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Data Management Plan

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Summary

The main goal of the Data Management Plan is to describe how the research data will be handled during and after the end of the project, what kind of data will be collected, processed and/or generated, which methodology and standards will be applied, whether data will be shared/made open access and how data will be curated and preserved. Any peer-reviewed research publications, abstracts and presentations for international conferences may also be shared through the website of the project at <http://www.sun-to-x.eu> .

Approval

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Summary

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Any peer-reviewed research publications, abstracts and presentations for international conferences may also be shared through the website of the project at <http://www.sun-to-x.eu>.

Abbreviations

Abbreviation	Definition
DMP	Data Management Plan
EC	European Commission
DRM	Digital Rights Management
PO	Programme Owner
RTO	Research and Technology Organisation
SME	Small and Medium Enterprise

Table 1: Abbreviations



1. Introduction

The Sun-to-X project contributes to European Commission targets for clean energy for all and circular economy by developing a system for the conversion of solar energy into storable chemical fuel. While the concept of solar-to chemical fuels has been around for decades, the technology has been limited by the economic viability and scalability of the technology. The Sun-to-X project focuses on using solar energy to produce a carbon-free, non-toxic, energy-dense, liquid fuel - Hydrosil, with very good long-term stability, which is applicable in the transport and energy sectors. The consortium will firstly produce hydrogen as chemical intermediate through a photoelectrochemical device. This will then be converted to Hydrosil through a thermochemical reaction. The novelty of our proposal lies in the following three key aspects: 1. Overcoming the known practical challenges of high-performance photoelectrochemical fuel production by using membrane photoelectrode assemblies which can operate with solar energy using only ambient humidity as the water supply 2. Developing reactors for and demonstrating the renewable production of Hydrosil for the first time, using a thermochemical process (using concentrated solar light) 3. Demonstrating a completely decarbonised energy cycle with liquid fuels. In addition, we will demonstrate the applicability of Hydrosil towards the transition to a circular economy, by using it for the valorisation of waste plastics.

1.1. Purpose of the Data Management Plan

The purpose of this document is to lay out a plan for the management of data generated/collected in Sun-To-X. It covers the following:

- Identification of data to be collected/processed/generated
- Methodology and standards to be applied
- Data handling during and after the project
- Sharing, curating and preserving data

At the time of this writing, Sun-To-X partners have identified 28 data sets to be included in the DMP at this stage. The majority of the datasets identified at this stage will be made openly accessible to the public through repositories such as Zenodo, and they will be preserved after the end of the project. The DMP is a living document – if necessary, it will be updated throughout the project's lifetime.

1.2. Data set properties

Following the guidelines of the EC (EC, 2016), this document contains the following properties for each of the identified data sets:

1. Name
2. Short description
3. Standards to be applied, metadata
4. Data sharing
5. Curation/archiving/preservation

A short description of each of these properties is provided below.

1.2.1. Name and reference code

In order to imbue the names of datasets with easily identifiable meaning that conveys important information, the following naming convention shall apply:

CountryCode.DataOwner.Openness.Title

CountryCode: this string identifies the country to which the data pertains/where the data was collected using the ISO 3166 Alpha-2 coding system.



DataOwner: this string identifies the project partner in Sun-To-X that is associated with the dataset (data collector/custodian) using the official abbreviated partner names.

Openness: this string determines whether a given dataset is intended to be shared with the public as Open Data. It may take the following values:

1. Open: can be accessed, used and shared by anyone without limitations, accessible on the internet in a machine-readable format, free of restrictions on use in its licensing)
2. Shared: available to use, but not under an open data license. Restrictions on its use or reproduction may apply (limited to a given group of people or organisations, may not be reproduced without authorisation, etc.)
3. Closed: can only be accessed by its subject, owner or holder

Title: a short and descriptive string to identify the contents of the data

Using these strings, the name of a dataset would look like this:

FR.LGI.Open.SolarenergycollectedBordeaux

A dataset with this name would describe a survey on the solar energy collected in Bordeaux area conducted in France and curated by LGI.

1.3. Data licensing

Without a license to set out the terms of use, data is not truly open. Data without a license may be publicly accessible, but users do not have the certainty that they can use and share the data, leaving them in a legal grey area. Data licensing standards are used to lay out the openness of data sets in concrete terms, and an open data license gives explicit permission to use the data both for commercial and non-commercial purpose. There are many types of licenses to choose from, and this document will not cover them in depth. The table below provides a summary of common data licenses that will be considered for use in the project (based on definitions from opendefinition.org):

Name	Domain	Attribution	Share-alike*	Notes
Creative Commons CCZero (CC0)	Content, data	N	N	All rights (including those of attribution) waived
Open Data Commons Public Domain Dedication and Licence (PDDL)	Data	N	N	All rights (including those of attribution) waived
Creative Commons Attribution 4.0 (CC-BY-4.0)	Content, data	Y	N	Credit must be given, a link to the license must be provided, changes made must be indicated. If these terms are not followed, license may be revoked
Open Data Commons Open Database License (ODbL)	Data	Y	Y	Credit must be given, share-alike must be assured, data may be redistributed using DRM as long as a DRM-free version is also released

Table 2: Common Data Licenses

***Share-alike is the requirement that any materials created using the given dataset must be redistributed under the same license**



2. Description of the data

The following detailed information sheet will be produced for every dataset to be produced/collected/curated in the project:

Name of the dataset	A name to identify the data, see 1.2.1 for details.
Description of the dataset	<ul style="list-style-type: none"> • A brief, easy to understand description of what the dataset contains and what it will be used for in the project • A list of institutions to whom the data set could be useful outside the project • Whether the dataset has been/will be used for a scientific publication (if yes, brief details about the content and journal) • If the dataset is collected, a brief description of its origin and how it was collected will be provided • Openness of the dataset • Whether the dataset is anonymised or not
Format/license	The format in which the data will be available (e.g. .xls, .csv, .txt) will be provided. The license to be used will also be provided.
Archiving/preservation	Efforts and means to keep the data available after the end of the project will be described here, including where/how the data will be preserved, the duration of preservation, the associated costs and the plans of the consortium to cover these costs.

Table 3: Dataset Example

3. Summary of identified datasets

This DMP contains 28 datasets identified by the Sun-To-X partnership. The following tables provide information on the various aspects of these datasets. The sheets completed by partners are provided in Annex I.

3.1. Format/license

Name of the dataset	Format	License
<i>BE.TME.Open.Ionomer_Raw_Data</i>	CSV	ODbL
<i>BE.TME.Open.HER_Catalyst_Raw_Data</i>	CSV	ODbL
<i>BE.TME.Open.OER_Catalyst_Raw_Data</i>	CSV	ODbL
<i>BE.TME.Open.Transparent_Conducting_Porous_Support_Raw_Data</i>	CSV, JPEG	ODbL
<i>BE.TME.Open.Assembly_Procedure_Prototype</i>	CSV	ODbL
<i>FR.CEA.Closed.HER_Catalyst_Raw_Data</i>	CSV	Other
<i>FR.CEA.Closed.PEC_Raw_Data</i>	CSV	Other
<i>NL.DIFFER.Open.Membranes_Raw_Data</i>	CSV	ODbL
<i>NL.DIFFER.Open.Photoelectrodes_Raw_Data</i>	CSV	ODbL
<i>NL.DIFFER.Open.Photoelectrode-MEAs_Procedure_Prototype</i>	CSV	ODbL
<i>NL.DIFFER.Open.PEM_PEC_Assembly_Procedure</i>	CSV	ODbL
<i>CH.LIMNO.Open.Photocathode_Raw_Data</i>	CSV	ODbL
<i>CH.LIMNO.Open.Photoanode_Raw_Data</i>	CSV	ODbL
<i>CH.LIMNO.Open.Transparent_Conducting_Porous_Support_Raw_Data</i>	CSV, JPEG	ODbL
<i>CH.LIMNO.Open.Assembly_Procedure_Prototype</i>	CSV	ODbL



<i>CH.LRESE.Open.PEC_Modeling_Data</i>	CSV	ODbL
<i>CH.LRESE.Open.System_Modeling_Data</i>	CSV	ODbL
<i>CH.LRESE.Open.Technoeconomics_Modeling_Data</i>	CSV	ODbL
<i>CH.LRESE.Open.HFSS_experimental_data_raw</i>	CSV	ODbL
<i>DE.HZB.Open.Photoanode_Raw_Data</i>	CSV	ODbL
<i>DE.HZB.Open.Transparent_Conducting_Support_Raw_Data</i>	CSV	ODbL
<i>DE.HZB.Open.OER_Catalyst_Raw_Data</i>	CSV	ODbL
<i>DE.HZB.Open.Photoanode_Assembly_Procedure</i>	CSV	ODbL
<i>FR.ENGIE.Open.WeatherRawDataWP5</i>	CSV	ODbL
<i>FR.ENGIE.Closed.HySiLabsReactorRawDataWP5</i>	CSV	Other
<i>FR.ENGIE.Closed.LightfuelReactorRawDataWP5</i>	CSV	Other
<i>FR.ENGIE.Open.DemoRawDataWP5</i>	CSV	ODbL
<i>FR.ENGIE.Open.LCARawDataWP5</i>	CSV	ODbL

Table 4: Summary of Datasets

3.2. Archiving/preservation

Name of the dataset	Sharing medium	Duration of preservation	Costs	How costs will be covered
<i>BE.TME.Open.Ionomer_Raw_Data</i>	Zenodo.org	Perpetual	N/A	N/A
<i>BE.TME.Open.HER_Catalyst_Raw_Data</i>	Zenodo.org	Perpetual	N/A	N/A
<i>BE.TME.Open.OER_Catalyst_Raw_Data</i>	Zenodo.org	Perpetual	N/A	N/A
<i>BE.TME.Open.Transparent_Conducting_Porous_Support_Raw_Data</i>	Zenodo.org	Perpetual	N/A	N/A
<i>BE.TME.Open.Assembly_Procedure_Prototype</i>	Zenodo.org	Perpetual	N/A	N/A
<i>FR.CEA.Closed.HER_Catalyst_Raw_Data</i>	CEA Internal	Perpetual	N/A	N/A
<i>FR.CEA.Closed.PEC_Raw_Data</i>	CEA Internal	Perpetual	N/A	N/A
<i>NL.DIFFER.Open.Membranes_Raw_Data</i>	Zenodo.org	Perpetual	N/A	N/A
<i>NL.DIFFER.Open.Photoelectrodes_Raw_Data</i>	Zenodo.org	Perpetual	N/A	N/A
<i>NL.DIFFER.Open.Photoelectrode-MEAs_Procedure_Prototype</i>	Zenodo.org	Perpetual	N/A	N/A
<i>NL.DIFFER.Open.PEM_PEC_Assembly_Procedure</i>	Zenodo.org	Perpetual	N/A	N/A
<i>CH.LIMNO.Open.Photocathode_Raw_Data</i>	Zenodo.org	Perpetual	N/A	N/A
<i>CH.LIMNO.Open.Photoanode_Raw_Data</i>	Zenodo.org	Perpetual	N/A	N/A
<i>CH.LIMNO.Open.Transparent_Conducting_Porous_Support_Raw_Data</i>	Zenodo.org	Perpetual	N/A	N/A
<i>CH.LIMNO.Open.Assembly_Procedure_Prototype</i>	Zenodo.org	Perpetual	N/A	N/A
<i>CH.LRESE.Open.PEC_Modeling_Data</i>	Zenodo.org	Perpetual	N/A	N/A
<i>CH.LRESE.Open.System_Modeling_Data</i>	Zenodo.org	Perpetual	N/A	N/A
<i>CH.LRESE.Open.Technoeconomics_Modeling_Data</i>	Zenodo.org	Perpetual	N/A	N/A
<i>CH.LRESE.Open.HFSS_experimental_data_raw</i>	Zenodo.org	Perpetual	N/A	N/A
<i>DE.HZB.Open.Photoanode_Raw_Data</i>	Zenodo.org	Perpetual	N/A	N/A
<i>DE.HZB.Open.Transparent_Conducting_Support_Raw_Data</i>	Zenodo.org	Perpetual	N/A	N/A
<i>DE.HZB.Open.OER_Catalyst_Raw_Data</i>	Zenodo.org	Perpetual	N/A	N/A
<i>DE.HZB.Open.Photoanode_Assembly_Procedure</i>	Zenodo.org	Perpetual	N/A	N/A
<i>FR.ENGIE.Open.WeatherRawDataWP5</i>	Zenodo.org	Perpetual	N/A	N/A



<i>FR.ENGIE.Closed.HySiLabsReactorRawDataWP5</i>	ENGIE Network	N/A	N/A	N/A
<i>FR.ENGIE.Closed.LightfuelReactorRawDataWP5</i>	ENGIE Network	N/A	N/A	N/A
<i>FR.ENGIE.Open.DemoRawDataWP5</i>	Zenodo.org	Perpetual	N/A	N/A
<i>FR.ENGIE.Open.LCARawDataWP5</i>	Zenodo.org	Perpetual	N/A	N/A

Table 5: Preservation of Datasets

4. Data Protection Officer

According to applicable GDPR regulations, The host institution (TME) is not required to appoint a Data Protection Officer. This Data Management Plan details how the data are kept on file during and after the project.

5. Ethical aspects

This Data Management Plan (DMP) was drafted taking into account the General Data Protection Rules (GDPR) for the collection, storage and re-use of the data, in line with the following general principles.

Personal data shall be:

1. processed lawfully, fairly and in a transparent manner in relation to the data subject ('lawfulness, fairness and transparency');
2. collected for specified, explicit and legitimate purposes and not further processed in a manner that is incompatible with those purposes; further processing for archiving purposes in the public interest, scientific or historical research purposes or statistical purposes shall, in accordance with Article 89(1), however not be considered to be incompatible with the initial purposes ('purpose limitation');
3. adequate, relevant and limited to what is necessary in relation to the purposes for which they are processed ('data minimisation');
4. accurate and, where necessary, kept up to date; every reasonable step must be taken to ensure that personal data that are inaccurate, having regard to the purposes for which they are processed, are erased or rectified without delay ('accuracy');
5. kept in a form which permits identification of data subjects for no longer than is necessary for the purposes for which the personal data are processed; personal data may be stored for longer periods insofar as the personal data will be processed solely for archiving purposes in the public interest, scientific or historical research purposes or statistical purposes, in accordance with Article 89(1) subject to implementation of the appropriate technical and organisational measures required by this Regulation in order to safeguard the rights and freedoms of the data subject ('storage limitation');
6. processed in a manner that ensures appropriate security of the personal data, including protection against unauthorised or unlawful processing and against accidental loss, destruction or damage, using appropriate technical or organisational measures ('integrity and confidentiality').

6. Restrictions for re-use

Data generated through interviews and surveys will not be re-used directly due to privacy concerns. Two different techniques could be used to enable re-use and prevent loss of research data. These techniques comply with the regulation on privacy and are detailed in the two following sub-sections.



6.1. Anonymization of data

“Anonymization” of data means processing it with the aim of irreversibly preventing the identification of the individual to whom it relates. Data can be considered anonymised when it does not allow identification of the individuals it is related to, and no individuals can be identified from the data by any further processing of that data or by processing it together with other information which is available or likely to be available.

There are different anonymization techniques. Here are the two most relevant:

- Generalisation : generalising data means removing its specificity. For example, in the case of a table containing household income levels, with 4 figures mentioned: €135,000, €60,367, €89,556, and €365,784. One way of generalising this numbers would be to write that the values are “more than €150,000, less than €80,000, between €90,000 and €120,000, and more than €300,000” respectively. Essentially it means taking exact figures, establishing a baseline category, and then obfuscating the data by assigning it to one of the categories in order to remove any sense of specificity from it.
- K-anonymity; A release of data is said to have the k-anonymity property if the information for each person contained in the release cannot be distinguished from the other individuals whose information also appear in the release. For instance, in a table composed of six attributes (Name, Age, Gender, State of Domicile, Religion and Disease), removing the name and the religion column while generalising the age is a way to effectively k-anonymise the data.

Other techniques, such as “masking” or “pseudonymisation”, which are aimed solely at removing certain identifiers, may also play a role in reducing the risk of identification. In many cases, these techniques work best when used together.

6.2. Pseudonymisation of data

“Pseudonymisation” of data means replacing any identifying characteristics of data with a pseudonym, or, in other words, a value which does not allow the data subject to be directly identified.

Although pseudonymisation has many uses, it should be distinguished from anonymization, as it only provides a limited protection for the identity of data subjects in many cases as it still allows identification using indirect means. Where a pseudonym is used, it is possible to identify the data subject by analysing the underlying or related data.

Task leaders will be responsible for the anonymization of data in Sun-To-X for all datasets where this is deemed necessary.

7. Personal data transfer and processing

In case personal data will be transferred from the EU to a non-EU country (EPFL is a Swiss partner in the project and Nanoptek Corporation an international (US) partner) or other international organisation, such transfers will be made in accordance with Chapter V of the General Data Protection Regulation 2016/679, and such transfers will comply with the laws of the country in which the data was collected.

In case of further processing of previously collected personal data, Sun-To-X will ensure that the beneficiary has legal grounds for the data processing and that the appropriate technical and organisational measures are in place to safeguard the rights of the data subjects.

8. References

EC, 2016: European Commission (2016), Guidelines on Data Management in Horizon 2020. Available [here](#) (accessed 15 November 2020)



EC, 2017: European Commission (2017), Guidelines on the Implementation of Open Access to Scientific Publications & Research Data in projects supported by the European Research Council under Horizon 2020. Available [here](#) (accessed 15 November 2020)



9. Annex I.: Detailed information sheets for identified datasets

All detailed information sheets filled in by the partnership for the datasets identified are provided below.

Name of the dataset	<i>BE.TME.Open.Ionomer_Raw_Data</i>
Description of the dataset	<p>Contains raw data on:</p> <ul style="list-style-type: none"> • Water sorption isotherms (both absorption and desorption) • UV-vis transmittance data for determination of transparency • Proton conductivity measurements <p>Raw data published in [Journal, tbc] on [date, tbc] and additional unpublished data for comparison</p>
Format/license	<p>The data will be available in the following format: CSV</p> <p>The license used for this dataset:</p> <p><input type="checkbox"/> CC0 <input type="checkbox"/> PDDL <input type="checkbox"/> CC-BY-4.0 <input checked="" type="checkbox"/> ODbL</p> <p><input type="checkbox"/> Other, please specify:</p>
Archiving/preservation	<p>The data will be made available through the following platform(s) and/or repositories: Zenodo</p> <p>The duration of the preservation will be: N/A</p> <p>Foreseen costs of the preservation: N/A</p> <p>Means to cover preservation costs: N/A</p> <p>If the dataset contains personal data, will it be anonymised? N/A</p>

Name of the dataset	<i>BE.TME.Open.HER_Catalyst_Raw_Data</i>
Description of the dataset	<p>Contains raw data on:</p> <ul style="list-style-type: none"> • Electrochemical performance (linear sweep voltammetry) • Electrochemical stability (chronopotentiometry) • Characterisation data (X-ray diffraction profiles, Raman spectroscopy profiles, UV-vis measurements) <p>Raw data published in [Journal, tbc] on [date, tbc] and additional unpublished data for comparison</p>
Format/license	<p>The data will be available in the following format: CSV</p> <p>The license used for this dataset:</p> <p><input type="checkbox"/> CC0 <input type="checkbox"/> PDDL <input type="checkbox"/> CC-BY-4.0 <input checked="" type="checkbox"/> ODbL</p> <p><input type="checkbox"/> Other, please specify:</p>
Archiving/preservation	<p>The data will be made available through the following platform(s) and/or repositories: Zenodo</p>



	<p>The duration of the preservation will be: N/A</p> <p>Foreseen costs of the preservation: N/A</p> <p>Means to cover preservation costs: N/A</p> <p>If the dataset contains personal data, will it be anonymised? N/A</p>
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Name of the dataset	<i>BE.TME.Open.OER_Catalyst_Raw_Data</i>
Description of the dataset	<p>Contains raw data on:</p> <ul style="list-style-type: none"> • Electrochemical performance (linear sweep voltammetry) • Electrochemical stability (chronopotentiometry) • Characterisation data (X-ray diffraction profiles, Raman spectroscopy profiles, UV-vis measurements) <p>Raw data published in [Journal, tbc] on [date, tbc] and additional unpublished data for comparison</p>
Format/license	<p>The data will be available in the following format: CSV</p> <p>The license used for this dataset:</p> <p><input type="checkbox"/>CC0 <input type="checkbox"/>PDDL <input type="checkbox"/> CC-BY-4.0 <input checked="" type="checkbox"/>ODbL</p> <p><input type="checkbox"/>Other, please specify:</p>
Archiving/preservation	<p>The data will be made available through the following platform(s) and/or repositories: Zenodo</p> <p>The duration of the preservation will be: N/A</p> <p>Foreseen costs of the preservation: N/A</p> <p>Means to cover preservation costs: N/A</p> <p>If the dataset contains personal data, will it be anonymised? N/A</p>

Name of the dataset	<i>BE.TME.Open.Transparent_Conducting_Porous_Support_Raw_Data</i>
Description of the dataset	<p>Contains raw data on:</p> <ul style="list-style-type: none"> • Characterisation data (UV-vis measurements, electron microscopy images) • Electrochemical performance in combination with OER / HER catalyst (linear sweep voltammetry) • Electrochemical stability (chronopotentiometry) <p>Raw data published in [Journal, tbc] on [date, tbc] and additional unpublished data for comparison</p>
Format/license	<p>The data will be available in the following formats: CSV, JPEG</p> <p>The license used for this dataset:</p> <p><input type="checkbox"/>CC0 <input type="checkbox"/>PDDL <input type="checkbox"/> CC-BY-4.0 <input checked="" type="checkbox"/>ODbL</p> <p><input type="checkbox"/>Other, please specify:</p>
Archiving/preservation	<p>The data will be made available through the following platform(s) and/or repositories: Zenodo</p>



	<p>The duration of the preservation will be: N/A</p> <p>Foreseen costs of the preservation: N/A</p> <p>Means to cover preservation costs: N/A</p> <p>If the dataset contains personal data, will it be anonymised? N/A</p>
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Name of the dataset	<i>BE.TME.Open.Assembly_Procedure_Prototype</i>
Description of the dataset	The detailed (step-by-step) procedure and specifications used to assemble the prototype photoelectrochemical cells and test them. Can be used by other institutions who would to follow a similar prototyping procedure.
Format/license	<p>The data will be available in the following format: CSV</p> <p>The license used for this dataset:</p> <p><input type="checkbox"/>CC0 <input type="checkbox"/>PDDL <input type="checkbox"/> CC-BY-4.0 <input checked="" type="checkbox"/>ODbL</p> <p><input type="checkbox"/>Other, please specify:</p>
Archiving/preservation	<p>The data will be made available through the following platform(s) and/or repositories: Zenodo</p> <p>The duration of the preservation will be: N/A</p> <p>Foreseen costs of the preservation: N/A</p> <p>Means to cover preservation costs: N/A</p> <p>If the dataset contains personal data, will it be anonymised? N/A</p>

Name of the dataset	<i>FR.CEA.Closed.HER_Catalyst_Raw_Data</i>
Description of the dataset	<p>Contains raw data on:</p> <ul style="list-style-type: none"> • Electrochemical performance (linear sweep voltammetry) • Electrochemical stability (chronopotentiometry) <p>Raw data for submission of publication and patent filling</p>
Format/license	<p>The data will be available in the following format: CSV</p> <p>The license used for this dataset:</p> <p><input type="checkbox"/>CC0 <input type="checkbox"/>PDDL <input type="checkbox"/> CC-BY-4.0 <input type="checkbox"/>ODbL</p> <p><input checked="" type="checkbox"/>Other, please specify: Confidential at first. To be discussed at a later stage for accessibility for research purposes (ODbL license).</p>
Archiving/preservation	<p>The data will be made available through the following platform(s) and/or repositories: CEA internal servers</p> <p>The duration of the preservation will be: N/A</p> <p>Foreseen costs of the preservation: N/A</p> <p>Means to cover preservation costs: N/A</p>



	If the dataset contains personal data, will it be anonymised? N/A
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Name of the dataset	<i>FR.CEA.Closed.PEC_Raw_Data</i>
Description of the dataset	Contains raw data on: <ul style="list-style-type: none"> • Photo-Electrochemical Performance • Photo-Electrochemical stability (chronopotentiometry) Raw data for submission of publication and patent filling
Format/license	The data will be available in the following format: CSV The license used for this dataset: <input type="checkbox"/> CC0 <input type="checkbox"/> PDDL <input type="checkbox"/> CC-BY-4.0 <input type="checkbox"/> ODbL <input checked="" type="checkbox"/> Other, please specify: Confidential at first. To be discussed at a later stage for accessibility for research purposes (ODbL license).
Archiving/preservation	The data will be made available through the following platform(s) and/or repositories: CEA internal servers The duration of the preservation will be: N/A Foreseen costs of the preservation: N/A Means to cover preservation costs: N/A If the dataset contains personal data, will it be anonymised? N/A

Name of the dataset	<i>NL.DIFFER.Open.Membranes_Raw_Data</i>
Description of the dataset	Contains raw data on: <ul style="list-style-type: none"> • UV-vis transmittance data for determination of transparency • Ionic conductivity measurements Raw data published in [Journal, tbc] on [date, tbc] and additional unpublished data for comparison purposes
Format/license	The data will be available in the following format: CSV The license used for this dataset: <input type="checkbox"/> CC0 <input type="checkbox"/> PDDL <input type="checkbox"/> CC-BY-4.0 <input checked="" type="checkbox"/> ODbL <input type="checkbox"/> Other, please specify:
Archiving/preservation	The data will be made available through the following platform(s) and/or repositories: Zenodo The duration of the preservation will be: N/A Foreseen costs of the preservation: N/A Means to cover preservation costs: N/A If the dataset contains personal data, will it be anonymised? N/A



Name of the dataset	<i>NL.DIFFER.Open.Photoelectrodes_Raw_Data</i>
Description of the dataset	<p>Contains raw data on:</p> <ul style="list-style-type: none"> • Electrochemical performance (linear sweep voltammetry) • Electrochemical stability (chronopotentiometry) • Characterisation data (X-ray diffraction profiles, X-ray Photoelectron Spectroscopy, Scanning Electron Microscopy, Electrochemical impedance spectroscopy, Raman spectroscopy, UV-vis measurements) <p>Raw data published in [Journal, tbc] on [date, tbc] and additional unpublished data for comparison purposes</p>
Format/license	<p>The data will be available in the following format: CSV</p> <p>The license used for this dataset:</p> <p><input type="checkbox"/> CC0 <input type="checkbox"/> PDDL <input type="checkbox"/> CC-BY-4.0 <input checked="" type="checkbox"/> ODbL</p> <p><input type="checkbox"/> Other, please specify:</p>
Archiving/preservation	<p>The data will be made available through the following platform(s) and/or repositories: Zenodo</p> <p>The duration of the preservation will be: N/A</p> <p>Foreseen costs of the preservation: N/A</p> <p>Means to cover preservation costs: N/A</p> <p>If the dataset contains personal data, will it be anonymised? N/A</p>

Name of the dataset	<i>NL.DIFFER.Open.Photoelectrode-MEAs_Procedure_Prototype</i>
Description of the dataset	The detailed (step-by-step) procedure and specifications used to assemble the prototype photoelectrochemical cells and test them. Can be used by other institutions who would to follow a similar prototyping procedure.
Format/license	<p>The data will be available in the following format: CSV</p> <p>The license used for this dataset:</p> <p><input type="checkbox"/> CC0 <input type="checkbox"/> PDDL <input type="checkbox"/> CC-BY-4.0 <input checked="" type="checkbox"/> ODbL</p> <p><input type="checkbox"/> Other, please specify:</p>
Archiving/preservation	<p>The data will be made available through the following platform(s) and/or repositories: Zenodo</p> <p>The duration of the preservation will be: N/A</p> <p>Foreseen costs of the preservation: N/A</p> <p>Means to cover preservation costs: N/A</p> <p>If the dataset contains personal data, will it be anonymised? N/A</p>



Name of the dataset	<i>NL.DIFFER.Open.PEM_PEC_Assembly_Procedure</i>
Description of the dataset	The detailed (step-by-step) procedure and specifications used to assemble the small cells and prototypes PEM based photoelectrochemical cells and test them. Testing will include variety humidity and temperature profiles. Can be used by other institutions who would to follow a similar prototyping procedure.
Format/license	The data will be available in the following format: CSV The license used for this dataset: <input type="checkbox"/> CC0 <input type="checkbox"/> PDDL <input type="checkbox"/> CC-BY-4.0 <input checked="" type="checkbox"/> ODbL <input type="checkbox"/> Other, please specify:
Archiving/preservation	The data will be made available through the following platform(s) and/or repositories: Zenodo The duration of the preservation will be: N/A Foreseen costs of the preservation: N/A Means to cover preservation costs: N/A If the dataset contains personal data, will it be anonymised? N/A

Name of the dataset	<i>CH.LIMNO.Open.Photocathode_Raw_Data</i>
Description of the dataset	Contains raw data on: <ul style="list-style-type: none"> • Characterisation data (UV-vis measurements, Raman spectroscopy profiles, XRD profiles, electron microscopy images) • Electrochemical performance (linear sweep voltammetry) • Electrochemical stability (chronopotentiometry) • Electrochemical performance/stability in the dark of HER catalyst (linear sweep voltammetry, chronopotentiometry) Raw data published in [Journal, tbc] on [date, tbc] and additional unpublished data for comparison purposes
Format/license	The data will be available in the following format: CSV The license used for this dataset: <input type="checkbox"/> CC0 <input type="checkbox"/> PDDL <input type="checkbox"/> CC-BY-4.0 <input checked="" type="checkbox"/> ODbL <input type="checkbox"/> Other, please specify:
Archiving/preservation	The data will be made available through the following platform(s) and/or repositories: Zenodo The duration of the preservation will be: N/A Foreseen costs of the preservation: N/A Means to cover preservation costs: N/A



	If the dataset contains personal data, will it be anonymised? N/A
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Name of the dataset	<i>CH.LIMNO.Open.Photoanode_Raw_Data</i>
Description of the dataset	<p>Contains raw data on:</p> <ul style="list-style-type: none"> • Characterisation data (UV-vis measurements, Raman spectroscopy profiles, XRD profiles, electron microscopy images) • Electrochemical performance (linear sweep voltammetry) • Electrochemical stability (chronopotentiometry) • Electrochemical performance/stability in the dark of OER catalyst (linear sweep voltammetry, chronopotentiometry) <p>Raw data published in [Journal, tbc] on [date, tbc] and additional unpublished data for comparison purposes</p>
Format/license	<p>The data will be available in the following format: CSV</p> <p>The license used for this dataset:</p> <p><input type="checkbox"/>CC0 <input type="checkbox"/>PDDL <input type="checkbox"/> CC-BY-4.0 <input checked="" type="checkbox"/>ODbL</p> <p><input type="checkbox"/>Other, please specify:</p>
Archiving/preservation	<p>The data will be made available through the following platform(s) and/or repositories: Zenodo</p> <p>The duration of the preservation will be: N/A</p> <p>Foreseen costs of the preservation: N/A</p> <p>Means to cover preservation costs: N/A</p> <p>If the dataset contains personal data, will it be anonymised? N/A</p>

Name of the dataset	<i>CH.LIMNO.Open.Transparent_Conducting_Porous_Support_Raw_Data</i>
Description of the dataset	<p>Contains raw data on:</p> <ul style="list-style-type: none"> • Characterisation data (UV-vis measurements, conductivity, robustness, porosity, electron microscopy images) • Electrochemical performance in combination with OER / HER catalyst (linear sweep voltammetry) • Electrochemical stability (chronopotentiometry) <p>Raw data published in [Journal, tbc] on [date, tbc] and additional unpublished data for comparison purposes</p>
Format/license	<p>The data will be available in the following formats: CSV, JPEG</p> <p>The license used for this dataset:</p> <p><input type="checkbox"/>CC0 <input type="checkbox"/>PDDL <input type="checkbox"/> CC-BY-4.0 <input checked="" type="checkbox"/>ODbL</p> <p><input type="checkbox"/>Other, please specify:</p>
Archiving/preservation	<p>The data will be made available through the following platform(s) and/or repositories: Zenodo</p>



	<p>The duration of the preservation will be: N/A</p> <p>Foreseen costs of the preservation: N/A</p> <p>Means to cover preservation costs: N/A</p> <p>If the dataset contains personal data, will it be anonymised? N/A</p>
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Name of the dataset	<i>CH.LIMNO.Open.Assembly_Procedure_Prototype</i>
Description of the dataset	The detailed (step-by-step) procedure and specifications used to assemble the prototype photoelectrochemical cells and test them. Can be used by other institutions who would to follow a similar prototyping procedure.
Format/license	<p>The data will be available in the following format: CSV</p> <p>The license used for this dataset:</p> <p><input type="checkbox"/> CC0 <input type="checkbox"/> PDDL <input type="checkbox"/> CC-BY-4.0 <input checked="" type="checkbox"/> ODbL</p> <p><input type="checkbox"/> Other, please specify:</p>
Archiving/preservation	<p>The data will be made available through the following platform(s) and/or repositories: Zenodo</p> <p>The duration of the preservation will be: N/A</p> <p>Foreseen costs of the preservation: N/A</p> <p>Means to cover preservation costs: N/A</p> <p>If the dataset contains personal data, will it be anonymised? N/A</p>

Name of the dataset	<i>CH.LRESE.Open.PEC_Modeling_Data</i>
Description of the dataset	<p>Contains results from the computational PEC model including:</p> <ul style="list-style-type: none"> • Light absorption • Flow characteristics • Species transport • Charge transport and potential <p>Data published in [Journal, tbc] on [date, tbc] and additional unpublished data for comparison purposes</p>
Format/license	<p>The data will be available in the following format: CSV</p> <p>The license used for this dataset:</p> <p><input type="checkbox"/> CC0 <input type="checkbox"/> PDDL <input type="checkbox"/> CC-BY-4.0 <input checked="" type="checkbox"/> ODbL</p> <p><input type="checkbox"/> Other, please specify:</p>
Archiving/preservation	<p>The data will be made available through the following platform(s) and/or repositories: Zenodo</p> <p>The duration of the preservation will be: N/A</p>



	Foreseen costs of the preservation: N/A Means to cover preservation costs: N/A If the dataset contains personal data, will it be anonymised? N/A
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Name of the dataset	<i>CH.LRESE.Open.System_Modeling_Data</i>
Description of the dataset	Contains results from the computational model of the full process (PEC and thermochemistry) including: <ul style="list-style-type: none"> Operational conditions (flow rates, pressures etc.) Energy characteristics (temperature, flux, etc.) Coupling or integration approach Data published in [Journal, tbc] on [date, tbc] and additional unpublished data for comparison purposes
Format/license	The data will be available in the following format: CSV The license used for this dataset: <input type="checkbox"/> CC0 <input type="checkbox"/> PDDL <input type="checkbox"/> CC-BY-4.0 <input checked="" type="checkbox"/> ODbL <input type="checkbox"/> Other, please specify:
Archiving/preservation	The data will be made available through the following platform(s) and/or repositories: Zenodo The duration of the preservation will be: N/A Foreseen costs of the preservation: N/A Means to cover preservation costs: N/A If the dataset contains personal data, will it be anonymised? N/A

Name of the dataset	<i>CH.LRESE.Open.Technoeconomics_Modeling_Data</i>
Description of the dataset	Contains results from the computational techno-economic model of the system including: <ul style="list-style-type: none"> Cost characteristics (levelized costs, capital costs, operational costs, etc.) Performance characteristics (efficiencies, degradation rates, etc.) Data published in [Journal, tbc] on [date, tbc] and additional unpublished data for comparison purposes
Format/license	The data will be available in the following format: CSV The license used for this dataset: <input type="checkbox"/> CC0 <input type="checkbox"/> PDDL <input type="checkbox"/> CC-BY-4.0 <input checked="" type="checkbox"/> ODbL <input type="checkbox"/> Other, please specify:
Archiving/preservation	The data will be made available through the following platform(s) and/or repositories: Zenodo



	<p>The duration of the preservation will be: N/A</p> <p>Foreseen costs of the preservation: N/A</p> <p>Means to cover preservation costs: N/A</p> <p>If the dataset contains personal data, will it be anonymised? N/A</p>
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Name of the dataset	<i>CH.LRESE.Open.HFSS_experimental_data_raw</i>
Description of the dataset	The detailed (step-by-step) procedure and specifications used to assemble the prototypes, location of them in the HFSS, HFSS calibration, operational conditions, and sensors data (for temperature, pressure, flow etc.).
Format/license	<p>The data will be available in the following format: CSV</p> <p>The license used for this dataset:</p> <p><input type="checkbox"/> CC0 <input type="checkbox"/> PDDL <input type="checkbox"/> CC-BY-4.0 <input checked="" type="checkbox"/> ODbL</p> <p><input type="checkbox"/> Other, please specify:</p>
Archiving/preservation	<p>The data will be made available through the following platform(s) and/or repositories: Zenodo</p> <p>The duration of the preservation will be: N/A</p> <p>Foreseen costs of the preservation: N/A</p> <p>Means to cover preservation costs: N/A</p> <p>If the dataset contains personal data, will it be anonymised? N/A</p>

Name of the dataset	<i>DE.HZB.Open.Photoanode_Raw_Data</i>
Description of the dataset	<p>Contains raw data on:</p> <ul style="list-style-type: none"> • (Photo)electrochemical performance and stability measurements (linear sweep voltammetry, photocurrent action spectra, current vs. time measurements) • Gas evolution measurements (hydrogen and oxygen) • Structure characterization data (X-ray diffraction data, electron microscopy images) • Optical characterization (UV/Vis transmission, reflection, and absorption measurements, Raman spectra) • Chemical characterization (XPS data) • Charge carrier measurements (time-resolved microwave conductivity data; electrochemical and opto-electrical impedance spectroscopy data) <p>Raw data published in [Journal, tbc] on [date, tbc] and additional unpublished data for comparison purposes</p>
Format/license	<p>The data will be available in the following format: CSV</p> <p>The license used for this dataset:</p>



	<input type="checkbox"/> CC0 <input checked="" type="checkbox"/> PDDL <input type="checkbox"/> CC-BY-4.0 <input checked="" type="checkbox"/> ODbL <input type="checkbox"/> Other, please specify:
Archiving/preservation	The data will be made available through the following platform(s) and/or repositories: Zenodo The duration of the preservation will be: N/A Foreseen costs of the preservation: N/A Means to cover preservation costs: N/A If the dataset contains personal data, will it be anonymised? N/A

Name of the dataset	<i>DE.HZB.Open.Transparent_Conducting_Support_Raw_Data</i>
Description of the dataset	Contains raw data on: <ul style="list-style-type: none"> • Structure characterization data (X-ray diffraction data, electron microscopy images) • Optical characterization (UV/Vis transmission, reflection, and absorption measurements, Raman spectra) • Electrical conductivity measurements • Chemical characterization (XPS data) Raw data published in [Journal, tbc] on [date, tbc] and additional unpublished data for comparison purposes
Format/license	The data will be available in the following format: CSV The license used for this dataset: <input type="checkbox"/> CC0 <input type="checkbox"/> PDDL <input type="checkbox"/> CC-BY-4.0 <input checked="" type="checkbox"/> ODbL <input type="checkbox"/> Other, please specify:
Archiving/preservation	The data will be made available through the following platform(s) and/or repositories: Zenodo The duration of the preservation will be: N/A Foreseen costs of the preservation: N/A Means to cover preservation costs: N/A If the dataset contains personal data, will it be anonymised? N/A

Name of the dataset	<i>DE.HZB.Open.OER_Catalyst_Raw_Data</i>
Description of the dataset	Contains raw data on: <ul style="list-style-type: none"> • Electrochemical performance (linear sweep voltammetry) • Electrochemical stability (chronopotentiometry) • Characterisation data (X-ray diffraction profiles, Raman spectroscopy profiles, UV-vis measurements) Raw data published in [Journal, tbc] on [date, tbc] and additional unpublished data for comparison purposes
Format/license	The data will be available in the following format: CSV



	The license used for this dataset: <input type="checkbox"/> CC0 <input type="checkbox"/> PDDL <input type="checkbox"/> CC-BY-4.0 <input checked="" type="checkbox"/> ODbL <input type="checkbox"/> Other, please specify:
Archiving/preservation	The data will be made available through the following platform(s) and/or repositories: Zenodo The duration of the preservation will be: N/A Foreseen costs of the preservation: N/A Means to cover preservation costs: N/A If the dataset contains personal data, will it be anonymised? N/A

Name of the dataset	<i>DE.HZB.Open.Photoanode_Assembly_Procedure</i>
Description of the dataset	The detailed (step-by-step) procedure and specifications used to assemble the complete photoanode assembly, composed of transparent support, photoanode, and OER catalyst, and to test them. Can be used by other institutions who would to follow a similar procedure.
Format/license	The data will be available in the following format: CSV The license used for this dataset: <input type="checkbox"/> CC0 <input type="checkbox"/> PDDL <input type="checkbox"/> CC-BY-4.0 <input checked="" type="checkbox"/> ODbL <input type="checkbox"/> Other, please specify:
Archiving/preservation	The data will be made available through the following platform(s) and/or repositories: Zenodo The duration of the preservation will be: N/A Foreseen costs of the preservation: N/A Means to cover preservation costs: N/A If the dataset contains personal data, will it be anonymised? N/A

Name of the dataset	<i>FR.ENGIE.Open.WeatherRawDataWP5</i>
Description of the dataset	Weather data acquired during WP5 experimental testing.
Format/license	The data will be available in the following format: CSV The license used for this dataset: <input type="checkbox"/> CC0 <input type="checkbox"/> PDDL <input type="checkbox"/> CC-BY-4.0 <input checked="" type="checkbox"/> ODbL <input type="checkbox"/> Other, please specify:
Archiving/preservation	The data will be made available through the following platform(s) and/or repositories: Zenodo The duration of the preservation will be: N/A



	Foreseen costs of the preservation:N/A Means to cover preservation costs:N/A If the dataset contains personal data, will it be anonymised?
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Name of the dataset	<i>FR.ENGIE.Closed.HySiLabsReactorRawDataWP5</i>
Description of the dataset	Temperatures, pressures and flows data from the HySiLabs reactor.
Format/license	The data will be available in the following format: CSV The license used for this dataset: <input type="checkbox"/> CC0 <input type="checkbox"/> PDDL <input type="checkbox"/> CC-BY-4.0 <input type="checkbox"/> ODbL <input checked="" type="checkbox"/> Other, please specify: confidential at first has obtained from privately owned technology. To be discussed with the technology owner.
Archiving/preservation	The data will be made available through the following platform(s) and/or repositories: ENGIE network The duration of the preservation will be: N/A Foreseen costs of the preservation:N/A Means to cover preservation costs:N/A If the dataset contains personal data, will it be anonymised?

Name of the dataset	<i>FR.ENGIE.Closed.LightfuelReactorRawDataWP5</i>
Description of the dataset	Temperatures, voltage, currents and flows data from the Lightfuel solar assisted electrolyser hydrogen production.
Format/license	The data will be available in the following format: CSV The license used for this dataset: <input type="checkbox"/> CC0 <input type="checkbox"/> PDDL <input type="checkbox"/> CC-BY-4.0 <input type="checkbox"/> ODbL <input checked="" type="checkbox"/> Other, please specify: confidential at first has obtained from privately owned technology. To be discussed with the technology owner.
Archiving/preservation	The data will be made available through the following platform(s) and/or repositories: ENGIE network The duration of the preservation will be: N/A Foreseen costs of the preservation:N/A Means to cover preservation costs:N/A If the dataset contains personal data, will it be anonymised?

Name of the dataset	<i>FR.ENGIE.Open.DemoRawDataWP5</i>
Description of the dataset	Mass flows of input and output product at the perimeter of the full demonstrator:



	<ul style="list-style-type: none"> - Solar input - Chemical reactants masses - Chemical products masses
Format/license	<p>The data will be available in the following format: CSV</p> <p>The license used for this dataset:</p> <p><input type="checkbox"/> CC0 <input type="checkbox"/> PDDL <input type="checkbox"/> CC-BY-4.0 <input checked="" type="checkbox"/> ODbL</p> <p><input type="checkbox"/> Other, please specify:</p>
Archiving/preservation	<p>The data will be made available through the following platform(s) and/or repositories: Zenodo</p> <p>The duration of the preservation will be: N/A</p> <p>Foreseen costs of the preservation: N/A</p> <p>Means to cover preservation costs: N/A</p> <p>If the dataset contains personal data, will it be anonymised?</p>

Name of the dataset	<i>FR.ENGIE.Open.LCARawDataWP5</i>
Description of the dataset	Temperatures, voltage, currents and flows data from the Lightfuel solar assisted electrolyser hydrogen production.
Format/license	<p>The data will be available in the following format: CSV</p> <p>The license used for this dataset:</p> <p><input type="checkbox"/> CC0 <input type="checkbox"/> PDDL <input type="checkbox"/> CC-BY-4.0 <input checked="" type="checkbox"/> ODbL</p> <p><input type="checkbox"/> Other, please specify:</p>
Archiving/preservation	<p>The data will be made available through the following platform(s) and/or repositories: Zenodo</p> <p>The duration of the preservation will be: N/A</p> <p>Foreseen costs of the preservation: N/A</p> <p>Means to cover preservation costs: N/A</p> <p>If the dataset contains personal data, will it be anonymised? yes</p>

