



This Project has received funding from the European Union’s Horizon 2020 Research and Innovation Programme under Grant Agreement N. 818329



Sun coupled innovative Heat pumps D1.2 – SunHorizon Data Management Plan

Due date of deliverable: **31/03/2019**

Actual submission date: **31/03/2019**

Organisation name of lead contractor for this deliverable: RINA-C

Dissemination Level (Specify with “X” the appropriate level)		
PU	Public	X

History of deliverable	
V1	Submitted on 31/3/2019

Project Contractual Details

Project Title	Sun coupled innovative Heat pumps
Project Acronym	SunHorizon
Grant Agreement No.	818329
Project Start Date	01-10-2018
Project End Date	30-09-2022
Duration	48 months
Supplementary notes: This document will be publicly available (on CORDIS and project official websites as soon as approved by EC.	

Table of Contents

Table of Contents	2
1 Introduction	3
2 Open access	4
2.1 Open access in the Grant Agreement	5
2.2 Open access in research data pilot	6
2.3 Open access in research data repository	7
3 Scientific publications	9
3.1 Selection of suitable publishers	9
3.2 Bibliographic metadata	10
4 Research Data	11
4.1 Key principle for open access to research data	11
4.2 Roadmap and procedures for data sharing	12
5 Expected Dataset	14
6 Potential exceptions to Open Access	19
7 ETHICAL ASPECTS	20
8 Conclusions	22

1 Introduction

The main objective of SunHorizon project is to develop and demonstrate up to TRL7 a technology packages which integrate properly heat pump and solar panels for H&C of buildings. In addition, a proper cloud based monitoring platform will be developed in WP4 and WP5 to be a proper performance data mine for the development of data driven oriented optimization algorithms and tools for predictive maintenance and optimize the management. The monitoring platform will also drive smart monitoring end user interfaces that will be applied at building level to collect thermal comfort data.

In this context, this deliverable, developed in the framework of WP1 “Project management” represents the Data Management Plan. The purpose of the present document is to outline a preliminary strategy for the management of the data generated in the framework of SunHorizon project activities. Procedures for the management of research data, energy resource databases, urban maps and scientific publication data will be addressed. The management policy will be defined fully in compliance with the open access principles adopted by the European Commission and enforced through the Grant Agreement.

This Document is about the SunHorizon Data Management Plan (DMP) which outline how the research data gathered or generated during and after the project development will be managed. It describes the standards and the methodology for the data collection and generation, when and how they will be shared. This document follow the guidelines provided from the European Commission.

Actually, the aim of the Data Management Plan is to consider the different aspects of data management since the beginning of the project to ensure that outcomes are well-managed in the present and prepared for preservation in the future.

Even if the document is due at M6 and project activities are at the beginning, a tentative description of the expected dataset generated will be carried out, trying to predict what data will be kept confidential and what data will be instead made available during project development.

In particular, this document specifies how the SunHorizon research data will be handled in the framework of the project as well as after its completion.

As a matter of fact, the report will indicate:

- what data will be collected, processed and/or created and from whom
- which data will be shared and which one will be maintained confidential
- how and where the data will be stored during the project
- which backup strategy will be applied for safely maintaining the data
- how the data will be preserved after the end of the project

An overview on Open Access and in particular on the Open Research Data Pilot will be given and different repositories will be investigated in order to find the most appropriate modality for ensuring open access to discoverable data and scientific publications generated throughout the project lifecycle.

The present Data Management Plan has to be considered as a living document, and any future update or change in the SunHorizon data management policy will be included in the periodic reports or will be specified in the deliverables related to the specific tasks.

In particular, the Data Management Plan will be refined according to the IPR strategy that will be defined for the SunHorizon exploitable results. Actually, the Consortium includes industrial partners aiming to develop innovative products and services through the project research and in this context, a proper management of the data generated is key in order do not jeopardize the results in a high competitive market.

It is important to highlight that this Data Management Plan will be updated at each reporting period as agreed by the whole Consortium.

2 Open access

Open access can be defined as the practice of providing on-line free of charge access to scientific information related to project outcomes. In the context of R&D “scientific information” mainly refers to:

- peer-reviewed scientific research articles, if projects results are going to be disseminated in academic journals (as with SunHorizon project)
- scientific research data, that means not only data underlying the aforementioned scientific publications, but also any other data related to project activities, both processed or raw.

Although there are no legally binding definitions of open access, authoritative definitions appear in key political declaration such as the *2002 Budapest Declaration* and the *2003 Berlin Declaration*. Under these definitions, “access” includes the right to read, download and print, but also to copy, distribute, search, link, crawl and mine the former data, provided that obligations to confidentiality, security and protection of personal data are ensured and the achievements of SunHorizon objectives, including the future exploitability of results, are not jeopardized.

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.

Within SunHorizon project, Open Access data related to building consumption, weather data, solar resource mapping, end-user comfort can enhance the market opportunities to the industrial partners and increase the opportunity for public authorities to be involved in the activities.

Open access (OA) is understood as the free, online provision of re-useable scientific information to other users. There are many good reasons to make the data and findings from publically funded research openly available to the research community, the commercial sector and civil society.

As the “Guidelines to the rules on Open Access to Scientific Publications and Open Access Research Data in Horizon 2020” (EC DG R&I, 2017) outline, more open access to scientific publications and data serves a number of purposes. It will (i) improve the quality of research by building on a stronger body of existing work, (ii) increase efficiency of research by reducing duplication of effort, (iii) bring innovations to market quicker by reducing barriers to information flow, and (iv) enhance the transparency of scientific progress. There is also the economic and ethical principle that information that has been paid for with public money should not have to be paid for again when it is required for use by other researchers, industry, or citizens.

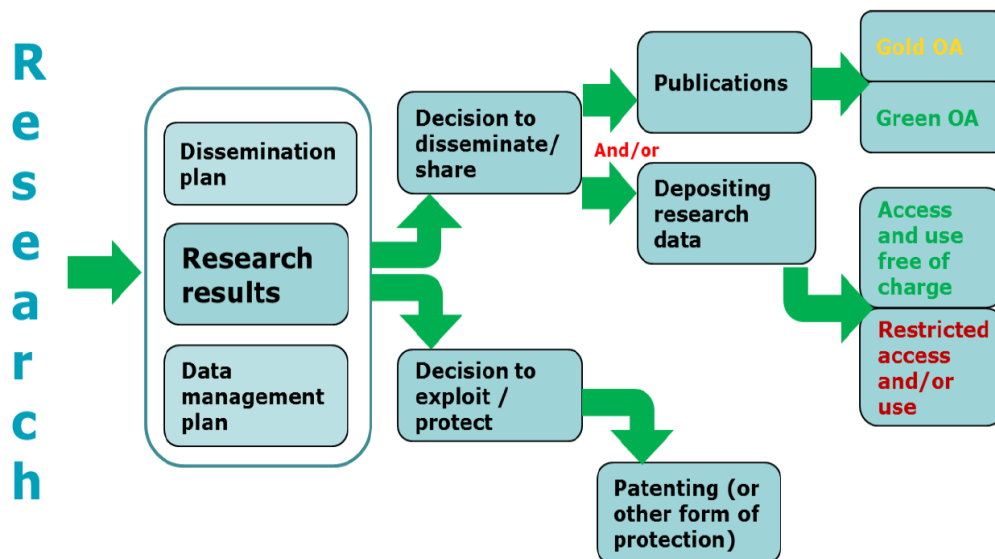


Figure 1 Open access to scientific publication and research data in the wider context of dissemination and exploitation (Reproduced from EC DG R&I (2017) H2020 Programme Guidelines on Open Access to Scientific Publications and Open Access Research Data in Horizon 2020)

The datasets outlined in the next section of the report present outputs and processes that will determine the path for different aspects of the SunHorizon project. This work will have input from the dissemination and exploitation activities of Work Package 7, which is also led by RINA-C. The process will involve patent search, the clarification of each partners' legitimate interests in relation to the project outputs, and the introduction of IPR agreements between partners prior to dissemination of findings.

2.1 Open access in the Grant Agreement

The importance given by the European Commission to the open access issue is clearly outlined in the SunHorizon Grant Agreement. Particularly, Article 29.2 and 29.3 states the responsibilities of beneficiaries and the actions to be undertaken in order to ensure open access to scientific publications and to research data respectively. The text of the aforementioned articles is reported below.

Article 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 on 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:

(i) on publication, if an electronic version is available for free via the publisher, or

(ii) 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:

- the terms “European Union (EU)” and “Horizon 2020”;
- the name of the action, acronym and grant number;
- the publication date, and length of embargo period if applicable, and
- a persistent identifier.

Article 29.3: Open access to research data

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

(a) deposit 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:

- (i) the data, including associated metadata, needed to validate the results presented in scientific publications as soon as possible;
- (ii) 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).

This does not change the obligation to protect results in Article 27, the confidentiality obligations in Article 36, the security obligations in Article 37 or the obligations to protect personal data in Article 39, all of which still apply.

As an exception, the beneficiaries do not have to ensure open access to specific parts of their research data if the achievement of the action's main objective, as described in Annex 1, would be jeopardised by making those specific parts of the research data openly accessible. In this case, the data management plan must contain the reasons for not giving access.

The confidentiality aspects have been duly taken into account in the preparation of this document in order do not compromise the protection of project results and legitimate interests of project partners.

2.2 Open access in research data pilot

Horizon2020 has launched an **Open Research Data Pilot (ORDP)** aiming at improving and maximising access to and re-use of research data generated by projects (eg. from experiments, simulations and surveys). These data are typically small sets, scattered across repositories and hard drives throughout Europe. The success of the EC's Open Data Pilot is therefore dependent on support and infrastructures that acknowledge disciplinary approaches on institutional, national, and European levels. The pilot is an excellent opportunity to stimulate and nurture the data-sharing ecosystem and has the potential to connect researchers interested in sharing and re-using data with the relevant services within their institutions (library, IT services), data centres and data scientists. The pilot should serve to promote the value of data sharing to both researchers and funders, as well as to forge connections between the various players in the ecosystem.

The SunHorizon project recognizes the value of regulating research data management issues. Accordingly, in line with the rules laid down in the Model Grant Agreement, the beneficiaries will deposit the underlying research data needed to validate the results presented in the deposited scientific publications in a clear and transparent manner.

Open Research Data Pilot project aims at supporting researchers in the management of research data throughout their whole lifecycle, providing answers to key issues such as “what”, “where”, “when”, “how” and “who”¹.

WHAT

The Open Data Pilot covers all research data and associated metadata resulting from EC-funded projects, if they serve as evidence for publicly available project reports and deliverables and/or peer reviewed publications. To support discovery and monitoring of research outputs, metadata have to be made available for all datasets, regardless of whether the dataset itself will be available in Open Access. Data repositories might consider supporting the storage of related project deliverables and reports, in addition to research data.

¹ http://sito.entecra.it/portale/public/documenti/horizon_2020_open_data_pilot.pdf

WHERE
All research data has to be registered and deposited into at least one open data repository. This repository should: provide public access to the research data, where necessary after user registration; enable data citation through persistent identifiers; link research data to related publications (eg. journals, data journals, reports, working papers); support acknowledgement of research funding within metadata elements; offer the possibility to link to software archives; provide its metadata in a technically and legally open format for European and global re-use by data catalogues and third-party service providers based on wide-spread metadata standards and interoperability guidelines. Data should be deposited in trusted data repositories, if available. These repositories should provide reliable long-term access to managed digital resources and be endorsed by the respective disciplinary community and/or the journal(s) in which related results will be published (e.g., Data Seal of Approval, ISO Trusted Digital Repository Checklist).
WHEN
Research data related to research publications should be made available to the reviewers in the peer review process. In parallel to the release of the publication, the underlying research data should be made accessible through an Open Data repository. If the project has produced further research datasets (i.e. not necessarily related to publications) these should be registered and deposited as soon as possible, and made openly accessible as soon as possible, at least at the point in time when used as evidence in the context of publications.
HOW
The use of appropriate licenses for Open Data is highly recommended (e.g. Creative Commons CC0, Open Data Commons Open Database License).
WHO
Responsibility for the deposit of research data resulting from the project lies with the project coordinator (delegated to project partners where appropriate)

2.3 Open access in research data repository

All the data collected from monitoring sensors related both to building consumptions, weather data and technology performances, will be stored and preserved in an online monitoring cloud platform with access limited to the SunHorizon Consortium, managed by SE and intended for internal uses. The collected data will be also stored in the Consortium repository, hosted in NextCloud, managed by RINA-C. Particular attention will be paid to the confidential and/or sensitive data and the consortium will not disclose or share this information to third parties.

At M18 a preliminary analysis will be performed in order to identify the data suitable to get open access disclosure: this preliminary list will be integrated and confirmed at the end of the project (M36). Furthermore it is important to remark that this Data Management Plan will be updated at each reporting period.

Concerning the open access of discoverable data, different online public repository possibilities will be investigated in subsequent stages of the project. Some examples of suitable repositories under evaluation are shown below:

- ZENODO (<http://www.zenodo.org/>) is the open access repository of OpenAIRE (the Open Access Infrastructure for Research in Europe, <https://www.openaire.eu/>). The goal of OpenAIRE portal is to make as much European funded research output as possible available to all. Institutional repositories are typically linked to it. Moreover, dedicated pages per project are visible on the OpenAIRE portal, making research output (whether it is publications, datasets or project information) accessible through the portal. This is possible due to the bibliographic metadata that must accompany each publication.
- LIBER (www.libereurope.eu) supports libraries in the development of institutional research data management policies and services. It also enables the exchange of experiences and good practices across Europe. Institutional infrastructures and support services are an emerging area and will be

linked to national and international infrastructure and funder policies. Building capacities and skills, as well as creating a culture of incentives for collaboration on research data, management are the core targets of LIBER.

3 Scientific publications

As reported in the DoA, a dissemination and communication plan has been set up in order to raise awareness on the project outcomes among specialized audience. In this framework, the consortium commits itself to perform publications in peer reviewed international journals, in order to make the outcomes available to the scientific community. The partner in charge of dissemination activities are responsible for the scientific publications as well as for the selection of the publishers considered as more relevant for the subject matter.

Further details on dissemination activities are already included in D8.3 “Dissemination and stakeholders’ engagement plan” which is delivered at M6 and will be included in D8.5 “Report on dissemination and communication activities” delivered at M24.

Fully in line with the rules laid down in the SunHorizon Grant Agreement and reported in section 2.2.1, each beneficiary will ensure open access to all peer reviewed scientific publications relating to its results.

The project will make use of a mix of the three different possibilities for open access, namely:

- 1.Open access publishing** (without author processing charges): partners may opt for publishing directly in open access journals, i.e. journals which provide open access immediately, by default without any charges.
- 2.Gold open access publishing:** partners may also decide to publish in journals that sell subscriptions, offering the possibility of making individual articles open accessible (hybrid journals). In such case, authors will pay the fee to publish the material for open access, whereby highest level journals offer this option.
- 3.Self-archiving/ “green” open access publishing:** alternatively, beneficiaries may deposit the final peer reviewed article or manuscript in an online disciplinary, institutional or public repository of their choice, ensuring open access to the publication within a maximum of six months.

Moreover, the relevant beneficiary will deposit at the same time the research data presented in the deposited scientific publication into a data repository. The consortium will evaluate which of these data will be part of the data to be published on SunHorizon Open Research Data Platform mainly according to Ethics and confidentiality reasons.

3.1 Selection of suitable publishers

Each publisher has its own policy on self-archiving (i.e, the act of the author's depositing a free copy of an electronic document online in order to provide open access to it). Since publishing conditions of some publishers might not fix to open access requirements applying to SunHorizon on the basis of the Grant Agreement, each partner in charge of dissemination activities will identify the most suitable repository. Particularly, beneficiaries will not choose a repository which claims rights over deposited publications and precludes access.

At this stage any specific journal has been identified each beneficiary, in collaboration with the project coordinator, will evaluate if the identified journal and its article sharing policy can respect the consortium agreement in terms of Open Access. According to consortium partners’ previous Open Access experience, ELSEVIER journals could be considered a good option.

As example, ELSEVIER article sharing policy is summarized in the table below²

	Share
Pre submission	Preprints ¹ can be shared anywhere at any time PLEASE NOTE: Cell Press, The Lancet, and some society-owned titles have different preprint policies. Information of these is available on the journal homepage.

https://www.publishingcampus.elsevier.com/websites/elsevier_publishingcampus/files/Guides/Brochure_OpenAccess_1_web.pdf ²

After acceptance	Accepted manuscripts ² can be shared: <ul style="list-style-type: none"> • Privately with students or colleagues for their personal use. • Privately on institutional repositories. • On personal websites or blogs. • To refresh preprints on arXiv and RePEc. • Privately on commercial partner sites.
After publication	Gold open access articles can be shared: <ul style="list-style-type: none"> • Anytime, anywhere on non-commercial platforms. • Via commercial platforms if the author has chosen a CC-BY license, or the platform has an agreement with us. Subscription articles can be shared: <ul style="list-style-type: none"> • As a link anywhere at any time. • Privately with students or colleagues for their personal use. • Privately on commercial partner sites.
After embargo	Author manuscripts can be shared: <ul style="list-style-type: none"> • Publicly on non-commercial platforms. • Publicly on commercial partner sites³.
<p>¹ Preprint is the initial write up of author results and analysis that have not yet been peer reviewed or submitted to a journal.</p> <p>² Accepted manuscript is a version of author manuscript which typically includes any changes you have incorporated through the process of submission, peer review and in your communications with the editor</p> <p>³ For an overview of how and where author can share his article, it is possible to check Elsevier.com/sharing-articles</p>	

3.2 Bibliographic metadata

As mentioned in the Grant Agreement, metadata for scientific peer reviewed publications must be provided. The purpose is to maximize the discoverability of publications and to ensure EU funding acknowledgment. The inclusion of information relating to EU funding as part of the bibliographic metadata is necessary also for adequate monitoring, production of statistics and assessment of the impact of Horizon 2020.

All the following information must be included in the metadata associated to each SunHorizon publication.

Information about the grant number, name and acronym of the action:

- European Union (UE)
- Horizon 2020 (H2020)
- Innovation Action (IA)
- SunHorizon [Acronym]
- Grant Agreement: GA N° 818329

Information about the publication date and embargo period if applicable:

- Publication date
- (eventual) Length of embargo period

Information about the persistent identifier:

- Persistent identifier, if any, provided by the publisher (for example an ISSN number)

4 Research Data

Research data refers to data that is collected, observed, or created within a project for purposes of analysis and to produce original research results. Data are plain facts. When they are processed, organized, structured and interpreted to determine their true meaning, they become useful and they are called information.

In a research context, research data can be divided into different categories, depending on their purpose and on the process through which they are generated. It is possible to have:

- Observational data, which are captured in real-time, for example, sensor data, survey data, sample data.
- Experimental data, which derive from lab equipment, for example resulting from fieldwork
- Simulation data, generated from test or numerical models
- Derived data

Research data may include all of the following formats:

- Text or word documents, spreadsheets
- Laboratory notebooks, field notebooks, diaries
- Questionnaire, transcripts, codebooks
- Audiotapes, videotapes
- Photographs, films,
- Test responses
- Slides, specimen, samples
- Collection of digital objects acquired and generated during the research process
- Data files
- Database contents
- Models, algorithms, scripts
- Contents of software application such as input, output, log files, simulations
- Methodologies and workflows
- Standard operating procedures and protocols

4.1 Key principle for open access to research data

According to the “*Guidelines on FAIR Data Management in Horizon 2020*”, research data must be *findable, accessible, interoperable, re-usable*³.

The FAIR guiding principles are reported in the following table⁴.

FINDABLE
F1 (meta)data are assigned a globally unique and eternally persistent identifier F2 data are described with rich metadata F3 (meta)data are registered or indexed in a searchable resource F4 metadata specify the data identifier
ACCESSIBLE
A1 (meta)data are retrievable by their identifier using a standardized communications protocol A1.1 the protocol is open, free, and universally implementable A1.2 the protocol allows for an authentication and authorization procedure, where necessary.

³ http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-data-mgt_en.pdf

⁴ <http://www.nature.com/articles/sdata201618>

A2 metadata are accessible, even when the data are no longer available
INTEROPERABLE
I1 (meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation I2 (meta)data use vocabularies that follow FAIR principles I3 (meta)data include qualified references to other (meta)data.
RE-USABLE
R1 meta(data) have a plurality of accurate and relevant attributes. <ul style="list-style-type: none"> R1.1 (meta)data are released with a clear and accessible data usage license R1.2 (meta)data are associated with their provenance R1.3 (meta)data meet domain-relevant community standards

4.2 Roadmap and procedures for data sharing

SunHorizon will generate a relevant amount of data mainly related to the eight different demotes (campaign monitoring data, energy consumption, weather data...). Part of these data could be made available not only for the purpose of the project but also for other tools and studies and presented in a specific section of the project website.

To facilitate the project data publication and in parallel guarantee confidentiality of the data and the linking with the open research data, a repository will be developed in order to share the selected project data towards external communities.

The access to this repository (section of project website) will be given after end-user registration and approval from the Project coordinator. The website provides a source catalogue, metadata and description of all the resourced to be shared with external.

According to the aforementioned principles (Section 4.1), information on data management is disclosed by detailing the next elements

- **Data set reference and name:** Identifier for the data set to be produced.
- **Data set description:** its origin (in case it is collected), nature and scale and to whom it could be useful, whether it underpins a scientific publication. Information on the existence (or not) of similar data and the possibilities for integration and reuse will be also included.
- **Standards and metadata:** reference to existing suitable standards of the discipline. If these do not exist, an outline on how and what metadata will be created has to be given.
- **Data sharing:** Description of how data will be shared, including access procedures, embargo periods (if any), outlines of technical mechanisms for dissemination and necessary software and other tools for enabling re-use, and definition of whether access will be widely open or restricted to specific groups. The repository where data will be stored will be identified, if already existing, indicating in particular the type of repository (institutional, standard repository for the discipline, etc.). In case the dataset cannot be shared, the reasons for this should be mentioned (e.g. ethical, IP, privacy related, security-related etc.).
- **Archiving and preservation** (including storage and backup): Procedures that will be put in place for long-term preservation of the data. Indication of how long the data should be preserved, what is its approximated end volume, what the associated costs are and how these are planned to be covered.

Since at M6, data set has not been generated yet, the previous list has to be intended as a guideline for data generated in the future. Obviously, the sharing of data will be strictly linked to the level of confidentiality of the data itself. In particular, the level of confidentiality of gathered data will be checked by the partner responsible for the activity (task leader) in which data has been collected, with the data owners (such as public authority, energy provider, industry, associations, etc...) in order to verify if data can be disclosed or not. For the purpose, a written confirmation to publish data in the SunHorizon Open Access Repository will be asked

via e-mail by the task leader to the data owner. It will be possible to make such data available only following the received confirmation provided by the data owner.

No confidential data generated within the project will be made available in digital form.

5 Expected Dataset

The purpose of the data collection is to bring an overview on the potential of the technology packages implemented in the demosites and studies in the virtual demosites through predefined KPI on different areas such as technology, energetic, economic, social and environmental. A preliminary set of KPI is already defined in WP2. The data will be related both to technology performance and personal data (like building consumption). This chapter address the origin and definition of the datasets that will be produced during the project for each work package, with the aim of clearly differentiate which are sensitive and which can be freely distributed in addition to other features.

What types of data will the project generate/collect?

INPUT DATA

In order to collect all the data necessary to be provided as inputs for achieving the objectives of the project, a survey will be carried out and distributed to collect the information both from building owners and building occupants. In this regard, data will be collected on file office format (word and excel) and the areas of reference are:

General information to characterize the building:

- General building information,
- General information on single dwellings.

Information to define the building plants features and uses of occupants:

- Heating system information,
- Cooling system information,
- Domestic Hot Water (DHW) system information,
- Ventilation system information,
- Energy use information
- Electric consumption
- Monitoring systems (Indicate the existence of any of these sensors)
- Control systems
- Internet connection

In addition to data collected with the surveys other type of data have been collected from demosite responsible partners such as drawings, pictures, scanned documents. Already existing data will also be used to defined a baseline to which compare the performance of the SunHorizon solution. Some data will be extracted from appropriate platform or sources (climate, historic building data, etc.) and reused inside the SunHorizon project to be able to reach the described project objectives. The data related to the building itself (building plant, energy profiles...) will be possibly taken directly by building owners or from interviews with building occupants.

MONITORING DATA: Data collection ongoing during the project development

Monitoring data will be acquired by designated metering equipment (provided and deployed by SE) and communicated via encrypted and secured communication means to the SunHorizon cloud. Data acquired in this way will be stored in the central database as part of a dedicated server provided by RINA-C and managed by SE, while applying all the necessary data protection and security measures in order to ensure complete communication and encryption of stored data.

OUTCOME DATA: Data generated during the project

Based on the analytics performed upon the monitoring data (e.g. consumption analytics, demand forecasting, supply/demand optimization, etc.), the project will generate a set of information that will be displayed on users' app and will provide to end-users feedback on their consumption.

These data will be visualized to the end user in different forms, such as graphics for indicating the energy profiles and trends, messages in natural language suggesting the energy conservation measures, or scoreboards for user benchmarking and performance indication.

Other general data from SunHorizon outcomes:

- Database including local energy prices, energy utility tariffs, gas/hydrogen/fuel prices, cost of BOP components, all data if explicitly anonymized.
- Database of emissions, technology and costs for the EU-28 countries: coming from already public databases.
- LCA/LCC useful databases for analysis is already public
- Results from stakeholders surveys properly anonymized and after informed consent signature
- Dissemination event materials
- Techno-economic framework initial assessment for replication and business model promotion

It is also important to consider that SunHorizon demosites will be open for dissemination visits within the so called SunHorizon Open Days.

At this stage of the project, the main datasets from each work packages have been already identified, specifying in the following table some relevant aspects such as the origin of the data, their utility and format. The datasets will be updated during the project to create a complete dataset of SunHorizon outcomes.

Table 1. Datasets from SunHorizon project

WP2		SunHorizon use cases scenario definition and demonstration strategy	
<i>Dataset 2.1</i>			
<i>Related project task</i>		Task 2.2	
<i>Data</i>		<ul style="list-style-type: none"> • Maps of solar resources • Mapping of building demand 	
<i>Confidentiality</i>		Public	
<i>Type and Format</i>		.xlsx, .docx	
<i>Dataset 2.2</i>			
<i>Related project task</i>		Task 2.3	
<i>Data</i>		<ul style="list-style-type: none"> • KPIs of demosites for the baseline scenario 	
<i>Confidentiality</i>		Public	
<i>Type and Format</i>		.xlsx, .docx	
WP3		PILLAR 1: SunHorizon enabling technologies	
<i>Dataset 3.1</i>			
<i>Related project task</i>		Task 3.1	
<i>Data</i>		<ul style="list-style-type: none"> • Thermal compression HP specifications 	
<i>Confidentiality</i>		Confidential	
<i>Type and Format</i>		.docx	
<i>Dataset 3.2</i>			

<i>Related project task</i>	Task 3.2
<i>Data</i>	<ul style="list-style-type: none"> • Adsorption HP specifications
<i>Confidentiality</i>	Confidential
<i>Type and Format</i>	..docx
Dataset 3.3	
<i>Related project task</i>	Task 3.3
<i>Data</i>	<ul style="list-style-type: none"> • Hybrid HP specifications
<i>Confidentiality</i>	Confidential
<i>Type and Format</i>	..docx
Dataset 3.4	
<i>Related project task</i>	Task 3.4
<i>Data</i>	<ul style="list-style-type: none"> • Hybrid PVT specifications
<i>Confidentiality</i>	Confidential
<i>Type and Format</i>	..docx
Dataset 3.5	
<i>Related project task</i>	Task 3.5
<i>Data</i>	<ul style="list-style-type: none"> • High vacuum thermal panels specifications
<i>Confidentiality</i>	Confidential
<i>Type and Format</i>	..docx
Dataset 3.6	
<i>Related project task</i>	Task 3.6
<i>Data</i>	<ul style="list-style-type: none"> • Stratified thermal storage specifications
<i>Confidentiality</i>	Confidential
<i>Type and Format</i>	..docx
Dataset 3.7	
<i>Related project task</i>	Task 3.7
<i>Data</i>	<ul style="list-style-type: none"> • Technical datasheet of SunHorizon Technologies packages
<i>Confidentiality</i>	Public
<i>Type and Format</i>	..docx
WP4	PILLAR 2: Functional Monitoring Platform and Optimization Tool
Dataset 4.1	
<i>Related project task</i>	Task 4.4
<i>Data</i>	<ul style="list-style-type: none"> • Simulation data from demosites

<i>Confidentiality</i>	Confidential
<i>Type and Format</i>	..docx
WP5	PILLAR 3: Thermal Comfort and Monitoring Data Driven Control System
<i>Dataset 5.1</i>	
<i>Related project task</i>	Task 5.2
<i>Data</i>	<ul style="list-style-type: none"> • Thermal comfort data from building demsites
<i>Confidentiality</i>	Public
<i>Type and Format</i>	.xlsx, .docx
WP6	Demonstration at TRL 7
<i>Dataset 6.1</i>	
<i>Related project task</i>	Task 6.1
<i>Data</i>	<ul style="list-style-type: none"> • Information coming from each demsites • Boundary conditions for the applicability of SunHorizon solutions • Monitoring data of H&C before the installation
<i>Confidentiality</i>	Public
<i>Type and Format</i>	.xlsx, .docx, .pptx
<i>Dataset 6.2</i>	
<i>Related project task</i>	Task 6.2
<i>Data</i>	<ul style="list-style-type: none"> • Environmental analysis of SunHorizon emissions impact
<i>Confidentiality</i>	Confidential
<i>Type and Format</i>	.xlsx, .docx
<i>Dataset 6.3</i>	
<i>Related project task</i>	Task 6.3
<i>Data</i>	<ul style="list-style-type: none"> • Data related to set up contract negotiation and signature, design, permitting, procurement and phases assessment
<i>Confidentiality</i>	Confidential
<i>Type and Format</i>	.xlsx, .docx
<i>Dataset 6.4</i>	
<i>Related project task</i>	Task 6.4
<i>Data</i>	<ul style="list-style-type: none"> • Monitoring data after 6 months the SunHorizon solution implementations
<i>Confidentiality</i>	Public
<i>Type and Format</i>	.xlsx, .docx
<i>Dataset 6.5</i>	
<i>Related project task</i>	Task 6.4
<i>Data</i>	<ul style="list-style-type: none"> • Monitoring data after 12 months the SunHorizon solution implementations

<i>Confidentiality</i>	Public
<i>Type and Format</i>	.xlsx, .docx
<i>Dataset 6.6</i>	
<i>Related project task</i>	Task 6.4
<i>Data</i>	<ul style="list-style-type: none"> Monitoring data after 18 months the SunHorizon solution implementations
<i>Confidentiality</i>	Public
<i>Type and Format</i>	.xlsx, .docx
WP7	SunHorizon Replication and Exploitation
<i>Dataset 7.1</i>	
<i>Related project task</i>	Task 7.1
<i>Data</i>	<ul style="list-style-type: none"> Information on new barriers to SunHorizon investor
<i>Confidentiality</i>	Public
<i>Type and Format</i>	.xlsx, .docx
<i>Dataset 7.2</i>	
<i>Related project task</i>	Task 7.3
<i>Data</i>	<ul style="list-style-type: none"> Feasibility studies on virtual demosites
<i>Confidentiality</i>	Public
<i>Type and Format</i>	.xlsx, .docx
WP7	SunHorizon Replication and Exploitation
<i>Dataset 8.1</i>	
<i>Related project task</i>	Task 8.1
<i>Data</i>	<ul style="list-style-type: none"> Project identity toolkit (Public reports and presentations of the Project)
<i>Confidentiality</i>	Public
<i>Type and Format</i>	.xlsx, .docx, .pptx
<i>Dataset 8.2</i>	
<i>Related project task</i>	Task 8.2
<i>Data</i>	<ul style="list-style-type: none"> Data related to the two stakeholder workshops with the 2 Stakeholders Groups
<i>Confidentiality</i>	Public
<i>Type and Format</i>	.xlsx, .docx, .pptx

6 Potential exceptions to Open Access

Within SunHorizon project, five different technologies packages will be properly studied and validated via specific simulation models and considering the integration of the different technologies (heat pump, solar panel and thermal storage) together with the control platform. These prototypes will be kept confidential until the final release is ready (according to what is reported in the DoA).

As already reported above, the level of confidentiality of data will be verified with the data owners in order to disclose only the information for which the consortium has received a written permission to publish from the data owners themselves. It is foreseen that some data may be kept confidential and/or subject to restriction in the diffusion.

One potential exception to open access could be represented by the individual specifications of the different technologies that will be implemented during SunHorizon project duration and related to the exploitation strategies that have already been described as Background and Foreground of project partners in the consortium agreement. Some of the partners have already indeed asked to keep these data as confidential. Therefore, data could be only partially available.

Additional data could be represented by energy consumption and production data available at demosite level which could be owned by local building owners. These data will be used for validating the different SunHorizon technologies packages at level of the validation site. It is reasonable to assume that part of such data will be kept confidential.

Moreover, in order to define models for evaluating heating and cooling consumption, responsible demosite will use the results of energy audits carried out in different building typologies. Specific data used for elaborating the energy audits will be kept confidential since they are of property of the citizen itself while the models elaborated for evaluating the energy consumption will be publicly available.

Data subject to confidentiality restrictions would be provided by the participants themselves, industries, local DSOs or heating providers, cities, etc..., and they will be stored and protected with state-of-the-art security measures on the private project cloud platform managed by RINA-C as project coordinator, accessed only by selected and restricted personnel of partners, and will be used to validate the performances of the SunHorizon innovations. This list of potential exceptions to open access must be considered provisional. As reported above the data management plant will be updated at each reporting period in order to update it based on the project's evolution.

Furthermore, data collection will be performed fully in compliance with European Standard and Regulations about Protection of Personal Data, as already outlined in D1.7 "Ethics Assessment" in order to avoid incidental findings during the analysis of the eight demosite data that could be redirect to personal habits, preferences, heating and cooling consumption etc.

7 ETHICAL ASPECTS

In the framework of SunHorizon project, a list of ethic requirements that the project must comply with has been established as reported in specific deliverable on WP1 and WP9 (D1.7 and D9.1 respectively).

Engagement with end-users will be one of the key components of the project. Hence, a complete ethics self-assessment has been carried out in order to ensure that the proposal is compliant with applicable international, European and national law. Two areas of concern for ethical issues have been identified: “Humans” and “Personal data”. Starting from these considerations, a set of procedures will be adopted to protect the privacy of the involved human end-users

In particular, activities will be carried out in compliance with the highest ethical principles and fundamental rights dictated in:

1. the Universal Declaration of Human Rights (UDHR, 1948);
2. the EU Charter on Fundamental Rights (CFREU, 2010);
3. the European Convention for the Protection of Human Rights and Fundamental Freedoms (ECHR, 1950);
4. the Helsinki Declaration in its latest version (2013);
5. the UNESCO Universal Declaration on Bioethics and Human Rights (2005);
6. the European Code of Conduct for Research Integrity (ECCRI, 2011).

With regard to the rights to privacy and to the protection of personal data, SunHorizon will adhere to:

1. the International Covenant on Civil and Political Rights (ICCPR, 1966);
2. the EU Charter on Fundamental Rights (art. 7 and 8);
3. the European Convention for the Protection of Human Rights and Fundamental Freedoms (art. 8);
4. the CoE Convention No. 108 for the Protection of Individuals with regard to Automatic Processing of Personal Data (1981);
5. the Data Protection Directive (1995/46/EC) and the Directive on Privacy and Electronic Communications (2002/58/EC);
6. the General Data Protection Regulation (GDPR) approved by the EU Parliament on 14 April 2016. Enforcement date: 25 May 2018.

In the framework of SunHorizon two different deliverables have been foreseen connected to ethics requirements:

- *D9.1 POPD – Requirement No.1:* 1. The host institution must confirm that it has appointed a Data Protection Officer (DPO) and the contact details of the DPO are made available to all data subjects involved in the research. For host institutions not required to appoint a DPO under the GDPR a detailed data protection policy for the project must be submitted as a deliverable. 2. Detailed information on the informed consent procedures in regard to data processing must be submitted as a deliverable 3. Templates of the informed consent forms and information sheets (in language and terms intelligible to the participants) must be kept on file 4. In case of further processing of previously collected personal data, an explicit confirmation that the beneficiary has lawful basis for the data processing and that the appropriate technical and organisational measures are in place to safeguard the rights of the data subjects must be submitted as a deliverable
- *D1.7 Ethics Assessment:* Self-Assessment Report describing how data will be managed in the project in order to avoid any incidental personal data findings and how to integrate in the project extra-EU partners

Ethical policy

Preliminary to any data collection activity all the end users, being strictly volunteers, shall be informed and given the opportunity to provide their consent to monitoring and data acquisition processes.

Moreover, detailed oral and written information about the activities in which they will be involved shall be given to them.

Therefore, participant will be provided with the following material, written in their own languages:

- A document including a commonly understandable description of the project and its goals, together with the planned activities (*Information sheet*)
- A written advice on unrestricted disclaimer rights on their agreement (*Informed Consent*).

The templates prepared for the above mentioned documents will be enclosed in the Deliverable 9.1 at M18.

8 Conclusions

The present document, deliverable D1.2 Data Management Plan, has the aim to describe the data management life cycle for the data to be collected, processed and created in the framework of SunHorizon project. All the data produced during the project will be as open as possible, focusing on sound data management for the sake of best research practice, and in order to create added-value usable from other EU initiatives, and foster knowledge and innovation solutions.

In SunHorizon, eight different demosite will be carried out to demonstrate the project objectives. So during the project span, Data will be collected. Most of the data are related •General information to characterize the building, Information to define the building plants features and uses of occupants, General information to map the occupants' behavior towards energy consumption.

Hence, the present document has intended to outline a preliminary strategy for the management of data generated throughout SunHorizon project. Considering that this deliverable is due at month six, few dataset has 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.

In particular, this document specifies how SunHorizon research data will be handled in the framework of the project as well as after its completion.

More in detail, the report indicated:

- what data will be collected, processed and/or created and from whom
- which data will be shared and which one will be maintained confidential
- how and where the data will be stored during the project
- which backup strategy will be applied for safely maintaining the data
- how the data will be preserved after the end of the project

The present Data Management Plan has to be considered as a living document and it will be updated over the project development according to any significant changes arising during the project implementation. The updates of the data management plan will be reported in the different periodic reports at the end of each reporting period.