identify which data can be made publicly available. Any revisions to this consortium agreement will be made through discussions within the General Assembly of ZERO BRINE project.

6.2 Limitations on the access to data

Confidential data will be stored in the secure facilities of the organisation responsible for collecting the data and will be retained for couple of years after the end of project (at least 5 years or longer) if required by individual institutions. A second person will be nominated to maintain study records if the responsible researcher is no longer able to do it.

If requested, data can be shared with other consortium members through the online repository of DataserveNL. The participants' names will be replaced with ID codes, for all personal data reported in the project, to maintain anonymity. Unless specific permission is provided, the participants' identity will be fully masked in any printed materials, project reports or dissemination materials.

The responsibilities of audio and video recording devices used within ZERO BRINE studies will be with the individual members of the research team; i.e. no one outside of the research team will have access to any of these data. Consent should be provided when personal media and other content will be used in the wider dissemination of the research project. Audio files and other media will be deleted from digital recorders and stored digitally within a password-protected folder on the network drives of the participating institutions after transcription. Other content will also be stored in password protected databases within institutions, available only to members of the research team. Public data such as deliverables of ZERO BRINE will have no limitations in publication and usage.

6.3 Data access control

Access control to information is the responsibility of the individual organisations involved in conducting the data collection studies. With regard to the personal data, only anonymised data is allowed to be placed on the selected platform (DataverseNL). The raw confidential data will be securely stored by individual organisations.

In Section 9, extra information will be provided with regard to the privacy of participants because a part of data in ZERO BRINE is disseminated to the wider public through deliverables, internal reports, scientific journals, conferences, articles, workshops, publications, website and social media etc.

6.4 User access

The used system for data storage and data sharing (DataverseNL) requires the manual activation of a new account from one of the administrators. This enables full control of the users accessing the ZERO BRINE project in either of the used systems and ensures the correct access for each user. In the beginning, TSAT and work package leaders will be added to the platform. The project coordination and innovation manager decide who could have access to data and which data can be access by each user. Platform administrator is responsible for ad hoc adding and removing users, and adjusting the access level of users on the request of the members of management team. Access of new users to data will be applied through the work package leaders, endorsed by the project coordinator and innovation manger and done by the platform administrator.

7 Data sharing and reuse

The consortium partners are the main user of data in ZERO BRINE project. This data will be used to support the design, development and assessment of innovations in ZERO BRINE project. In addition to the consortium partners, other stakeholders (salt producers, water and wastewater purification technologies, engineering agencies, etc.) may express their interest in reusing the data during or after the project to support further research projects or products and services. In the case of public data such as deliverable, the data reuse procedure is not complicated; the information is public. In other cases, assessments will be done about the aims pursued by the stakeholder with the data and about the role of applicant stakeholder in the data collection.

Sharing and reuse of confidential data such as commercial or sensitive data is not possible .In case that the dataset cannot be shared, the reasons for this should be mentioned (e.g. ethical, rules of personal data, intellectual property, commercial, privacy-related, security-related).

8 Data preservation and archiving

Criteria for preservation and long-term access

All relevant obtained data will be preserved and archived on the DataverseNL platform, the network of the researcher institute and on the network drive of the Technical University of Delft during the project and on the on the network drive of researcher institute and the Technical University of Delft for at least 5 years after the termination of the ZERO BRINE project.

The consortium partners decide which data has to be archived for preservation and long-term access during the implementation course of the project. Experts suggest that all data should be kept in secured storage at least for 5 years or longer after the end of the project. In the cases that audio and video recording devices are used within ZERO BRINE project the media will be deleted from digital recorders and stored digitally within a password-protected folder on the network drives of the participating institutions after transcription of the data. Exceptions are when consent is specifically provided. In the case of staff changes and illness, it is possible to access data by a second responsible person. The second person is not yet determined in the ZERO BRINE and the project coordinator and innovation manger explores the possibilities.

Data formats chosen for long-time preservation

The consortium partners are still discussing this aspect. For the long-term data preservation and availability, the data will be preserved in the pdf format for which software is widely available on a variety of platforms. When data consists of many files, zip bundles will be used to group this data; thus making uploading and downloading easier.

Data repository for archiving ZERO BRINE data

4TU.Centre for Research Data.

4TU.ResearchData is a repository for technical-scientific research data that stores the data in a permanent and sustainable manner, according to the guidelines of the international Data Seal of Approval. Being a Trusted Digital Repository, 4TU.ResearchData is taking appropriate measures to ensure the long-term availability and quality of data it holds.

Once a dataset has been completed and 'frozen', it may be transfered to 4TU.ResearchData archived for long-term storage (at least 15 years). Before uploading, the data should be finalised because it cannot be altered or supplemented by additional information. Any changes or supplements to data will be accepted as a newly uploaded version. 4TU.ResearchData will make a link between the new and previous version. By default, this data will be available via Open Access and be stored for a minimum of 15 years. It can also be extended for periods of 15 years at the cost rates indicated below. The data is stored in three different locations to ensure its safety. In principle, the data will then be made public, while a new version of the website at 4TU.ResearchData website is currently being developed, in which limited access possibilities will also be provided. More information will be provided at later stages of the project implementation. It is possible that the data or a part of it cannot be released.

A view of the repository can be seen here: http://data.4tu.nl/repository/collection:all. The project consortium plans to create a repository called "ZERO BRINE". This repository will have a unique Digital Object Identifier (DOI),

where the research data that are generated during the project and selected to be made publically available, will be uploaded.

Costs for archiving data

TU Delft provides the possibility to store and archive 100 GB by year for each staff member that is being involved in ZERO BRINE project. This means that 14,000 GB can be stored for free each year in the identified repository, while for archiving more data the cost is € 4.50 per GB. By default, this data is stored for a minimum of 15 years, while it can also be extended for periods of 15 years at the same rate.

For more information about the preservation policy of TU Delft, you may refer to this document:
http://researchdata.4tu.nl/fileadmin/editor_upload/pdf/Preservation_Plan/4TU.Preservation_Policy.pdf

9 Privacy of participants

The privacy of participants during and after the ZERO BRINE project should be guaranteed and safeguarded at all time during and after the project. The participants will not be providing sensitive personal data about their own lifestyle or beliefs. To this aim, the lines of the EU Data Protection Directives will be adopted. Deliverable 11.1 (ethic No. 01, human beings) and deliverable 11.2 (ethic No. 02, Protection of Personal Data) provide guidelines for the participants' privacy. Therefore all participants' information should be anonymised before storing and archiving.

9.1 Responsibility of partners in ZERO BRINE

The partners involved in the ZERO BRINE project recognise that gathering empirical data and evidence from participants entails significant responsibilities for them, such as the conditions mentioned in ethical report No.1, ethical report No.2.

9.2 Governance

The following governance measures will be applied to ensure the compliance with all aforementioned data management decisions. WP leaders are responsible for adhering to the above specifications for their respective work package. For the overall project, TU DELFT will be responsible for complying with the data management plan. All consortium partners are responsible for making sure personnel working on the project have read the data management plan and adopted the principles.

9.3 Any other business

Changes in the Data Management Plan cannot overrule the principles that guide the Plan, such as the integrity rules of TU DELFT. To evaluate the efficiency and efficacy of the data management plan, it will be revised on the yearly basis. The evaluation will at least include:

- Do data sufficiently preserve the anonymity?
- Is the anonymization occurred correctly and issued with unique identifier?
- Is the confidential and sensitive data being stored safely in the database?
- Is file identification occurred correctly and meaningful (i.e. labels)
- Is the file identifier understandable for outsiders?
- Is the plan still consistent with what is being done in WPs?
- Is the instantiated database consistent with the specifications in this document?

In any case, it must be mentioned that any anonymized / pseudonymised data that cannot be cross-linked and contains no further identifiable variables will be regarded as free to be used as 'regular' data.