Sustainable SoluTions FOR recycling of end-of-life Hydrogen technologies

BEST 4Hy

Deliverable D8.2

Data Management Plan

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x PU - Public

CO - Confidential, only for members of the consortium (including the EC)

FCH | FUEL CELLS AND HYDROGEN JOINT UNDERTAKING

Abbreviations

APCs	Article processing Charges
DOI	Digital object identifier
DMP	Data Management Plan
EoL	End-of-life
FAIR	findable, accessible, interoperable and re-usable
GA	Grant Agreement
MEA	Membrane Electrode Assembly
PEMFC	Polymer electrolyte fuel cell
PGMs	Platinum group metals
ORD	Open Research Data
SOFC	Solid oxide fuel cell

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1   Executive Summary

According to the Open Research Data (ORD) Pilot drafted by the European Commission, all data generated by H2020 projects have to be **available for open access and reusable**: the main aim of the ORD pilot is the improvement and maximization of access to research data, with a special consideration for the need for balancing protection of scientific information, opportunities for commercialization and security. Best4Hy project will follow the principle "**As open as possible, As closed as necessary"**, enhancing a reliable data tracking and management.

Research Data will be managed according to the guidelines described in this first version of the Data Management Plan, which specifies how data will be used and handled during and after the project, specification of what type of data will become open access, how they will be shared and in which repository, and which methods and standards will be used. The First Data Management Plan will be updated at M36 (D8.8: Data Management Final report).

2   Introduction

BEST4Hy – "SustainaBlE SoluTions FOR recycling of EoL Hydrogen Technologies" has the main objective of bringing to TRL5 recycling technologies adapted or developed specifically for PEMFC and SOFC, which would ensure the maximization of recycling of critical raw materials including PGMs, rare earth elements, cobalt and nickel. The technologies are evaluated for cost efficiency and environmental impact to ensure the materials bring value to the European economy without harmful emissions or high energy costs. The output of the recycling technologies are optimized for both closed loop and open loop recycling. More specifically, Pt and membrane materials are delivered back for manufacturing MEAS to be tested in full stacks, while both anode and cathode materials from EoL SOFCs are treated for direct recycling into cells. The whole EoL device is considered, with technologies validated for open loop recycling and opportunities for recovery of other components of the cells/stacks explored.

This report has the purpose to present the Data Management Plan for BEST4Hy project, as part of WP8: Project Management, under responsibility of ENVIPARK. The deliverable is developed by ENVIPARK with the support of all the partners.

The document describes the data management life cycle for the data to be collected, processed and/or generated by BEST4Hy project. In the spirit of ensuring the research funded by the EU is made accessible to all, the DMP will also include details about how the research data will be made 'FAIR', that is: findable, accessible, interoperable and re-usable.

Specifically, the DMP describes the data management life cycle for all datasets to be collected, processed and/or generated by a research project. It covers:

- the handling of research data during & after the end of the project
- which data will be collected, processed and/or generated
- which methodology & standards will be applied
- whether data will be shared/made open access and how
- how data will be curated & preserved (including after the end of the project).

Below the preliminary list of data likely to be generated by BEST4Hy project:

- experimental and observational data (measured during the qualification of modules, equipment and process, both raw and derived data will be recorded and filed).
- models (to predict module and process interaction and behavior).
- simulations (optimization of machine structure, optimization of energy consumption).
- multimedia documents (reports, spread sheets, presentations, websites),
- images (photo to document the project progress).
- videos (e.g., short movies, animations)
- Stakeholders contacts and interaction activity documents (also foreseeing personal data like emails to be properly collected and stored)

The above list will be verified with the partners and updated during the course of the project.

The document reports a brief description of the Data Management plan in H2020 program and more in detail the methodology that the consortium used to create the DMP (the policy that the consortium plans to use regarding the data sets collected, processed and/or generated within the project).

3 Open access

As first aspect, it is necessary to define the meaning of "**Open access**", which can be defined as the practice of providing on-line, free of charge access to scientific information related to project outcomes.

Open access is not a requirement to publish, but it is seen by the European Commission as an approach to facilitate and improve the circulation of information in the European research area and beyond. Open access to some data generated in projects funded by the European commission is the key to lower barriers to accessing publicly-funded research, as well as to demonstrate and share the potential of research activities supported with the help of public funding.

Why Open Access?

- reduction of costs linked to research by avoiding duplication of efforts through the reuse of data and information;
- promotion of innovation through the circulation of information between economic actors and potential innovators;
- stimulation of cross-sector collaboration, given that the results obtained in one field can be reused in other research areas;
- transparency in the use of research funding (often public);
- citizens and society's involvement in the innovative process

3.1 Open access in BEST4Hy Grant Agreement

ARTICLE 29 in GA_BEST4Hy (BEST4Hy Grant Agreement) specifies that project's beneficiaries will ensure Open Access.

29.2 Open access to scientific publications

Each beneficiary must ensure open access (free of charge online access for any user) to all peer-reviewed scientific publications relating to its results.

In particular, it must:

(a) as soon as possible and at the latest upon publication, deposit a machine-readable electronic copy of the published version or final peer-reviewed manuscript accepted for publication in a repository for scientific publications;

Moreover, the beneficiary must aim to deposit at the same time the research data needed to validate the results presented in the deposited scientific publications.

(b) ensure open access to the deposited publication — via the repository — at the latest:

- upon publication, if an electronic version is available for free via the publisher, or
- within six months of publication (twelve months for publications in the social sciences and humanities) in any other case..

(c) ensure open access — via the repository — to the bibliographic metadata that identify the deposited publication.

The bibliographic metadata must be in a standard format and must include all of the following:

- o the terms "Fuel Cells and Hydrogen 2 Joint Undertaking", "European Union (EU)" and "Horizon 2020";
- o the name of the action, acronym and grant number;
- o the publication date, and length of embargo period if applicable, and
- o a persistent identifier.

29.3 Open access to research data

Regarding the digital research data generated in the action ('data'), the beneficiaries must:

(a) deposit it in a research data repository and take measures to make it possible for third parties to access, mine, exploit, reproduce and disseminate — free of charge for any user — the following:

- the data, including associated metadata, needed to validate the results presented in scientific publications, as soon as possible;
- other data, including associated metadata, as specified and within the deadlines laid down in the 'data management plan' (see Annex 1);

(b) provide information — via the repository — about tools and instruments at the disposal of the beneficiaries and necessary for validating the results (and — where possible — provide the tools and instruments themselves).

4 Data Management in H2020 Program

The deliverable is submitted to the Open Research Data Pilot (ORD), a flexible program drafted by the European Commission: it concerns the sharing of scientific data and information on specific repositories, in order to enhance the re-use of research data and their exploitation for new studies and future projects. In particular, it is not dealing with scientific peer-reviewed publications (for which open access is an obligation in Horizon 2020[1]) but with research data (they could be open or closed), for which the best practice suggested is the sharing with other users, provided the absence of contractual clauses, copyright limits or confidentiality restrictions. In other terms, not only it's necessary to put out scientific publications on specific repositories (download and printing must be made accessible), but it is essential to present also data needed to validate results of scientific publications, so that it's possible to mine, exploit, reproduce and disseminate them by any user; concerning other data instead, they can be provided or not (voluntary basis)[2].

As anticipated, it is not mandatory to have all data produced published, but the principle to be followed is "As open as possible, As closed as necessary": in this way, the ORD Pilot aims at maximizing the access and re-use of research data, without neglecting the aspect of security, Intellectual Property Rights and privacy issues.

The Data Management Plan is the fundamental element necessary for a proper data management: it occupies of all the life cycle of data in a project, making research data FAIR, i.e. Findable, Accessible, Interoperable and Re-usable[3]. Therefore, to guarantee the previous characteristics, it must focus on aspects as the way data are collected or generated, on which methodology is applied, whether they are shared or not. Being a document dealing with 'dynamic' data, it requires a periodical review to be defined and discussed between the consortium partners.

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[1]   http://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/open-access-data-management/data-management_en.htm
[2]   http://ec.europa.eu/research/participants/data/ref/h2020/other/hi/oa-pilot/h2020-hi-erc-oa-guide_en.pdf
[3]   http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-data-mgt_en.pdf

Open Research Data Pilot project aims at supporting the management of research data, responding to key issues such as "what", "where", "when", "how" and "who"[4]

What: The Open Data Pilot covers all research data and associated metadata resulting from EC funded project, if they serve as evidence for publicly available project reports and deliverables or peer reviewed publications.

Where: all public released research data has to be registered and deposited into at least one open data repository.

When: research data related to research publications should be made available to the reviewers in the peer review process.

How: The use of appropriate licenses for Open Data is highly recommended.

Who: Responsibility for the deposit of research data resulting from the project lies with the project coordinator (delegated to project partners where appropriate).

5 Methodology applied for the DMP draft

The Data Management Plan will be structured following a precise template, provided by the European Commission: it contains a set of questions to be answered by beneficiaries with an appropriate level of detail (in case of no information available, the phrase "non-applicable" or acronym N/A will be used).

All the aspects treated in the template and concerning the main DMP characteristics are listed and presented hereunder, through the following sections.

The DMP must contain:

- Dataset: identification of data, how it is collected and how it will be used
- Standards and metadata (data relating to the data that describe the properties of the data in a structured way: who created them, who owns them, when they were created ...)
- Data sharing: the data should be made available with open access, otherwise it should be given a reason (opting out).
- Storage and storage methods

5.1 Data summary

In the first section, beneficiaries have to give some specifications; first of all, it is necessary to **investigate the purpose of data and their relation with the main objective of project**; moreover, it is necessary to **specify some data formats**, as the **origin of data**, the **utility**, the **expected size** and the **possibilities of re-utilization**.

Specific questions:

- What is the purpose of the data collection/generation and its relation to the objectives of the project?
- What types and formats of data will the project generate/collect?
- Will you re-use any existing data and how?
- What is the origin of the data?
- What is the expected size of the data?
- To whom might it be useful ('data utility')?

5.2 FAIR data

F=Findable: Data are findable when they are described by sufficiently rich metadata and registered or indexed in a searchable resource that is known and accessible to potential users. Additionally, a unique and persistent identifier should be assigned such that data can be unequivocally referenced and cited in research communications. The identifier enables persistent linkages to be established between the data, metadata and other related materials in order to assist data discovery and reuse. Related materials may include the code or models necessary to use the data, research literature that provides further insights into the creation and interpretation of the data and other related information.

A=Accessible: data objects can be obtained by humans and machines upon appropriate authorisation and through a well-defined and universally implementable protocol. Anyone with a computer and internet connection should be able to access at least the metadata, but FAIR doesn't mean OPEN without constraint.

I=Interoperable: data and metadata are described in the FAIR principles as those that use a formal, accessible, shared, and broadly applicable language for knowledge representation. The data are described using normative and community recognised specifications, vocabularies and standards that determine the precise meaning of concepts and qualities that the data represent. Technical interoperability means that the data and related information is encoded using a standard that can be read on all applicable systems. In FAIR, legal interoperability falls under the principle that data should be 'Reusable'.

R=Reusable: the FAIR principles reassert the need for rich metadata and documentation that meet relevant community standards and provide information about provenance. Reusability also requires that the data be released with a 'clear and accessible data usage

license': in other words, the conditions under which the data can be used should be transparent to both humans and machines[5].

The section below reports on how to implement FAIR data.

5.2.1.1 Making data FINDABLE, including provisions for metadata

- Are the data produced and/or used in the project discoverable with metadata, identifiable and locatable by means of a standard identification mechanism (e.g. persistent and unique identifiers such as Digital Object Identifiers)?
- What naming conventions do you follow?
- Will search keywords be provided that optimize possibilities for re-use?
- Do you provide clear version numbers?
- What metadata will be created? In case metadata standards do not exist in your discipline, please outline what type of metadata will be created and how.

5.2.1.2 Making data openly ACCESSIBLE

In the following section, it is fundamental to specify which data will be made available and which not, and why.

It is possible in fact that some beneficiaries should choose to keep their data closed, provided suitable justifications: the partner involved has to describe if there are legal, contractual or ethical impediments.

Moreover, it must be pointed out where the data/metadata will be available (in what repository, whether the use of specific software or tools is necessary etc.) and how (for instance, in which way the access should be provided in case of restrictions, or in which way the identity of a person searching will be ascertained).

There are some available specific repositories such as: OpenAIRE[6], The Registry of Research Data Repositories[7], Zenodo[8], arXiv[9].

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[5] Turning FAIR into reality 2018,
https://ec.europa.eu/info/sites/info/files/turning_fair_into_reality_1.pdf
[6] https://www.openaire.eu/
[7] http://www.re3data.org/
[8] https://zenodo.org/
[9] https://arxiv.org/

Some repositories like Zenodo, an OpenAIRE and CERN collaboration, allow researchers to deposit both publications and data, while providing tools to link them. The goal of OpenAIRE portal is to make as much European funded research output as possible available to all.
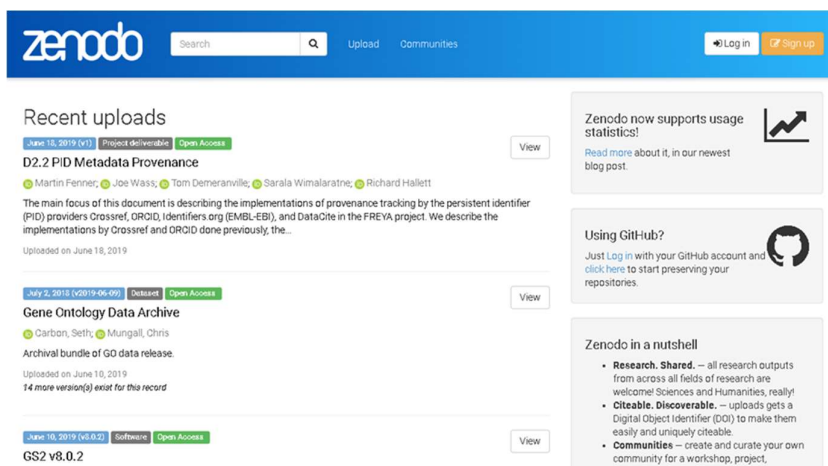

Figure 1 Zenodo repository

5.2.1.3 Making data INTEROPERABLE

The data providers must specify what vocabularies and methodology have to be used to guarantee a suitable exchange and re-use among institutions, researchers and companies.

5.2.1.4 Increase data RE-USE

Some specifications must be postulated regarding the re-utilisation of data, such as the type of licenses exploited, the period in which data will be available (so, for how much time data can be found and re-used in other researches), whether it is forecast the use by third parties before the end of project and if such data have limitations or not.

5.2.1.5 Allocation of resources

The partners will decide and describe the procedures that will be used in order to ensure long-term preservation of the data sets. This field will provide information regarding the duration of the data preservation, the approximate end volume, the associated costs and the plans of the consortium to cover the costs.

5.2.1.6 Data security

A special attention will be given to security of sensitive data (not only concerning data recovery, but also their transfer and storage), which necessitate for protection through specific technologies and expedients.

5.2.1.7 Ethical aspects

Any ethical issue involved in project must be discussed in this section and if there are any ethical or legal issues that can have an impact on data sharing, they can be discussed in this context.

5.2.1.8 Other issues

Any national/funder/sectorial/departmental procedure, if used, must be highlighted here.

6 Methodology applied for the DMP BEST4Hy

6.1 BEST4Hy project internal repository

All data collected during the project will be stored and preserved in an online data repository/cloud platform linked to the project website (https://cloud.best4hy-project.eu). The partners can access with user and password and only BEST4Hy partners have access to it.

Table 1 BEST4Hy repository

6.2 Research datasets

The first aspect the BEST4Hy consortium has to evaluate, is the identification of different datasets, at this early stage of the project. Table 1 gives an overview of all the data that are expected to be potentially collected or generated by the BEST4Hy project.

The present document aims to outline a preliminary strategy for the management of data generated throughout BEST4Hy project. Considering that this deliverable is due at month six, few datasets have been generated yet, so it is possible that in the future some aspects outlined in the present document will need to be refined or adjusted.

The table below presents different data-types divided also with the different activities in the WPs: experimental data, characterization data, publications data, modelling data,

documents data, photos and videos. Data will be shared between partners using the project internal repository (access allowed only to partners): https://cloud.best4hy-project.eu. Scientific publication and public deliverables: Upload on Zenodo. Confidential Deliverables: upload a synthetic document.

WPs	Tasks	Data type (experimental/characterization/publications/documents/photos/videos)	Data description	Partner responsible	Data standard (.csv/.png/.pdf/.xls/.docx/.txt…)	Open/restricted
1. Existing and novel technologies of PEMs: proof of concept	Task 1.1: Existing Platinum recovery technology	Experimental/characterization/publications/documents/photos/videos	Experiments for recovery Pt and optimization. Quality characterization (ICP-OES) of Pt/solution. Results reported in the D1.1. photos and videos to collect all the information about processes. Documents produced along the project: D1.1, D1.2, D1.5 (public documents). Publications	HRD, ENVI, EKPO, IDO-Lab	.csv, .png, .pdf, .xls, .docx, .jpg	During the project the partners will define which data are restricted and which open. The 3 reference documents are public. To define mainly between HRD and EKPO which photos or videos can be presented in the documents. Some data will be presente in scientific publications
	Task 1.2: Novel recycling technologies to recover platinum and ionomer	Experimental/characterization/publications/documents/photos/videos	Experiments for gaseous dismantling and for ionomer recovery and optimization. Fraction purity (MEB and ICP techniques) analysis from gas phase. Characterization of Pt/C and ionomer. Results reported in the D1.1. photos and videos to collect all the information about processes. Documents produced along the project: D1.1, D1.3, D1.4, D1.5. Publications.	HRD, CEA, IDO-Lab	.csv, .png, .pdf, .xls, .docx, .jpg	During the project the partners will define which data are restricted and which open. 2 reference documents are public and 1 confidential. To define mainly between HRD and EKPO which photos or videos can be presented in the documents. Some data will be presente in scientific publications
	Task 1.3: Novel PEMs recycling technologies generalization to PEMWE technologies	Experimental/characterization/publications/documents	Experiments for PEMWE recovery materials. Document prepared along the project: D1.6. Publications	HRD, CEA, IDO-Lab	.csv, .png, .pdf, .xls, .docx, .jpg	During the project the partners will define which data are restricted and which open. reference document is confidential. Some data will be presente in scientific publications
	Task 1.4 Demonstration (data for LCA/LCC)	Experimental/publications/documents	Experiments useful to collect info for LCA/LCC	HRD, CEA, UL, ENVI	.xls, .docx	During the project the partners will define which data are restricted and which open. Some data will be presente in scientific publications

Table 2 WP1 Data-Types (status M6)

WPs	Tasks	Data type (experimental/characterization/publications/documents/photos/videos)	Data description	Partner responsible	Data standard (.csv/.png/.pdf/.xls/.docx/.txt…)	Open/restricted
2. Characterization and evaluation of recycled materials in single cell and stack PEM configuration	Task 2.1: Pt/C Catalyst synthesis	Experimental/characterization/publications/documents	Experiments with recovered material: synthesis. Results reported in the D2.1 and D2.2 (confidential documents)	CEA	.csv, .png, .pdf, .xls, .docx,	During the project the partners will define which data are restricted and which open. The 2 reference documents are confidential. Some data will be presented in scientific publications
	Task 2.2: Characterization of recovered materials	Experimental/characterization/publications/documents	Quality characterization of recycled materials: TEM, XRD, physical characterization, chemical characterization via ICP MS and electrochemical characterization (RDE, ECSA, ORR kinetics. In situ performance for the ionomer. Results reported in the D2.1	CEA, HRD, IDO-Lab	.csv, .png, .pdf, .xls, .docx, .xrd, .jpeg	During the project the partners will define which data are restricted and which open. 1 reference document confidential. Some data will be presented in scientific publications
	Task 2.3: Remanufacturing of the MEA	Experimental/characterization/publications/documents	Experiments for remanufacturing MEA. Document prepared along the project: D2.2 and 2.3. Publications	CEA, EKPO	.csv, .png, .pdf, .xls, .docx	During the project the partners will define which data are restricted and which open. 1 reference document is public and 1 confidential. Some data will be presented in scientific publications
	Task 2.4: Performance evaluation of recycled materials	Experimental/characterization/publications/documents	Experiments in a small FC and in a stack: polarization curves: Electrochemical Impedance Spectroscopy and CV measurements. Documents prepared along the project: D2.5 and 2.6. Publications	CEA, EKPO, ENVI	.xls, .docx, .csv	During the project the partners will define which data are restricted and which open. 1 reference document is public and 1 confidential. Some data will be presented in scientific publications

Table 3 WP2 Data-Types (status M6)

WPs	Tasks	Data type (experimental/characterization/publications/documents/photos/videos)	Data description	Partner responsible	Data standard (.csv/.png/.pdf/.xls/.docx/.txt…)	Open/restricted
3. Existing Technologies (SOFCs): selection, validation and demonstration	Task 3.1: Materials procurement	experimental/characterization/publications/documents/photos/videos	Post mortem characterization: SEM-EDS, XRF. Quality material characterization. photos and videos to collect all the information about processes. Publications	Elcogen, PoliTo	.csv, .png, .pdf, .xls, .docx,	During the project the partners will define which data are restricted and which open. The activity is reported in D3.1 (confidential). Some data will be presented in scientific publications
	Task 3.2: Implementation & validation of small-scale plant	experimental/characterization/publications/documents	Experiments for recovery anode supported electrolyte. Quality characterization of recycled materials: XRF, XRD, ICP. Results reported in the D3.1	PoliTo, Elcogen	.csv, .png, .pdf, .xls, .docx, .xrd, .jpeg	During the project the partners will define which data are restricted and which open. 1 reference document confidential. Some data will be presented in scientific publications
	Task 3.3: Performance evaluation of recycled materials	experimental/characterization/publications/documents	Quality characterization of recycled materials: XRD, SEM EDS… Experiments with remanufacturing of the cell: impedance, mechanical analysis, high resolution micro_CT, SEM. Document prepared along the project: D3.2,3.3 and 3.4. Publications	PoliTo, Elcogen	.csv, .png, .pdf, .xls, .docx, .xrd, .jpeg	During the project the partners will define which data are restricted and which open. The task will develop a public section of the D3.2 (D3.3). Some data will be presente in scientific publications
	Task 3.4 Open loop – analysis of different scenarios	publications/documents	Document prepared along the project: D3.5. Publications	PoliTo, Elcogen	.docx, .pdf	During the project the partners will define which data are restricted and which open. D3.5 document is public. Some data will be presented in scientific publications

	Task 3.5 Demo of plant with monitoring for LCA/LCC data collection	experimental/publications/documents	experiments useful to collect info for LCA/LCC	PoliTo, UL, ENVI	.xls, .docx	During the project the partners will define which data are restricted and which open. Some data will be presented in scientific publications

Table 4 WP3 Data-Types (status M6)

WPs	Tasks	Data type (experimental/characterization/publications/documents/photos/videos)	Data description	Partner responsible	Data standard (.csv/.png/.pdf/.xls/.docx/.txt…)	Open/restricted
4. Novel technologies (SOFCs) studies	Task 4.1: Study and identification of novel recycling technologies for SOFC	experimental/characterization/publications/documents/photos/videos	Post mortem characterization of cathode dismantled cells: RD, FESEM-EDS, XPS, XRF. Experiments for recovery. Publications	PoliTo, Elcogen	.csv, .png, .pdf, .xls, .docx, .xrd, .jpeg	During the project the partners will define which data are restricted and which open. The activity is reported in D4.1 (confidential). Some data will be presented in scientific publications
	Task 4.2: Lab scale validation of previous recycling processes identified	experimental/characterization/publications/documents	Quality characterization of recycled materials: SEM-EDS, XRF, XRD. Experiments with recovered materials. Results reported in the D4.3 and 4.4.	PoliTo	.csv, .png, .pdf, .xls, .docx, .xrd, .jpeg	During the project the partners will define which data are restricted and which open. The task will develop a public section of the D4.2 (D4.3) and a confidenatial document (D4.4) Some data will be presented in scientific publications

Table 5 WP4 Data-Types (status M6)

WPs	Tasks	Data type (experimental/characterization/publications/documents/photos/videos)	Data description	Partner responsible	Data standard (.csv/.png/.pdf/.xls/.docx/.txt…)	Open/restricted
5. LCA/LCC for FCH EoL	Task 5.1: Calculate the environmental profile of FCH products and the existing EoL technologies	publications/documents	LCA analysisis of PEMFC and SOFC (manufacturing phase to EoL and recycling)	UL, HRD, Elcogen, PoliTo, EKPO	.csv, pdf, .xls, .docx,	During the project the partners will define which data are restricted and which open. The activity is reported in D5.1 (public). Some data will be presented in scientific publications
	Task 5.2: Calculate the environmental profile of the novel EoL technologies	publications/documents	LCA analysisis of PEMFC and SOFC (manufacturing phase to EoL and recycling)	UL, HRD, PoliTo, CEA	.csv, .pdf, .xls, .docx,	During the project the partners will define which data are restricted and which open. The activity is reported in D5.2 (public). Some data will be presented in scientific publications
	Task 5.3: LCC of existing and novel EoL technologies	publications/documents	LCC analysisis of PEMFC and SOFC (manufacturing phase to EoL and recycling)	UL, HRD, PoliTo, CEA	.csv, .pdf, .xls, .docx,	During the project the partners will define which data are restricted and which open. The activity is reported in D5.2 and 5.3 (public). Some data will be presented in scientific publications
	Task 5.4: Ecolabelling certification for Fuel cell technology	publications/documents	Document prepared along the project: D5.35. Publications	RINA-C, UL, EKPO, Elcogen	.docx, .pdf	During the project the partners will define which data are restricted and which open. D5.3 document is public. Some data will be presented in scientific publications

Table 6 WP5 Data-Types (status M6)

WPs	Tasks	Data type (experimental/characterization/publications/documents/photos/videos)	Data description	Partner responsible	Data standard (.csv/.png/.pdf/.xls/.docx/.txt…)	Open/restricted
6. Measures towards take up	Task 6.1 - Regulatory aspects (EU and extra EU vision)	publications/documents	Document: D6.2 and D6.3 and publications	ENVI, all	.csv, .pdf, .xls, .docx,	During the project the partners will define which data are restricted and which open. The activity is reported in D6.2 and D6.3 (public). Some data will be presented in scientific publications
	Task 6.2 – Standardisation Aspects	publications/documents	Standardisation inventory and roadmap document. D6.3. Publications	RINA-C, ENVI, Elcogen, EKPO	.csv, .pdf, .xls, .docx,	During the project the partners will define which data are restricted and which open. The activity is reported in D6.3 (public). Some data will be presented in scientific publications
	Task 6.3 – Strategic Analysis towards replication	publications/documents	Strategic analysis: documents and publications. D6.3, 6.4, 6.5, 6.6	RINA-C, ENVI, HRD	.csv, .pdf, .xls, .docx,	During the project the partners will define which data are restricted and which open. Some data will be presented in scientific publications
	Task 6.4. Technical training: HOW recycling and dismantling FCH technologies	publications/documents/powerpoints/videos/photos	Document prepared along the project: D6.7, 6.8. Public material for training	ENVI, HRD	.docx, .pdf, .ppt	During the project the partners will define which data are restricted and which open. Some data will be presented in scientific publications

Table 7 WP6 Data-Types (status M6)

WPs	Tasks	Data type (experimental/characterization/publications/documents/photos/videos)	Data description	Partner responsible	Data standard (.csv/.png/.pdf/.xls/.docx/.txt…)	Open/restricted
7. Dissemination, communication, exploitation	Task 7.1 – Communication& Dissemination	publications/documents	Best4Hy logo, templates of reports-presentations-deliverables, leaflets, newsletter to stakeholders, ppts for workshops	ENVI, all	.csv, .pdf, .xls, .docx, ppt	During the project the partners will define which data are restricted and which open. The activity is reported in D7.2 and 7.3 (public). Some data will be presented in scientific publications
	Task 7.2 – Stakeholders involvement	publications/documents	documents	ENVI, all	.csv, pdf, .xls, .docx,	During the project the partners will define which data are restricted and which open. The activity is reported in D7.5(public). Some data will be presented in scientific publications
	Task 7.3 – Exploitation and IPR Management	publications/documents	Exploitation and IPR documents	ENVI, all	.csv, pdf, .xls, .docx,	During the project the partners will define which data are restricted and which open. The activity is reported in 7.5 and 7.6 (public). Some data will be presented in scientific publications

Table 8 WP7 Data-Types (status M6)

WPs	Tasks	Data type (experimental/characterization/publications/documents/photos/videos)	Data description	Partner responsible	Data standard (.csv/.png/.pdf/.xls/.docx/.txt …)	Open/restricted
8. Project coordination and management	Task 8.1 – Consortium general coordination and management	documents	BEST4Hy logo, templates of reports-presentations-deliverables, leaflets, newsletter to stakeholders, ppts for workshops. NdA and letter for Arvisory Boards.	ENVI	.csv, .pdf, .xls, .docx, ppt	During the project the partners will define which data are restricted and which open. The activity is reported in D8.1 (public) and D8.3, 8.5, 8.6, 8.7
	Task 8.2 – Administrative and financial management	documents, excel sheets	documents and excel sheets	ENVI, all	.csv, .pdf, .xls, .docx,	internal documents only for partners members.
	Task 8.3 – Quality assurance, performance monitoring and risk analysis	documents	quality and risk documents	ENVI, all	.csv, .pdf, .xls, .docx,	During the project the partners will define which data are restricted and which open. The activity is reported in D8.4 (confidential)
	Task 8.4 – Consortium meetings organization	documents, pts		ENVI, all	.csv, .pdf, .xls, .docx,	minutes and ppts of the meeting. Only confidential to the consortium
	Task 8.5– Data management	documents	Data managment plan documents	ENVI, all	.csv, .pdf, .xls, .docx,	During the project the partners will define which data are restricted and which open. The activity is reported in 8.2 and 8.8 (public).

Table 9 WP8 Data-Types (status M6)

6.3 BEST4Hy data repository

For the project data repository, including deliverables, the consortium proposes the use of a public online repository ZENODO.

Zenodo is a general-purpose open-access repository developed under the European OpenAIRE program and operated by CERN. It allows researchers to deposit research papers, data sets, research software, reports, and any other research related digital artifacts. For each submission, a persistent digital object identifier (DOI) is minted, which makes the stored items easily citeable.

6.3.1 Deliverables' repository

BEST4Hy defined two deliverables' typologies to upload on Zenodo:
- For public Deliverable

Upload of the deliverable without the BEST4Hy header as the goal is the promotion of the research results,
- For Confidential Deliverable

Upload of a synthetic document with only the introduction, aims and conclusions of the deliverable: responsible partner provide the document approved.

In the framework of BEST4Hy project, 25 deliverables are public on a total of 48 deliverables (around 50%). In particular D2.5, D3.2, D4.2 reports are each one divided in two documents, one CO and one PU with some visible results.

6.4 Scientific publications

Under Horizon 2020, each beneficiary must ensure open access to all peer-reviewed scientific publications relating to its results: 'Disseminate' its results by disclosing them to the public by appropriate means (other than those resulting from protecting or exploiting the results), including in scientific publications (in any medium).
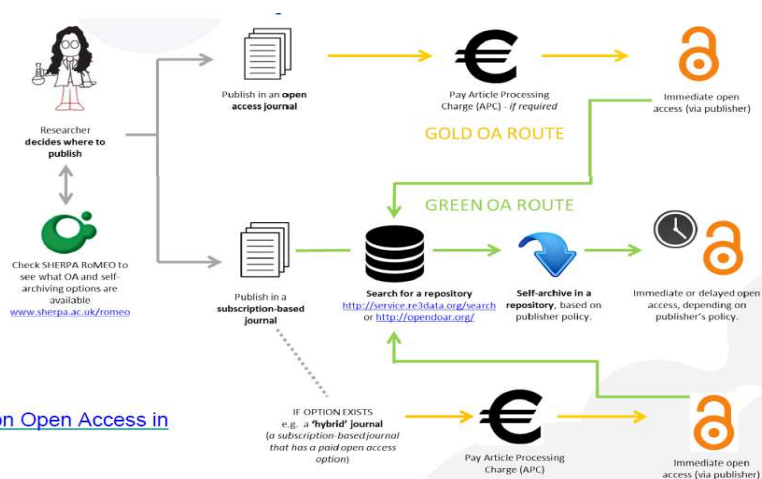

Figure 2 Guidelines on Open Access in H2020 Open Aire

There are two typologies of publications that beneficiaries can choose:

GOLD OPEN ACCESS: means that an article is immediately provided in open access mode (on the publisher/journal website). Publishers sometimes charge so called Article Processing Charges (or APCs) to make articles open. Such costs are eligible for reimbursement during the duration of the project as part of the overall project budget.

In the case of gold open access publishing, open access must be granted at the latest on the date of publication and you also have to deposit a copy in a repository.

COSTS=   reimbursable cost during the project, but TOO LIMITED budget

Cost: around 2000-3000 €/article

GREEN OPEN ACCESS: means that a published article or the final peer-reviewed manuscript is archived (deposited) in an online repository before, alongside or after its publication. Repository software usually allows authors to delay access to the article ('embargo period') If this route is chosen beneficiaries must ensure open access to the publication within a maximum of six months (twelve months for publications in the social sciences and humanities). -->institutional repository, with embargo < 6 months.

The partners will consider to publish in Open Research Europe[10], an open access publishing platform for the publication of research stemming from Horizon 2020 funding across all subject areas. The platform makes it easy for Horizon 2020 beneficiaries to comply with the open access terms of their funding and offers researchers a publishing venue to share their results and insights rapidly and facilitate open, constructive research discussion.

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[10] https://open-research-europe.ec.europa.eu/about

Our Publishing Process

PREPRINT · UNDERGOING PEER REVIEW · PASSED PEER REVIEW

Article Submission

Submission is via a single-page submission system. The in-house editorial team carries out a comprehensive set of prepublication checks to ensure that all policies and ethical guidelines are adhered to.

Publication & Data Deposition

Once the article has passed the prepublication checks, the preprint version is published within 10 days, enabling immediate viewing and citation.

Open Peer Review & Article Revision

Expert reviewers are selected and invited, and their reviews and names are published alongside the article, together with the authors' responses and comments from registered users. Authors are encouraged to publish revised versions of their article. All versions of an article are linked and independently citable.

Send to Indexers & Repositories

Articles that pass peer review are sent to major indexing databases and repositories.

Figure 3 Open Research Europe process

No specific journal has been identified at this stage of the project. The partners together with the coordinator will evaluate during the project which journal to apply according to the sharing policies.

7 TRUST

BEST4Hy, like all other FCH 2 JU`s projects, has the obligation to provide by each June (except June 2021) some technical information related to the previous calendar year using structured parameter templates as applicable – Technology Reporting Using Structured Templates (TRUST). This obligation was described by the Project Officer during the kick off meeting. TRUST is an online secure interface which hosts a number of reporting templates. At least one will be provided to BEST4Hy according to project scope. In this template, each project can qualify the level of confidentiality of the data provided (public/confidential) upon justification. Confidential data will be anonymized. ENVIPARK as Project Coordinator is responsible for this yearly update (deliverables D8.9 and D8.10).
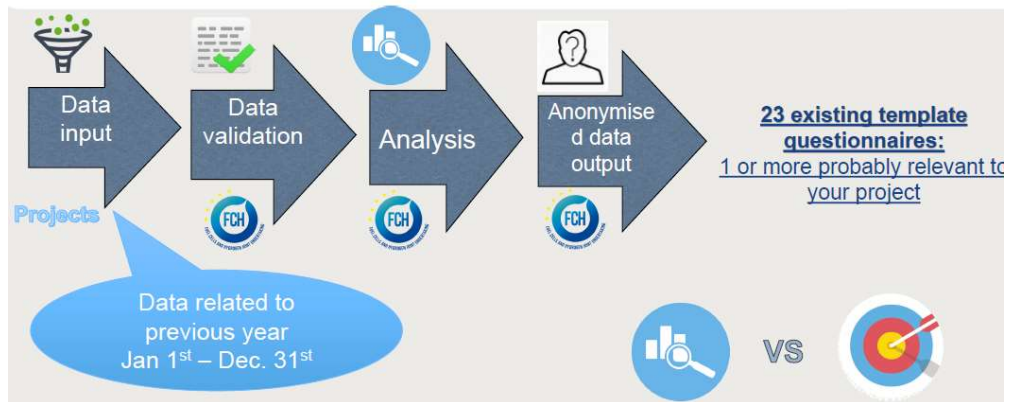
Figure 4 Process flow for TRUST

BEST4Hy might be invited by FCH JU to take part to other surveys. The Project Coordinator will follow up on such requests, involving the relevant project partners and consulting on disclosure of data when potential for confidentiality exists.

8   Conclusions

The present document has intended to outline a preliminary strategy for the management of data generated throughout BEST4Hy project. Considering that this deliverable is due at month six, few datasets have been generated yet, so it is possible that in the future some aspects outlined in the present document will need to be refined or adjusted.

The update of the data management plan and the research data types reported preliminary from table 2 to table 9 will be reported in the different periodic reports at the end of each reporting period.