Data Management Plan v3

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Data Management Plan v3

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2.4	Nikos Katsaros, CERTH	June 30, 2025	Updated version based on peer review comments
3.0	Dimosthenis Ioannidis, CERTH	July 02, 2025	Available for submission to the EC

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Executive Summary

The current document is deliverable D8.9 associated with the third version of the project's data management plan (DMP). The updated datasets are shown throughout the document along with the following details:

- Procedures for managing research data both during and after project completion;
- Type and short description of the datasets to be produced, collected and processed;
- Standards and formats concerning the metadata; and
- Data exchange, exploitation, and preservation knowledge.

For the preparation of the deliverable, an appropriate dataset template was created and sent to partners who are responsible for specific components and their corresponding produced datasets.

In the Data Management Plan, it is also included the procedures that all consortium members followed according to the ethics standards presented in this plan.

During SmartLivingEPC project data from different pilot sites in Greece, Cyprus, Spain, and Estonia gathered and analysed to determine how effective the proposed solution is. It is emphasized that ethical questions about the privacy and confidentiality of data collecting and processing may come up throughout the execution of the project operations. These potentially serious difficulties are seen to be quite prevalent in the circumstances of ICT and IoT projects and activities. The SmartLivingEPC consortium has given these issues its full attention and has designed a pilot ethical methodology and an ethical management plan for this purpose in accordance with both national and European Union (EU) laws. This strategy also makes it possible for the project participants to communicate data in a secure manner.

Compared with the previous version of the same deliverable the datasets modified or expanded as the associated tasks and pilot activities proceed, and the information on the templates updated.

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List of Acronyms and Abbreviations

Term	Description
DMP	**Data Management Plan**
DPO	**Data Protection Officers**
EAB	**Ethics advisory Board**
EC	**European Commission**
EPC	**Energy Performance Certificate**
EU	**European Union**
IPR	**Intellectual Property Rights**
NDA	**Non-Disclosure Agreement**
OA	**Open access**

1 Introduction

1.1 Scope and objectives of the deliverable

This deliverable presents the final version of the Data Management Plan (DMP) for the SmartLivingEPC project, incorporating all developments and enhancements made throughout the project's lifetime. The DMP outlines the comprehensive procedures for the collection, organization, storage, and sharing of the project's diverse datasets, ensuring adherence to the principles and standards established in this document.

As the project has evolved, the scope of the DMP has also expanded to further integrate and emphasize the ethical dimensions of our data-related activities. This final version reflects the commitment to ethical management, based on the frameworks and policies that guide the responsible handling of data within the project as were outlined in the previous versions of the DMP.

The datasets in SmartLivingEPC have been categorized into two primary groups: data derived from the pilot sites and data generated from the platform's calculation modules. These datasets, following a thorough review and necessary post-processing (e.g., anonymization), can be made available for third-party research, promoting transparency and further scientific exploration.

The concept of "Open Access" remains a cornerstone of our data management strategy, ensuring that the project's outputs are accessible and beneficial to the broader research community.
While the primary focus of this update is on the datasets, the document also reaffirms our commitment to ethical data management. The established legal and regulatory frameworks guiding our practices remain in place, and SmartLivingEPC's ethical management policy ensures that all data-related activities complied with relevant ethical standards.

The document adopts the following structure:

- **Chapter 2** reviews the fundamental topics for the Data Management Plan, in terms of Open Access and FAIR compliance.
- **Chapter 3** elaborates on the SmartLivingEPC Data Management Framework's information, covering the aspects of collection, handling, storage, protection, retention, and destruction. Moreover, this section provides the finalized group of datasets, anticipated in the project.
- **Chapter 4** broadens the above-mentioned datasets according to the documentation template. In this version of the DMP the information of these templates is completed for all the datasets.
- **Chapter 5** is related to the legal aspects on European and National levels, which affect the Data and Ethics Management activities
- **Chapter 6** presents the SmartLivingEPC Ethics Management Design, including a high-level view of the adopted policy, a synoptic view of the Ethics Advisory Board, and detailed documentation of the Ethical Risks.
- **Chapter 7** focuses on the SmartLivingEPC demonstrators, introducing specific requirements, processes, and guidelines for maintaining the Research Ethics over the three years of the project's duration.
- **Chapter 8** summarises the key findings and conclusions of this deliverable.

1.2 Relation to Other Tasks and Deliverables

Task/ WP/Deliverable	Relation
T8.4	D8.9 is the final result of Task 8.4 Ethics and Data Management. The outcome of this deliverable has assisted the relevant tasks regarding the exploitation activities in the project as well as the core development work packages. Multiple exploitable data are presented by the templates.
WP2, WP3, WP4, WP5 and WP6	The dataset type, format, standards, and data models, are used as input for the development activities under WP2, WP3, WP4, WP5, and WP6.
WP1 and WP6	D8.9 has guided the ethical aspects of the stakeholder's participation in these WPs.

2 General Principles for Data Management

2.1 Participation in the Pilot on Open Research Data

SmartLivingEPC participated in the Pilot on Open Research Data Pilot launched by the European Commission along with the Horizon2020 program. Participants in the SmartLivingEPC consortium embraced the concepts and tenets of open science and recognised the advantages of reusing and evaluating previously produced data for promoting and supporting research and innovation projects at the European level. Selected information recorded during project activities was given access for further analysis and exploitation via open access. To ensure the proper use of data, all relevant data handling principles were described. Likewise, the perspective of the SmartLivingEPC partners was fully compliant with European and national data protection regulations (more details in Section 5, EC legislation).

2.1.1 Data Availability and Handling

The term open access (OA) concerns the free, online provision of re-useable scientific information to other users. The scope of publicly funded research and innovation projects and incentives is to contribute to the improvement of different sectors within society serving environmental, economic, and social needs and objectives. The benefits of open access to scientific outcomes are outlined in the "Guidelines on Open Access to Scientific Publications and Research Data in Horizon 2020"[1] and are outlined below

Open access (OA) refers to the free online distribution of reusable scientific data to other account holders. Publicly funded research and innovation projects and incentives are intended to contribute to the improvement of various sectors of society that serve environmental, economic, and social needs and goals. In the "Guidelines on Open Access to Scientific Publications and Research Data in Horizon 2020," the benefits of open access to scientific the following results are outlined:

- Accessible scientific publications and results form the basis for effective peer-to-peer knowledge exchange and enhancement of research quality, thereby reducing effort and eliminating duplicated results;
- Correlation between market and innovation processes speeds up and becomes seamless thanks to information flow.
- Transparency during research is ensured and at the same time the progress and dissemination of ideas is being enhanced.

The processes for the identification and management of the exploitable results concerning IPR and patent issues and the individual exploitation plans of each partner have been presented and analysed in the first version of the deliverables "IPR Protection Plan v1 and v2 " in M24 and M36, respectively.

The availability of data can be divided into the following three categories:

- **Open Data**: Data that are made available to the public for reuse and exploitation
- **Consortium:** Confidential data accessible only to members of the SmartLivingEPC consortium and EU Commission services and subject to the project Non-Disclosure Agreement (NDA)
- **Private:** Information retained by individual partners for their own processes and evaluations

Within the SmartLivingEPC project, datasets are subdivided as follows:

- Pilot sites generated datasets shared between the Consortium partners (Consortium)
- Pilot sites generated datasets that are used for individual partner purposes (Private)
- Pilot sites generated datasets shared to the public (Open Data)
- Research findings and outcomes that should be publicly disseminated (Open Data)

[1] https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-pilot-guide_en.pdf

In order to achieve the project's objectives, consortium members were permitted to share datasets. Moreover, open access to a fully anonymized dataset were granted to the public under conditions specified by consortium members.

SmartLivingEPC introduces two primary responsibilities in relation to data management: data controllers and data processors. The data controllers impose the purposes and rules of data processing, whereas the data processors process personal data for the benefit of the data controller. In SmartLivingEPC, the data controllers are the Pilot Responsible and the Data Protection Officers (DPOs), while the data processors are all technical partners involved in the tasks that involve data analysis.

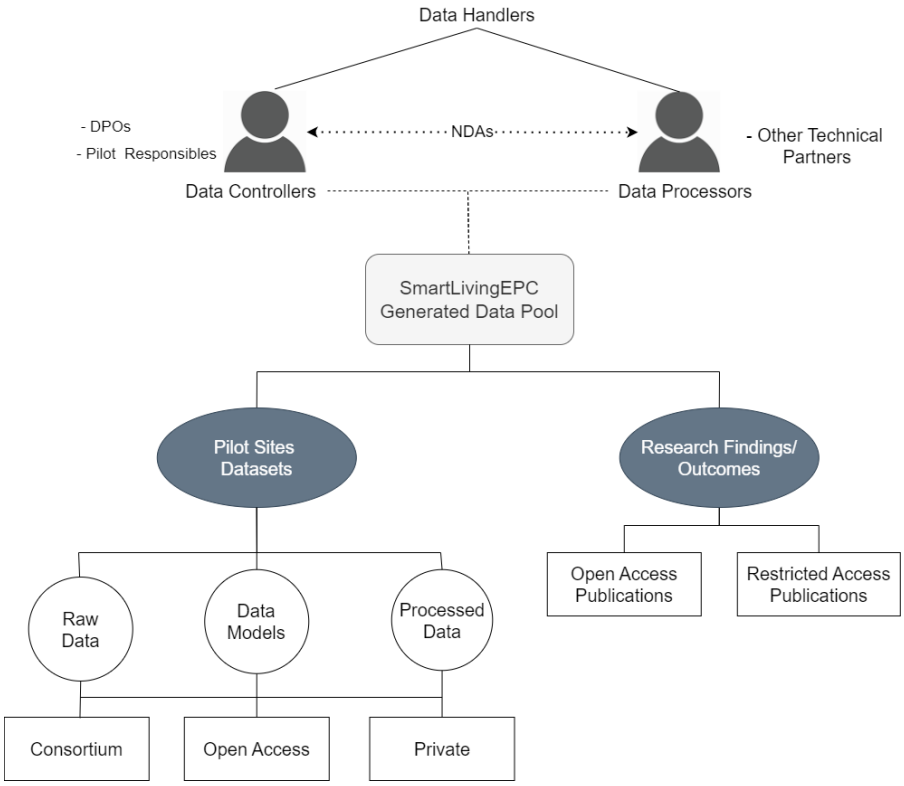

Figure 1: SmartLivingEPC Data Handling

2.1.2 Open Access to Scientific Publications

Open access is defined to ensure free online access from each beneficiary to all peer-reviewed scientific publications related to the results extracted from this project.

Partners may define the background needed in any manner and may exclude specific background (not necessarily prior to the signature of the EC grant agreement). It is possible to grant exclusive licenses to background and foreground if the other partners waive their access rights and depending on previous agreements. The EC may object to exclusive licenses being granted to third parties established in non-associated third countries for ethical, competitiveness, or security reasons (where appropriate, a requirement to notify the EC applied). Partners may agree to additional or more favourable access rights than those provided for in the consortium agreement. At a preliminary stage, partners agreed on open-access publishing.

SmartLivingEPC is committed to maximizing the accessibility of its outcomes within the bounds of permissibility, by making them available on an open web repository. Selected scientific publications and public deliverables are accessible through the project's webpage. Additionally, several research findings as well as datasets have been upload to Zenodo web repository.

2.1.3 Open Access to Research Data

Four primary aspects of open data are summarised by the acronym FAIR[2]:

- **Findable:** The data has a unique, persistent identifier (ID), resides in a searchable resource, and is accompanied by descriptive metadata.
- **Accessible:** The data are readily and freely retrievable using common methods and protocols. Furthermore, the metadata are accessible even in the case that the main data are not available.
- **Interoperable:** The representation of the utilized data is conducted in broadly recognized standard formats, vocabularies, and languages.
- **Re-useable:** The data licenses are clear and accurate meaningful metadata conform to relevant community standards, identifying their content and provenance.

Since the project's pilots also involve residential buildings, the datasets from users have been reviewed to determine if they require aggregation or anonymization for security or commercial purposes before their release (details are provided in Section 3).

2.1.4 IPR Management and Security

In addition to the integrated platform, several software and hardware technological components have been extracted after the completion of SmartLivingEPC.. The Consortium Agreement (CA), which is signed by the partners, specifies the handling of project knowledge and IPRs. In some instances, its content reflects the terms and conditions defined in the Commission Contractual Rules. Specifically, the CA addresses such topics as Individual and Joint Ownership of the Knowledge, Knowledge Protection, Publication of Results, Use and Dissemination of Knowledge Derived from the Project, Access Rights, Open Source and Standards, etc.

The SmartLivingEPC, being an innovation action project, addresses mid to high TRL technologies targeting to provide market-oriented solutions by the end of the project's duration. The SmartLivingEPC consortium includes various partners from the academic and research domains (CERTH, FRC, AIIR, UDEUSTO, TeleTech), non-profit organisations (REHVA, ASI, ANEC), as well as private SMEs (IsZEB, IESRD, DEMO, R2M, QUE, GOI, EUNICE). These partners obviously claimed Intellectual Property Rights on their technologies and data. Therefore, the SmartLivingEPC consortium should crosscheck with the concerned partners before every publication of data. D7.5 and D7.9 disclosed further information on the field of IPR management.

SmartLivingEPC has implemented a comprehensive security strategy to ensure the confidentiality, integrity, and availability of information. The proposed method includes both a methodical evaluation of security risks and an assessment of their impact. This evaluation has been conducted on the personal information and data handled by the proposed solution, including the various processing steps and risks identified in relation to their handling.

The pilot site's demonstration applies monitored and controlled procedures related to the data collection, integrity, and protection procedures. Personal information security (data protection and privacy) involved protective measures against intrusion in addition to physical protection of core system components and access control measures. Security measures included secure protocols (HTTPS and SSL), login procedures, as well as protection against bots and other malicious attack. Sections 6 and 7 of this report analyse in detail the terms of data protection, ethics, and security.

[2] https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-data-mgt_en.pdf

3 Data Management Framework

3.1 Format of Datasets

Throughout the project's efforts, the following characteristics for each dataset have been specified:

Table 1: Dataset Identification Template

<DS-XX-Title>	
Data Identification	
Dataset Reference/ name	<Short name/outline of the dataset>
Dataset description	<Explain why and how data are collected and describe the content. Also, mention the related datasets (used as input), if any and if they contain future sub-datasets.> Related datasets:
Source of the data (e.g., device, evaluation surveys)	<From which device and how the dataset is collected. Mention also the position of installation >
Related SmartLivingEPC architectural component(s)	<Mention the name of the architectural component which is linked with the metering device >
Related SmartLivingEPC objectives	<Mention the related SmartLivingEPC objectives>
Partners services and responsibilities	
Partner(s) responsible for the data collection	<Partner short name>
Partner(s) responsible for the data storage	<Partner short name>
Partner(s) responsible for the data analysis (partners with access to the databases)	<Partner short name>
WPs and tasks	<The data is collected within activities of WPX and TX e.g., WP3, T3.4>
Metadata, Pre-processing, Sharing and Expected Size	
Metadata info (Production and storage dates, places) and documentation	<Provide information about the discoverability of the dataset and if a documentation is available>
External data used	<Mention the external data/database sources in case the dataset includes data from sources outside of SmartLivingEPC project>
Data pre-processing steps	<Mention any pre-processing done to the dataset: E.g., anonymization, data interpolation, outlier cleaning etc.>
Sharing	<Consortium / Private / Open >
Licence type (e.g., Public Domain, Attribution, Non-commercial, No Derivatives, or other)	<Mention the type of licence>
Expected volume of data	<Mention the expected size of data: e.g., 200 MB or 1GB, etc.>

Format of data	<Mention the format of data, e.g., JSON, csv etc.>
Storage location (URI)	<Mention where dataset is stored: e.g., public URL, SVN path>
Exploitation	
Data exploitation (purpose/ use of the data analysis)	<Explain shortly the scope of the data collection/ generation>
Data Storage Duration	< Explain how long the dataset is retained and why. >

3.2 Data Sharing

The SmartLivingEPC partners can use a variety of methods to exploit and disseminate the data including:

- Using them in further research activities (outside the action)
- Developing, creating, or marketing a product or process
- Creating and providing a service
- Making use of them in standardization efforts

Selected data sets that were generated during the pilot activities have been published the Zenodo Online Repository, which was created as part of the OpenAIRE project by researchers to promote Open Science and facilitate universal participation. Specifically, datasets related to building unit use cases and a building complex use case were uploaded[3] to Zenodo. From the single building unit perspective, measurements and operational data, along with the geometry of the building, were uploaded[4] for Demo Site #3 in Tallinn, Estonia. Additionally, measurements and operational data were uploaded for the building complex in Leitza, Spain.

3.3 Data Collection, Archiving and preservation (including storage and backup)

Data storage has been conducted in servers provided by the pilots and/or the technology providers, and agreed upon within the consortium, in a secured form (for example, data encrypted with a strong cryptographic protocol). Such a repository also retains or provides descriptive metadata. Pilot data have also been included in local backups (e.g., using the SharePoint infrastructure, managed by the Microsoft exchange and 365 servers). No data collection or storage of the pilot participants' personal information has been carried out (such as building occupants etc.).

3.4 Data Collection

The following general principles have used to ensure the acquired data's quality:

- Specific technological procedures have been followed for transferring data from field devices to other project repositories for additional processing and analysis.
- In order to facilitate secure meter, sensor, and asset data collection, pilot sites have been outfitted with the appropriate tools and procedures. All data circulated within the SmartLivingEPC framework have been anonymized.

[3] https://zenodo.org/records/15781077

[4] https://zenodo.org/records/15782433

- Using HTTPS (Hypertext Transfer Protocol Secure), SFTP (Secure File Transfer Protocol) and SCP (Secure Copy Protocol) and other secure transfer protocols and technologies.

3.5 Data Storage

After anonymization and aggregation processes, building data have been transferred and kept in the Common Information Exchange Model (CIEM) Database and in the Web Platform Database.

Following the completion of the project, any data from the pilot use cases that was designated as confidential are scheduled for deletion. Only the public models and associated datasets, which are thoroughly detailed in the Data Management Plan, are kept accessible.

3.6 Data protection

Only authenticated employees (as clearly recognized and agreed upon from the consortium) were permitted access to the data obtained from pilots in order to prevent it from misuse, including unauthorized access to the SmartLivingEPC repository. In order to guarantee information security in terms of confidentiality, integrity, and availability, SmartLivingEPC adhered to a holistic security approach. The suggested strategy called for a methodical review of security concerns as well as an analysis of how they would affect the system. This evaluation has been applied to the personal information and data handled by the proposed solution, along with the various stages and identified processing-related hazards.

The following factors have been taken into account in order to protect the personal data of volunteer participants in the pilot sites:

- All information associated with an identifiable person were kept private.
- Participants' individual information were used under stringent confidentiality restrictions and have only been shared as statistics (anonymously).
- No matter how the data or information was acquired, any information relevant to a participant has been kept private. As a result, any information that may have been gathered accidentally as part of the SmartLivingEPC study has been treated confidentially and has not taken the place of the required process, in which each participant gave their explicit agreement for researchers to collect, retain, and utilize their information.
- During data management procedures, all personally identifiable information on people have been completely anonymized.
- Under no circumstances the collected data were used for commercial gain.

3.7 Measures for preventing malevolent/criminal/terrorist abuse of research findings

Management roles and responsibilities have been assigned for the SmartLivingEPC project's smooth handling and control of research findings and access rights. The partners in charge of data protection for each pilot case directly inform the quality board and the project coordinator. By rigorously adhering to the processes, the Ethical Advisory Board established that the study findings were safeguarded from misuse by malicious, criminal, or terrorist actors.

3.8 Data Retention and Destruction

Data that is deemed to be "Open Data" has be published to the Zenodo open repository, while all other are scheduled to be deleted after the project is finished, in accordance with the Open Access principles outlined in the previous section and in compliance with EU and national laws and regulations. Given that computerized means (hard disk drives) have be used for data storage, existing methods for permanent and irreversible data destruction were used (i.e., whole disk overwriting and re-formatting tools).

In all circumstances, the following rules for data protection and privacy have be followed:

- Penetration protection principles have been adhered to.
- Major system components have been physically protected, and access control techniques were used.
- SmartLivingEPC system(s) logging and appropriate peripheral component audits have taken place.

3.9 Pilot Participant Recruitment Process for the execution of the Pilot Use Cases

Participants in the SmartLivingEPC Demonstration Case Studies included volunteers who wanted to take part in some of the Pilot Use Cases as well as current occupants, employees, and residents of the chosen buildings. People who actively participated in, were involved with, or were connected to the fulfillment of each Pilot Use Case have gone through careful recruitment and informed consent process. The stringent nature of this approach was intended to prevent any sort of enforcement from being used. While a range of roles were specified for the participants, the pilot requirements highlighted the specific criteria based on which the volunteers have been chosen.

Additionally, specific measures were taken to protect the pilot use case participants from privacy and confidentiality breaches, including:

Confidentiality:

Employees who participated in the pilot project remained anonymous and their participation was not shared with other participants. In accordance with what has been stated above, all personal information stored during the pilot execution was totally and permanently anonymized and scheduled to be erased after the SmartLivingEPC Project is finished. The information gathered does not contain any of the following, or codes for any of the following, as a total minimum anonymized procedure:

- Full postcode, name, address, phone number(s), and/or fax number(s).
- Any references to identification, pictures, or information on family.

Right to get more information about the pilots:

The pilot participants were provided full freedom to ask for further information or to voice any concerns at any time during the pilot's execution phase. The SmartLivingEPC consortium member who represents the corresponding pilot was always be available to participants to address any questions, concerns, or interests regarding the demonstration phase. Each participant in the pilot program had the option of withdrawing from the program without having to give any further justification or suffering any consequences as a result.

Informed Consent:

Each pilot site created a thorough informed consent to be communicated with the relevant parties, outlining the goals and limitations of the demonstration as well as outlining the data to be gathered and handled.

3.10 Datasets List

The stated datasets are predicated on specific interactions between the various SmartLivingEPC architectural modules. According to Table 2, the datasets mentioned in this part are grouped more precisely into the following categories:

i. datasets belonging to the architecture components of SmartLivingEPC (DS_01 - DS_14),
ii. raw datasets from the pilot sensors/meters (DS_15 – DS_23),
iii. open data / datasets to be made available for third-party stakeholders (DS_23+).

Table 2: Dataset List

SmartLivingEPC Dataset	Related Task(s)	Task Leader

Architecture Components		
DS_01_SmartLivingEPC_Common_Information_Exchange_Model	WP2, WP3, WP4, WP5, WP6	QUE
DS_03_Asset_Calculation_engine	WP1, WP2, WP4, WP5, WP6	AIIR
DS_04_Operational_Calculation_engine	WP1, WP3, WP4, WP5, WP6	FRC
DS_05_Performance_Benchmarking_Module	T4.1, T4.2, T4.3, T4.4, T5.2	DEMO
DS_06_Building_Dynamic_Behavior_Monitoring_Tool	T4.1, WP5	CERTH
DS_07_Digital _Logbook	WP4, WP5	R2I
DS_08_Anomalies_Detection	WP4 (T4.1), WP5 (T5.1, T5.3, T5.4), WP6 (T6.5)	IESRD
DS_09_Simulation_Evaluation	WP4 (T4.1), WP5 (T5.1, T5.3, T5.4), WP6 (T6.5)	IESRD
DS_10_Comfort_Inference_engine	WP4 (T4.1), WP5 (T5.1, T5.3, T5.4), WP6 (T6.5)	IESRD
DS_11_Disaggregation_engine	WP4 (T4.1), WP5 (T5.1, T5.3, T5.4), WP6 (T6.5)	IESRD
DS_12_Activity_Inference_engine	WP4 (T4.1), WP5 (T5.1, T5.3, T5.4), WP6 (T6.5)	IESRD
DS_14_SmartLivingEPC_Web_Platform	T4.4, WP5, WP6	CERTH
Measurement Datasets		
DS_15_Case_Study_1 _Thessaloniki_Greece	T1.3, T4.1, T4.3, WP5	CERTH
DS_16_Case_Study_2_ Frederick_University_Cyprus	T1.3, T4.1, T4.3, WP5	FRC
DS_17_Case_Study_3_ Parnu_Estonia	T1.3, T4.1, T4.3, WP5	TalTech
DS_18_Case_Study_4_SFH_Leitza_Spain	T1.3, T4.1, T4.3, WP5	GOI
DS_19_Case_Study_5_ PF_Leitza_Spain	T1.3, T4.1, T4.3, WP5	GOI
DS_20_Case_Study_6_MUB_Leitza_Spain	T1.3, T4.1, T4.3, WP5	GOI
DS_21_Case_Study_7_TH_Leitza_Spain	T1.3, T4.1, T4.3, WP5	GOI
DS_22_Case_Study_8_SBF_Leitza_Spain	T1.3, T4.1, T4.3, WP5	GOI
DS_23_Case_Study_8_SC_Leitza_Spain	T1.3, T4.1, T4.3, WP5	GOI
DS_24_Building_Complex_Leitza_Spain	T1.3, T4.1, T4.3, WP5	GOI

4 Description of Datasets

This Section presents the final details on the information on the project's datasets that were initially documented in the previous versions of the DMP. With the completion of the project, all the information that was gathered and elaborated on the SmartLivingEPC datasets is presented in this section.

4.1 Architecture Components

The following sub-sections provide updates on most of the SmartLivingEPC datasets that belong to the architecture components of SmartLivingEPC.

4.1.1 SmartLivingEPC Common Information Exchange Model

DS_01_SmartLivingEPC_Common_Information_Exchange_Model	
Data Identification	
Dataset Reference/ name	DS_01_SmartLivingEPC_Common_Information_Exchange_Model
Dataset description	Geometric Model of the building that includes descriptive attributes and design parameters along with their geometry. Operational data of the building related with its function and performance.
Source of the data (e.g., device, evaluation surveys)	IoT platforms (IoT data), assessors (BIM files).
Related SmartLivingEPC architectural component(s)	Common Information Exchange Model (CIEM).
Related SmartLivingEPC objectives	Objective 5: The design and development of a certification process based on digital construction practices and Industry 4.0 building services.
Partners services and responsibilities	
Partner(s) responsible for the data collection	QUE
Partner(s) responsible for the data storage	QUE
Partner(s) responsible for the data management	QUE
WPs and tasks	WP4/T4.1
Metadata, Pre-processing, Sharing and Expected Size	
Metadata info (Production and storage dates, places) and documentation	Data exchange are in line with CIEM's Data Model. CIEM's Data Model is based on standard open BIM data models (IFC4) and BIM/IoT-related ontologies.
External data used	N/A
Data pre-processing steps	Checking of the IFC files in terms of IFC4 schema compliance and completeness. In addition, within CIEM data

	management processes (data cleansing, normalization etc) are considered.
Sharing	Only among the involved SmartLivingEPC components, as indicated by the project architecture.
Licence type (e.g. Public Domain, Attribution, Non-commercial, No Derivatives, or other)	CIEM is a closed-source component and as so licensing, is not provided.
Expected volume of data	Largely depends on the IFC files generated as well as the data received from the IoT platforms. IFC files can vary significantly i.e. from 6MB up to 300MB. With respect to the IoT data volume of data, this is expected to be less than 1TB.
Format of data	File formats managed by and stored in the CIEM can be .ifc files and .json files.
Storage location (URI)	N/A
Exploitation	
Data exploitation (purpose/ use of the data analysis)	Data are managed by the CIEM component and shared with the relevant SmartLivingEPC components.
Data Storage Duration	The input data for each case study will be maintained in the aforementioned storage location and will be accessible through the Web Platform interfaces by the members of the consortium or affiliated parties upon prior agreement unless requested to be removed by the pilot responsible partner, up to a maximum duration of 5 years (according to EC).

4.1.2 Asset Calculation Engine

DS_03_Asset_Calculation_Engine	
Data Identification	
Dataset Reference/ name	DS_03_Asset_Calculation_Engine
Dataset description	Data retrieved from IFCs and from energy audit phase, additional user inputs
Source of the data (e.g., device, evaluation surveys)	Files provided by the demo sites responsible partners User inputs SmartLivingEPC Web Platform
Related SmartLivingEPC architectural component(s)	CIEM Performance Benchmarking and evaluation module, Building_Logbook, SmartLivingEPC_Web_Platform
Related SmartLivingEPC objectives	Objective 1, Objective 2, Objective 3, Objective 6, Objective 7
Partners services and responsibilities	

Partner(s) responsible for the data collection	QUE, CERTH
Partner(s) responsible for the data storage	QUE, CERTH
Partner(s) responsible for the data analysis	AIIRFV, UDEUSTO, FRC, REHVA, CERTH
WPs and tasks	WP1, WP2, WP4, WP5, WP6, T2.5, T2.6, T2.7
Metadata, Pre-processing, Sharing and Expected Size	
Metadata info (Production and storage dates, places) and documentation	Timestamps, sensor and device IDs, space ids, and more metadata for properly identifying the origin of the data
External data used	Data from national standards for building categorization, EPD data from external database (ECO-Platform)
Data pre-processing steps	Data validated per the requirements of the calculation modules prior to calculations
Sharing	Consortium
Licence type (e.g. Public Domain, Attribution, Non-commercial, No Derivatives, or other)	-
Expected volume of data	Few GBs
Format of data	BIM files (.ifc), database table entries (available for export to JSON format)
Storage location (URI)	CIEM database, SmartlivingEPC Web Platform database
Exploitation	
Data exploitation (purpose/ use of the data analysis)	To assess the SmartLivingEPC tools, and validate their performance under real-life conditions
Data Storage Duration	The input data for each case study will be maintained in the aforementioned storage locations and will be accessible through the Web Platform interfaces by the members of the consortium or affiliated parties upon prior agreement unless requested to be removed by the pilot responsible partner.

4.1.3 Operational Calculation Engine

DS_04_Operational_Calculation_engine	
Data Identification	
Dataset Reference/ name	DS_04_Operational_Calculation_engine
Dataset description	The information gathered in tasks T3.1, T3.2, T3.3, T3.4, and T3.5 is intended to analyse and identify a set of operational rating indicators for future generations of EPCs. These indicators consider user-driven models such as Indoor Air Quality, energy rating, and Life Cycle Costing. Smart meters and IoT sensors have been installed in SmartLivingEPC's pilot buildings to collect relevant data, which is then transferred to the project's main CIEM platform. Additionally, data concerning the neighbourhood,

	including infrastructure and smart sensors for measuring actual neighbourhood-scale performance, is integrated into the common information model.
Source of the data (e.g., device, evaluation surveys)	CIEM User Inputs SmartLivingEPC Web Platform
Related SmartLivingEPC architectural component(s)	CIEM, Performance Benchmarking and evaluation Module, Building Logbook, SmartLivingEPC_Web_Platform
Related SmartLivingEPC objectives	Objective 1, Objective 3, Objective 6, Objective 7
Partners services and responsibilities	
Partner(s) responsible for the data collection	QUE, CERTH
Partner(s) responsible for the data storage	QUE , CERTH
Partner(s) responsible for the data analysis	FRC, TalTech, DEMO, UDEUSTO, CERTH
WPs and tasks	The data was gathered from activities of WP3, T3.1, T3.2, T3.3, T3.4, T3.5.
Metadata, Pre-processing, Sharing and Expected Size	
Metadata info (Production and storage dates, places) and documentation	Timestamps, sensor/meter IDs, space ids, and more metadata for properly identifying the origin of the data.
External data used	-
Data pre-processing steps	Data validated per the requirements of the calculation modules prior to calculations
Licence type (e.g. Public Domain, Attribution, Non-commercial, No Derivatives, or other)	-
Expected volume of data	Few GBs
Format of data	Database table entries (available for export to JSON format)
Storage location (URI)	CIEM database, SmartlivingEPC Web Platform database
Exploitation	
Data exploitation (purpose/ use of the data analysis)	The data analysis aims to develop operational rating indicators for future generations of EPCs, focusing on improving Indoor Air Quality, energy efficiency, and life cycle costing.
Data Storage Duration	The input data for each case study will be maintained in the aforementioned storage locations and will be accessible through the Web Platform interfaces by the members of the consortium or affiliated parties upon prior agreement unless requested to be removed by the pilot responsible partner.

4.1.4 Performance Benchmarking Module

DS_05_Performance_Benchmarking_Module	
Data Identification	
Dataset Reference/ name	
Dataset description	Synthetic benchmarking dataset for the evaluation and comparison of building performance with similarly classified buildings. Recommendation dataset for rating improvement suggestions. Benchmarking module inputs (calculation engine results) and results
Source of the data (e.g., device, evaluation surveys)	SmartLivingEPC Web Platform (calculation engines), additional user inputs
Related SmartLivingEPC architectural component(s)	Asset calculation engine, Operational calculation engine, Web Platform, DBL
Related SmartLivingEPC objectives	KO#1, KO#8
Partners services and responsibilities	
Partner(s) responsible for the data collection	CERTH
Partner(s) responsible for the data storage	CERTH
Partner(s) responsible for the data analysis	DEMO, CERTH
WPs and tasks	WP5, T5.2, T5.3, T5.4
Metadata, Pre-processing, Sharing and Expected Size	
Metadata info (Production and storage dates, places) and documentation	Building IDs, space IDs, location etc. to provide the benchmarking results
External data used	Recommendation services results
Data pre-processing steps	Synthetic dataset compilation
Sharing	N/A
Licence type (e.g. Public Domain, Attribution, Non-commercial, No Derivatives, or other)	Benchmarking dataset, Proprietary Recommendation dataset, Proprietary
Expected volume of data	Few MBs
Format of data	Relational database and exports
Storage location (URI)	SmartLivingEPC Web Platform
Exploitation	
Data exploitation (purpose/ use of the data analysis)	Required for component functionality and calculation purposes, future research opportunities
Data Storage Duration	Indefinite

4.1.5 Building Dynamic Behavior Monitoring Tool

DS_06_Building _Dynamic_Behavior_Monitoring_Tool	
Data Identification	
Dataset Reference/ name	DS_06_Building _Dynamic_Behavior_Monitoring_Tool
Dataset description	This dataset includes diverse attributes- including temperature, relative humidity, light levels, CO2 consecration etc., in order to estimate the room occupancy and its impact on the building's environment and energy use.
Source of the data (e.g., device, evaluation surveys)	Metering devices on site from the pilot buildings
Related SmartLivingEPC architectural component(s)	Building Dynamic Behaviour Tool, Web Platform
Related SmartLivingEPC objectives	#1, #8
Partners services and responsibilities	
Partner(s) responsible for the data collection	QUE, CERTH
Partner(s) responsible for the data storage	QUE, CERTH
Partner(s) responsible for the data analysis	CERTH
WPs and tasks	WP4, T4.2
Metadata, Pre-processing, Sharing and Expected Size	
Metadata info (Production and storage dates, places) and documentation	Data defining the room occupancy and its impact on the building's environment and energy use are produced and visualized in SmartLivingEPC Web Platform
External data used	-
Data pre-processing steps	Techniques such as data scaling, optimization of data splitting and resolution enhancement via up sampling were thoroughly explored. These processes were crucial for ensuring data quality before undertaking any substantial analysis
Sharing	Confidential/only among project partners
Licence type (e.g. Public Domain, Attribution, Non-commercial, No Derivatives, or other)	-
Expected volume of data	Few MBs, depending on the ML models created for each DS
Format of data	Numerical and binary timeseries
Storage location (URI)	SmartLivingEPC Repository
Exploitation	
Data exploitation (purpose/ use of the data analysis)	To deliver the Building Dynamic Behavior monitoring tool
Data Storage Duration	Indefinite

4.1.6 Digital Logbook

DS_07_Digital_Logbook	
Data Identification	
Dataset Reference/ name	DS_07_Digital_Logbook
Dataset description	Structured records of building states, activities, events, or observations typically used for monitoring and auditing purposes. Each entry includes fields such as date and time, user ID, event type, description, and associated metadata, providing a comprehensive and searchable log of digital interactions.
Source of the data (e.g., device, evaluation surveys)	Files provided by the demo sites responsible partners User inputs SmartLivingEPC Web Platform
Related SmartLivingEPC architectural component(s)	All SmartLivingEPC architectural components
Related SmartLivingEPC objectives	#6
Partners services and responsibilities	
Partner(s) responsible for the data collection	CERTH
Partner(s) responsible for the data storage	CERTH
Partner(s) responsible for the data analysis	CERTH
WPs and tasks	WP4, T4.4
Metadata, Pre-processing, Sharing and Expected Size	
Metadata info (Production and storage dates, places) and documentation	Revision ID, date
External data used	-
Data pre-processing steps	Data from the tool's calculations are properly formatted in order to be presented to the user in an intuitive way
Sharing	Among project partners
Licence type (e.g. Public Domain, Attribution, Non-commercial, No Derivatives, or other)	-
Expected volume of data	Continuously expanding. Normally few MBs but depending on the size of the stored BIM files
Format of data	BIM files, dynamic data rendered in HTML interfaces
Storage location (URI)	SmartLivingEPC Web Platform
Exploitation	
Data exploitation (purpose/ use of the data analysis)	Analyze user interactions and system activities to enhance security, ensure compliance, optimize performance, and support informed decision-making.

Data Storage Duration	The logbook entries for each case study will be maintained in the aforementioned storage locations and will be accessible through the Web Platform interfaces by the members of the consortium or affiliated parties upon prior agreement unless requested to be removed by the pilot responsible partner.

4.1.7 SmartLivingEPC Web Platform

DS_13_SmartLivingEPC_Web_Platform	
Data Identification	
Dataset Reference/ name	DS_13_SmartLivingEPC_Web_Platform
Dataset description	The dataset for the SmartLivingEPC Web Platform includes data derived from sensors, smart meters (operational data), and end-users' input, encompassing energy consumption, environmental conditions, and user behaviour patterns. Additionally, it contains the outcomes of all SmartLivingEPC services, such as energy performance ratings, efficiency assessments, benchmark comparisons, and recommendations for improvements.
Source of the data (e.g., device, evaluation surveys)	Sensors and smart meters installed at the pilot sites and user input
Related SmartLivingEPC architectural component(s)	All SmartLivingEPC architectural components
Related SmartLivingEPC objectives	#1, #5, #6, #8
Partners services and responsibilities	
Partner(s) responsible for the data collection	QUE, CERTH
Partner(s) responsible for the data storage	QUE, CERTH
Partner(s) responsible for the data analysis	QUE, CERTH
WPs and tasks	WP5, T5.3, T5.4
Metadata, Pre-processing, Sharing and Expected Size	
Metadata info (Production and storage dates, places) and documentation	Timestamps, sensor and device IDs, space ids, and more metadata for properly identifying the origin of the data, assessment reports
External data used	-
Data pre-processing steps	Data from the tool's calculations are properly formatted in order to be presented to the user in an intuitive way
Sharing	Among project partners
Licence type (e.g., Public Domain, Attribution, Non-commercial, No Derivatives, or other)	-
Expected volume of data	A few MBs

Format of data	JSON
Storage location (URI)	SmartLivingEPC Web Platform
Exploitation	
Data exploitation (purpose/ use of the data analysis)	The purpose of data exploitation for the SmartLivingEPC Web Platform is to analyze energy consumption, environmental conditions, and user behavior to enhance energy efficiency, provide personalized recommendations, ensure regulatory compliance, optimize system performance, and support informed decision-making for sustainable living.
Data Storage Duration	The results for each case study will be maintained in the aforementioned storage locations and will be accessible through the Web Platform interfaces by the members of the consortium or affiliated parties upon prior agreement unless requested to be removed by the pilot responsible partner.

4.2 Pilot Measurement Datasets

The following datasets concern datasets from the pilot sensors/meters. With the project's advancement since the first version of the DMP more concrete information on these datasets, is provided.

4.2.1 Case Study 1-Thessaloniki Greece

DS_15_Case_Study_1_Thessaloniki_Greece	
Data Identification	
Dataset Reference/ name	DS_15_Case_Study_1_Thessaloniki_Greece
Dataset description	Data retrieved from the CERTH/ITI Smart House Related datasets: DS_01_SmartLivingEPC_Common_Information_Exchange_Model
Source of the data (e.g., device, evaluation surveys)	Metering devices and sensors on site from the pilot buildings
Related SmartLivingEPC architectural component(s)	SmartLivingEPC Common Information Exchange model
Related SmartLivingEPC objectives	All
Partners services and responsibilities	
Partner(s) responsible for the data collection	CERTH, QUE
Partner(s) responsible for the data storage	CERTH, QUE
Partner(s) responsible for the data analysis	CERTH, QUE

WPs and tasks	The data were gathered as part of the activities of WP6 and T6.2. and T6.4.
Metadata, Pre-processing, Sharing and Expected Size	
Metadata info (Production and storage dates, places) and documentation	Timestamps, sensor and device IDs, space ids, and more metadata for properly identifying the origin of the data
External data used	-
Data pre-processing steps	Cleaning of outliers and missing data
Sharing	Consortium
Licence type (e.g., Public Domain, Attribution, Non-commercial, No Derivatives, or other)	CC-BY-NC
Expected volume of data	50-100 MB
Format of data	Database table entries (available for export to JSON and CSV format)
Storage location (URI)	Local server, CIEM database, SmartlivingEPC Web Platform
Exploitation	
Data exploitation (purpose/ use of the data analysis)	To assess the SmartLivingEPC tools, and validate their performance under real-life conditions
Data Storage Duration	Data will be maintained in the SmartlivingEPC Repository and will be accessible by the members of the consortium or other affiliated parties (on agreement) through the Web Platform for future demonstration purposes unless otherwise decided by the pilot site responsible.

4.2.2 Case Study 2 - Limassol Cyprus

DS_16_Case_Study_2_Frederick_University_Cyprus	
Data Identification	
Dataset Reference/ name	DS_16_Case_Study_2_Frederick_University_Cyprus
Dataset description	Data retrieved from the FRC Limassol pilot building Related datasets: -
Source of the data (e.g., device, evaluation surveys)	Metering devices on site from the pilot building (smart meters, IoT sensors)
Related SmartLivingEPC architectural component(s)	SmartLivingEPC Common Information Exchange model
Related SmartLivingEPC objectives	All
Partners services and responsibilities	
Partner(s) responsible for the data collection	FRC, QUE
Partner(s) responsible for the data storage	FRC, QUE
Partner(s) responsible for the data analysis	FRC, QUE

WPs and tasks	The data were gathered as part of the activities of WP6 and T6.2. and T6.4.
Metadata, Pre-processing, Sharing and Expected Size	
Metadata info (Production and storage dates, places) and documentation	Timestamps, sensor and device IDs, space ids, and more metadata for properly identifying the origin of the data
External data used	-
Data pre-processing steps	Sorting by date and summation of smart meter data
Sharing	Consortium
Licence type (e.g., Public Domain, Attribution, Non-commercial, No Derivatives, or other)	-
Expected volume of data	To be determined
Format of data	Database table entries (available for export to JSON and CSV format)
Storage location (URI)	Local server, CIEM database, SmartlivingEPC Web Platform
Exploitation	
Data exploitation (purpose/ use of the data analysis)	The scope of the data collection/ generation is to evaluate the efficacy of the SmartLivingEPC technologies in practical settings and verifying their effectiveness
Data Storage Duration	Data will be maintained in the SmartlivingEPC Repository and will be accessible by the members of the consortium or other affiliated parties (on agreement) through the Web Platform for future demonstration purposes unless otherwise decided by the pilot site responsible.

4.2.3 Case Study 3 - Tallinn Estonia

DS_17_Case_Study_3_Tallinn_Estonia	
Data Identification	
Dataset Reference/ name	DS_17_Case_Study_3_Tallinn_Estonia
Dataset description	IEQ and technical systems data from the Mäepealse 3 Educational facility
Source of the data (e.g., device, evaluation surveys)	Metering data from IAQ sensors and energy meters. Evaluation survey on IEQ
Related SmartLivingEPC architectural component(s)	SmartLivingEPC Common Information Exchange model
Related SmartLivingEPC objectives	All
Partners services and responsibilities	
Partner(s) responsible for the data collection	TalTech, QUE
Partner(s) responsible for the data storage	TalTech, QUE

Partner(s) responsible for the data analysis	TalTech, QUE
WPs and tasks	The data were be gathered as part of the activities of WP6 and T6.2. and T6.4.
Metadata, Pre-processing, Sharing and Expected Size	
Metadata info (Production and storage dates, places) and documentation	The documentation identifying the data is provided together with the data in separated excel sheet.
External data used	-
Data pre-processing steps	Calculating the energy consumption out of cumulative data. Analysing questionnaire answers.
Sharing	Open Access
Licence type (e.g. Public Domain, Attribution, Non-commercial, No Derivatives, or other)	No Derivatives
Expected volume of data	100k historic datapoints per sensor/meter
Format of data	Database table entries (available for export to JSON and CSV format)
Storage location (URI)	Local server, CIEM database, SmartlivingEPC Web Platform
Exploitation	
Data exploitation (purpose/ use of the data analysis)	Monitoring of building performance in actual use conditions, fault detection. Data were be used for piloting developed SmartLivingEPC energy performance and IEQ methodologies.
Data Storage Duration	Data will be maintained in the SmartlivingEPC Repository and will be accessible by the members of the consortium or other affiliated parties (on agreement) through the Web Platform for future demonstration purposes unless otherwise decided by the pilot site responsible.

4.2.4 Case Study 4 - Leitza, Spain

DS_18_Case_Study_4_SFH_Leitza_Spain	
Data Identification	
Dataset Reference/ name	DS_18_Case_Study_4_SFH_Leitza_Spain
Dataset description	Data retrieved from the single-family house from Leitza Related Datasets: - DS_19_Case_Study_5_ PF_Leitza_Spain - DS_20_Case_Study_6_MUB_Leitza_Spain - DS_21_Case_Study_7_TH_Leitza_Spain - DS_22_Case_Study_8_SBF_Leitza_Spain - DS_23_Case_Study_8_SC_Leitza_Spain

Source of the data (e.g., device, evaluation surveys)	- Metering devices and sensors on site from the pilot buildings - smart electricity meter readings - evaluation surveys
Related SmartLivingEPC architectural component(s)	Common Information Exchange Model (CIEM)
Related SmartLivingEPC objectives	All
Partners services and responsibilities	
Partner(s) responsible for the data collection	GoiEner, QUE
Partner(s) responsible for the data storage	GoiEner, QUE
Partner(s) responsible for the data analysis	GoiEner, QUE
WPs and tasks	The data were gathered as part of the activities of WP6 (T6.2 and T6.4) Related task: T1.3; T4.1; T4.3; WP5
Metadata, Pre-processing, Sharing and Expected Size	
Metadata info (Production and storage dates, places) and documentation	Timestamp, device ID
External data used	DATADIS for getting smart electricity meter data of pilot buildings and street lighting
Data pre-processing steps	Cleaning outliers
Sharing	Open Access
Licence type (e.g. Public Domain, Attribution, Non-commercial, No Derivatives, or other)	-
Expected volume of data	100 MB
Format of data	Database table entries (available for export to JSON and CSV format)
Storage location (URI)	Local server, CIEM database, SmartlivingEPC Web Platform
Exploitation	
Data exploitation (purpose/ use of the data analysis)	• To assess the SmartLivingEPC tools, and validate their performance under real-life conditions • To provide building owners advisory services on energy efficiency improvements
Data Storage Duration	Data will be maintained in the SmartlivingEPC Repository and will be accessible by the members of the consortium or other affiliated parties (on agreement) through the Web Platform for future demonstration purposes unless otherwise decided by the pilot site responsible.

4.2.5 Case Study 5 - Leitza, Spain

DS_19_Case_Study_5_PF_Leitza_Spain	
Data Identification	
Dataset Reference/ name	DS_19_Case_Study_5_PF_Leitza_Spain
Dataset description	Data retrieved from the single-family house from Leitza Related Datasets: - DS_18_Case_Study_4_ SFH_Leitza_Spain - DS_20_Case_Study_6_MUB_Leitza_Spain - DS_21_Case_Study_7_TH_Leitza_Spain - DS_22_Case_Study_8_SBF_Leitza_Spain - DS_23_Case_Study_8_SC_Leitza_Spain - DS_24_Building_Complex_Leitza_Spain
Source of the data (e.g., device, evaluation surveys)	- Metering devices and sensors on site from the pilot buildings - smart electricity meter readings - evaluation surveys
Related SmartLivingEPC architectural component(s)	Common Information Exchange Model (CIEM)
Related SmartLivingEPC objectives	All
Partners services and responsibilities	
Partner(s) responsible for the data collection	GoiEner, QUE
Partner(s) responsible for the data storage	GoiEner, QUE
Partner(s) responsible for the data analysis	GoiEner, QUE
WPs and tasks	The data were be gathered as part of the activities of WP6 (T6.2 and T6.4) Related task: T1.3; T4.1; T4.3; WP5
Metadata, Pre-processing, Sharing and Expected Size	
Metadata info (Production and storage dates, places) and documentation	Timestamp, device ID, place
External data used	DATADIS for getting smart electricity meter data of pilot buildings and street lighting
Data pre-processing steps	Cleaning outliers
Sharing	Open Access
Licence type (e.g. Public Domain, Attribution, Non-commercial, No Derivatives, or other)	-
Expected volume of data	100 MB
Format of data	Database table entries (available for export to JSON and CSV format)

Storage location (URI)	Local server, CIEM database, SmartlivingEPC Web Platform
Exploitation	
Data exploitation (purpose/ use of the data analysis)	• To assess the SmartLivingEPC tools, and validate their performance under real-life conditions • To provide building owners advisory services on energy efficiency improvements
Data Storage Duration	Data will be maintained in the SmartlivingEPC Repository and will be accessible by the members of the consortium or other affiliated parties (on agreement) through the Web Platform for future demonstration purposes unless otherwise decided by the pilot site responsible.

4.2.6 Case Study 6 - Leitza, Spain

DS_20_Case_Study_6_MUB_Leitza_Spain	
Data Identification	
Dataset Reference/ name	DS_20_Case_Study_6_MUB_Leitza_Spain
Dataset description	Data retrieved from the single-family house from Leitza Related Datasets: - DS_18_Case_Study_4_ SFH_Leitza_Spain - DS_19_Case_Study_5_ PF_Leitza_Spain - DS_21_Case_Study_7_TH_Leitza_Spain - DS_22_Case_Study_8_SBF_Leitza_Spain - DS_23_Case_Study_8_SC_Leitza_Spain - DS_24_Building_Complex_Leitza_Spain
Source of the data (e.g., device, evaluation surveys)	- Metering devices and sensors on site from the pilot buildings - smart electricity meter readings - evaluation surveys
Related SmartLivingEPC architectural component(s)	Common Information Exchange Model (CIEM)
Related SmartLivingEPC objectives	All
Partners services and responsibilities	
Partner(s) responsible for the data collection	GoiEner, QUE
Partner(s) responsible for the data storage	GoiEner, QUE
Partner(s) responsible for the data analysis	GoiEner, QUE
WPs and tasks	The data was gathered as part of the activities of WP6 (T6.2 and T6.4) Related task: T1.3; T4.1; T4.3; WP5

Metadata, Pre-processing, Sharing and Expected Size	
Metadata info (Production and storage dates, places) and documentation	Timestamp, device ID
External data used	DATADIS for getting smart electricity meter data of pilot buildings and street lighting
Data pre-processing steps	Cleaning outliers
Sharing	Open Access
Licence type (e.g. Public Domain, Attribution, Non-commercial, No Derivatives, or other)	-
Expected volume of data	100 MB
Format of data	Database table entries (available for export to JSON and CSV format)
Storage location (URI)	Local server, CIEM database, SmartlivingEPC Web Platform
Exploitation	
Data exploitation (purpose/ use of the data analysis)	• To assess the SmartLivingEPC tools, and validate their performance under real-life conditions • To provide building owners advisory services on energy efficiency improvements
Data Storage Duration	Data will be maintained in the SmartlivingEPC Repository and will be accessible by the members of the consortium or other affiliated parties (on agreement) through the Web Platform for future demonstration purposes unless otherwise decided by the pilot site responsible.

4.2.7 Case Study 7 - Leitza, Spain

DS_21_Case_Study_7_TH_Leitza_Spain	
Data Identification	
Dataset Reference/ name	DS_21_Case_Study_7_TH_Leitza_Spain
Dataset description	Data retrieved from the single-family house from Leitza Related Datasets: - DS_18_Case_Study_4_ SFH_Leitza_Spain - DS_19_Case_Study_5_ PF_Leitza_Spain - DS_20_Case_Study_6_MUB_Leitza_Spain - DS_22_Case_Study_8_SBF_Leitza_Spain - DS_23_Case_Study_8_SC_Leitza_Spain - DS_24_Building_Complex_Leitza_Spain
Source of the data (e.g., device, evaluation surveys)	- Metering devices and sensors on site from the pilot buildings - smart electricity meter readings

	- evaluation surveys
Related SmartLivingEPC architectural component(s)	Common Information Exchange Model (CIEM)
Related SmartLivingEPC objectives	All
Partners services and responsibilities	
Partner(s) responsible for the data collection	GoiEner, QUE
Partner(s) responsible for the data storage	GoiEner, QUE
Partner(s) responsible for the data analysis	GoiEner, QUE
WPs and tasks	The data were be gathered as part of the activities of WP6 (T6.2 and T6.4) Related task: T1.3; T4.1; T4.3; WP5
Metadata, Pre-processing, Sharing and Expected Size	
Metadata info (Production and storage dates, places) and documentation	Timestamp, device ID
External data used	DATADIS for getting smart electricity meter data of pilot buildings and street lighting
Data pre-processing steps	Cleaning outliers
Sharing	Open Access
Licence type (e.g. Public Domain, Attribution, Non-commercial, No Derivatives, or other)	-
Expected volume of data	100 MB
Format of data	Database table entries (available for export to JSON and CSV format)
Storage location (URI)	Local server, CIEM database, SmartlivingEPC Web Platform
Exploitation	
Data exploitation (purpose/ use of the data analysis)	• To assess the SmartLivingEPC tools, and validate their performance under real-life conditions • To provide building owners advisory services on energy efficiency improvements
Data Storage Duration	Data will be maintained in the SmartlivingEPC Repository and will be accessible by the members of the consortium or other affiliated parties (on agreement) through the Web Platform for future demonstration purposes unless otherwise decided by the pilot site responsible.

4.2.8 Case Study 8 - Leitza, Spain

DS_22_Case_Study_8_SBF_Leitza_Spain
Data Identification

Dataset Reference/ name	DS_22_Case_Study_8_SBF_Leitza_Spain
Dataset description	Data retrieved from the single-family house from Leitza Related Datasets: - DS_18_Case_Study_4_ SFH_Leitza_Spain - DS_19_Case_Study_5_ PF_Leitza_Spain - DS_20_Case_Study_6_MUB_Leitza_Spain - DS_21_Case_Study_7_TH_Leitza_Spain - DS_23_Case_Study_8_SC_Leitza_Spain - DS_24_Building_Complex_Leitza_Spain
Source of the data (e.g., device, evaluation surveys)	- Metering devices and sensors on site from the pilot buildings - smart electricity meter readings - evaluation surveys
Related SmartLivingEPC architectural component(s)	Common Information Exchange Model (CIEM)
Related SmartLivingEPC objectives	All
Partners services and responsibilities	
Partner(s) responsible for the data collection	GoiEner, QUE
Partner(s) responsible for the data storage	GoiEner, QUE
Partner(s) responsible for the data analysis	GoiEner, QUE
WPs and tasks	The data were gathered as part of the activities of WP6 (T6.2 and T6.4) Related task: T1.3; T4.1; T4.3; WP5
Metadata, Pre-processing, Sharing and Expected Size	
Metadata info (Production and storage dates, places) and documentation	Timestamp, device ID
External data used	DATADIS for getting smart electricity meter data of pilot buildings and street lighting
Data pre-processing steps	Open Access
Sharing	-
Licence type (e.g. Public Domain, Attribution, Non-commercial, No Derivatives, or other)	-
Expected volume of data	100 MB
Format of data	Database table entries (available for export to JSON and CSV format)
Storage location (URI)	Local server, CIEM database, SmartlivingEPC Web Platform
Exploitation	
Data exploitation (purpose/ use of the data analysis)	• To assess the SmartLivingEPC tools, and validate their performance under real-life conditions

	• To provide building owners advisory services on energy efficiency improvements
Data Storage Duration	Data will be maintained in the SmartlivingEPC Repository and will be accessible by the members of the consortium or other affiliated parties (on agreement) through the Web Platform for future demonstration purposes unless otherwise decided by the pilot site responsible.

4.2.9 Case Study 9 - Leitza, Spain

DS_23_Case_Study_9_SFH_Leitza_Spain	
Data Identification	
Dataset Reference/ name	DS_23_Case_Study_9_SFH_Leitza_Spain
Dataset description	Data retrieved from the single-family house from Leitza Related Datasets: - DS_18_Case_Study_4_ SFH_Leitza_Spain - DS_19_Case_Study_5_ PF_Leitza_Spain - DS_20_Case_Study_6_MUB_Leitza_Spain - DS_21_Case_Study_7_TH_Leitza_Spain - DS_22_Case_Study_8_SBF_Leitza_Spain - DS_24_Building_Complex_Leitza_Spain
Source of the data (e.g., device, evaluation surveys)	- Metering devices and sensors on site from the pilot buildings - smart electricity meter readings - evaluation surveys
Related SmartLivingEPC architectural component(s)	Common Information Exchange Model (CIEM)
Related SmartLivingEPC objectives	All
Partners services and responsibilities	
Partner(s) responsible for the data collection	GoiEner, QUE
Partner(s) responsible for the data storage	GoiEner, QUE
Partner(s) responsible for the data analysis	GoiEner, QUE
WPs and tasks	The data were gathered as part of the activities of WP6 (T6.2 and T6.4) Related task: T1.3; T4.1; T4.3; WP5
Metadata, Pre-processing, Sharing and Expected Size	
Metadata info (Production and storage dates, places) and documentation	Timestamp, device ID
External data used	DATADIS for getting smart electricity meter data of pilot buildings and street lighting

Data pre-processing steps	Cleaning outliers
Sharing	Open Access
Licence type (e.g. Public Domain, Attribution, Non-commercial, No Derivatives, or other)	-
Expected volume of data	100 MB
Format of data	
Storage location (URI)	Local server, CIEM database, SmartlivingEPC Web Platform
Exploitation	
Data exploitation (purpose/ use of the data analysis)	• To assess the SmartLivingEPC tools, and validate their performance under real-life conditions • To provide building owners advisory services on energy efficiency improvements
Data Storage Duration	Data will be maintained in the SmartlivingEPC Repository and will be accessible by the members of the consortium or other affiliated parties (on agreement) through the Web Platform for future demonstration purposes unless otherwise decided by the pilot site responsible.

4.2.10 Leitza building complex

DS_24_Building_Complex_Leitza_Spain	
Data Identification	
Dataset Reference/ name	DS_24_Building_Complex_Leitza_Spain
Dataset description	Data retrieved from the Leitza building complex
Source of the data (e.g., device, evaluation surveys)	- Metering devices and sensors on site from the public street lighting
Related SmartLivingEPC architectural component(s)	Common Information Exchange Model (CIEM)
Related SmartLivingEPC objectives	All
Partners services and responsibilities	
Partner(s) responsible for the data collection	GoiEner, QUE
Partner(s) responsible for the data storage	GoiEner, QUE
Partner(s) responsible for the data analysis	GoiEner, QUE
WPs and tasks	The data were gathered as part of the activities of WP6 (T6.2 and T6.4) Related task: T1.3; T4.1; T4.3; WP5

Metadata, Pre-processing, Sharing and Expected Size	
Metadata info (Production and storage dates, places) and documentation	Timestamp, device ID
External data used	DATADIS for getting smart electricity meter data of pilot buildings and street lighting
Data pre-processing steps	Cleaning outliers
Sharing	Open Access
Licence type (e.g. Public Domain, Attribution, Non-commercial, No Derivatives, or other)	-
Expected volume of data	100 MB
Format of data	Database table entries (available for export to JSON and CSV format)
Storage location (URI)	Local server, CIEM database, SmartlivingEPC Web Platform
Exploitation	
Data exploitation (purpose/ use of the data analysis)	• To assess the SmartLivingEPC bulding complex performance
Data Storage Duration	Data will be maintained in the SmartlivingEPC Repository and will be accessible by the members of the consortium or other affiliated parties (on agreement) through the Web Platform for future demonstration purposes unless otherwise decided by the pilot site responsible.

5 Legislation

The ethical, social, and data protection issues are important for the SmartLivingEPC consortium and for this reason special attention has been paid to those issues. During the lifetime of the project all the activities and processes complied with the Horizon Europe ethical guidelines and standards as well as those represented in the European Union's Charter of Fundamental Rights. The SmartLivingEPC partners were aware that concerns about privacy and data protection could be present in the tasks that carried out in the framework of the project (in WP1 and WP6). Data collection was a component of the project's pilot trials in order to assess the efficiency of the proposed solution, and some people were anticipated to take part in the pilot execution activities.

Data collection was carried out in complete conformity with any national and European regulations and laws that are applicable in the countries where the data gathering is taking place (Greece, Cyprus, Estonia, Spain).

5.1 EU Legislation

The SmartLivingEPC consortium was fully aware and took into consideration the EU regulations and legislation on data protection. Specifically:

- The Universal Declaration of Human Rights and the Convention 108 for the Protection of Individuals with Regard to Automatic Processing of Personal Data.
- The General Data Protection Regulation[5] (Regulation (EU) 2016/679 of the European Parliament and of the Council, hereinafter: GDPR).
- Core ethical issues and with the European Charter of Fundamental Human Rights, as well as with any relevant EU standard in the fields of privacy and data protection.

The Convention for the Protection of Individuals with Regard to Automatic Processing of Personal Data (European Treaty Series No.108) issued in Strasbourg on 28/1/1981, states in Article 7, that security measures have to be taken to ensure the protection of personal data against accidental destruction or loss, as well as against unauthorized access, alteration, or dissemination.

The General Data Protection Regulation (GDPR), according to the Regulation (EU) 2016/679 of the European Parliament and of the Council, refers to the protection of natural persons with regard to the processing of personal data and on the free movement of such data. The Regulation went into effect on the 25 May 2018, replacing the previous Directive 95/46/EC[6].

The majority of the new legislation is primarily equal to the old Directive, with slightly stricter modifications, especially with the National Data Protection Acts. Improvements were incorporated for better planning, providing informed consent in a clearer more thorough manner and providing some technical solutions. Standard working procedures in EU member states costs around 10% of the GDPR, thus leaving room for individual interpretation. This concerns the supervisory authorities and the guidelines provided to the data protection officers on sensitive personal data such as health, age threshold for children at the working environment. The main sources of authority for creating authorized codes of conduct that serve as compliance tools for data controllers and processors are found in articles 40 and 41 of the GDPR.

The GDPR presents a new combination of regulatory aspects with organizational and technological perspectives, in comparison to the previous EU actions. The regulation addresses individuals, but not anonymized data (data which do not allow the identification of a data subject). According to article 4, par. 1 of GDPR, the personal data are defined as “any information relating to an identified or identifiable natural person (data subject)”.

In respect of the SmartLivingEPC program, the ethics aspects were considered by all partners of the consortium and monitored by the Ethics Advisory Board and the Project Coordinator. The Technical Management Team was

[5] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02016R0679-20160504&qid=1532348683434

[6] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31995L0046

available to be immediately informed of any significant issues or ethical violations. In order to address all aspects of the GDPR, the applied procedures, as well as the information to be gathered as part of the pilot trials are explained below.

First of all, in order to safeguard the fundamental human rights and security needs of individuals participating in pilot trials, the Evaluation Plans included a module of ethical and privacy guidelines that have to be followed. The basic principles to apply are:

- For all data collection, it is mandatory to have the explicit consent of individuals under observation. In particular, all participants know and understand their involvement to the project, and they fully agree to the research being conducted as part of the pilot trials, by giving their explicit consent.
- All collected data are solely used for the SmartLivingEPC project and will not be sold or utilized for any other reason.
- The project adopts a data minimisation policy that each pilot representative is responsible for adhering to. This ensures that data that is not needed for the implementation of the research will not be collected and utilized.
- Any shadow (ancillary) personal data collected during the pilot trials, was destroyed immediately. Efforts were made to keep to a minimum this kind of ancillary information. Full consideration was also given to adhering to the Council of Europe's Recommendation R(87)15 on the processing of personal data for police purposes, Art.2:

  > *The collection of data on individuals solely on the basis that they have a particular racial origin, particular religious convictions, sexual behaviour or political opinions or belong to particular movements or organisations which are not proscribed by law should be prohibited. The collection of data concerning these factors may only be carried out if absolutely necessary for the purposes of a particular inquiry.*

- In the event of compensation, this was expected to be provided as reimbursement for working hours lost due to participation in the research. Avoiding undue inducement will receive special consideration.
- In the case of recruiting employees of partner organizations, special actions were set to be followed in order to protect them from a breach of privacy/confidentiality and any potential discrimination. Specifically, their anonymity was secured, and their participation will not be communicated to their managers.

5.2 National Legislation

SmartLivingEPC core components were demonstrated and deployed in Greece, Cyprus, Estonia and Spain, where each pilot site representative was responsible for the proper implementation of the core components. The legislation for the countries taking part in the demonstration activities is highlighted in the following sections.

5.2.1 Greek Pilot Trials

- The relevant legislation in Greece corresponds to the GDPR as described above.
- The national supervisory data protection authority in Greece is the Hellenic Data Protection Authority (HDPA) (https://www.dpa.gr/).

5.2.2 Cypriot Pilot Trials

- The Commissioner for the Protection of Personal Data is the supervisory authority in Cyprus for GDPR purposes and represents Cyprus on the European Data Protection Board (https://www.dataprotection.gov.cy/).
- The national law providing for the protection of natural persons with regard to the processing of personal data and for the free movement of such data (Law 125(I)/2018), was published in the official gazette of the Cyprus Republic.

5.2.3 Estonian Pilot Trials

- Personal Data Protection Act (*Isikuandmete kaitse seadus*), which elaborates and supplements the provisions contained in the Regulation (EU) 2016/679.

5.2.4 Spanish Pilot Trials

- The General Data Protection Regulation (Regulation (EU) 2016/679).
- Organic Law 3/2018, of 5 December, on the Protection of Personal Data and Guarantee of Digital Rights (LOPD-GDD)

6 Ethical Management

To implement and comply with the EU and national legislation, as outlined in Section 5, SmartLivingEPC partnership incorporated the following objectives:

- To allocate special efforts for ensuring the confidentiality and security of the collected, stored, and transferred data;
- To secure access to personal data, which can be re-identified only by the ethics boards; and
- To provide an information consent form and Non-Disclosure Agreement (NDA) template that was distributed and signed by the pilot trial participants (the former) or between consortium members (the latter).

The next section outlines the specific actions that SmartLivingEPC partners took to fulfil the previous objectives.

6.1 Ethics Advisory Board

The support and security of legal and ethical issues concerning the project's results and technologies was carried out by the Ethics Advisory Board (EAB). The board was established by members of the consortium and its primary goal was to oversee the ethical and legal procedures of all actions within the project. The EAB was also responsible for ensuring that all members of the consortium provide the necessary participation in SmartLivingEPC and its code of conduct towards the participants. Specifically, the Ethics Advisory Board (EAB) addressed privacy issues related to data collection, management, and processing, supporting partners who took part in the design and realisation of the pilot studies, as well as actual end-user participants. The EAB members were the only ones with sole access to re-identify the gathered data, during the pilot trials.

Each pilot site was be supervised by an ethics committee, where one member was nominated responsible for the site. The person in charge made sure that all activities comply with the national and European legislation, taking into account the project's guidelines.

The EAB board consisted of the people in charge of each pilot site as well as the Ethics Manager. The following table 3 lists the members of the EAB, as agreed and delivered in the D8.1 Project Management Plan. The Ethics Manager was responsible for the coordination of the ethics board and the rest of the members were in charge of locating potential ethical issues, implementing the SmartLivingEPC ethical policy, as well as addressing ethical concerns raised during the trials.

The members of the EAB are provided D8.7 Management Plan. The EAB included at least one person per pilot, who was in charge of pointing out potential ethical issues, implementing the SmartLivingEPC ethical policy, as well as resolving ethical concerns raised during the trials, and the Ethics Manager, who acted as the coordinator of the ethics board.

Table 3: SmartLivingEPC Ethics Advisory Board

Partner - Company	Person - Contact	Email
CERTH	Dr. Dimosthenis Ioannidis	djoannid@iti.gr
UDEUSTO	Marta Enciso-Santocildes	marta.enciso@deusto.es
QUE	Samy Iousef	s.iousef@que-tech.com
FRC	Mr. Paris Fokaides	eng.fp@frederick.ac.cy
CERTH	Aggeliki Veliskaki	skoltsios@iti.gr
FRC	Phoebe-Zoe Georgali	res.gp@frederick.ac.cy
GOI	Eider Iribar	eider.iribar@goiener.com
TalTech	Karl-Villem Võsa	karl-villem.vosa@taltech.ee

The EAB had the additional role of giving specific directives, and supporting and educating the consortium members on matters of ethics and privacy. The EAB provided best practices and suggestions for the demonstration sites, where the pilot cases were implemented, taking into account European law and the national laws of the various nations.

6.2 Ethical Policy

SmartLivingEPC concurred with the recommendations of multiple experts (e.g., the European Group on Ethics – EGE), with respect to science and novel technologies to the EC. Additionally, in each country where the research took place, the national legal and ethical requirements, as well as the relevant guidelines were implemented and fulfilled. To promote research excellence and be in line with the principles and guidelines of "Ethics for Researchers" (prepared by the EC Governance and Ethics Unit in 2007), all human-related data were collected under strong confidentiality rules, at all times of the research. This specifically means that:

- All end-users provided their consent after they were fully informed of any monitoring and data acquisition process. It was imperative that all participants are volunteers and they had received detailed oral and if necessary written notice information.
- Centralized storage of personal or sensitive data was not accepted.

In addition, to promote in-depth understanding and communication, the material below was handed in their native language:

- A general description of the project in a simple format, outlining the main activities and objectives
- The time plan of the project, as well as the progress process and testing or evaluation procedures.
- Advice on unrestricted disclaimer rights on their agreement.

The EAB also reviewed extensively all research activities to ensure that there were no unjustified risks for the end users, neither technological nor connected to privacy violations. The Consortium carried out all actions in accordance with the highest standards of ethical and legal requirements and code of practice.

6.3 Ethical Risks

The SmartLivingEPC project did not raise any significant ethical issues or problems; nevertheless, a number of common considerations to ICT applications and real-world pilot demonstrators were taken into account. The consortium of the project possessed the requisite knowledge and skills to effectively manage any problems in relation to ethical risks and address them accordingly.

In D8.1, the "Quality & Risk Assessment Plan," a risk register was created and recorded in accordance with best management practices. Ethics and security concerns were investigated in-depth and in an iterative manner as the project moved forward, simultaneously with other activities and always in a way that enabled risk avoidance and, if necessary, early mitigation.

7 Pilot Ethical Methodology

The pilot demonstration activities of the project were the actions with the highest end-user engagement participation, where ethical requirements mostly applied. A specific methodology was created and provided with the aim of thoroughly outlining the procedures and rules for all activities involved, from data collection through results exploitation. The overall objective was to guarantee that all pilot-related activities adhered to ethical standards for user privacy and data protection.

7.1 Ethical Requirements

SmartLivingEPC consortium identified and outlined the steps to be followed regarding compliance with EU and national legislation, along with the national implementation in EU Member States.

1. Identify and analyse National and EU Regulations
2. Prepare and provide specific guidelines on data collection in accordance with the project's objectives
3. Thoroughly inform end-user participants on data collection, storage, retention times, handling, and elimination. Compliance and alignment with EU and national legislation was secured, while consent forms and detailed procedures was provided.
4. In addition to the Grant Agreement, Non-Disclosure Agreements (NDAs) were signed where necessary, to support proper information exchange within the project's activities.
5. Define precise policy regarding critical findings
6. Preserve records of confirmation from the competent Institutional Data Protection Officer or obtain approval or notice from the National Data Protection Authority (whichever applies according to GDPR and national laws)
7. Ensure proper justification when sensitive personal data is collected and processed.
8. All required NDAs were signed by the involved parties before full implementation, integration, and pilot deployment.
9. Before the start of pilot deployment, the concerned end-users received detailed oral and written notice, through informed consent. After the completion of signage, the consent was gathered from all parties involved.

7.2 Process Approach and Guidelines

The framework of SmartLivingEPC was assessed and validated under realistic conditions in buildings in Greece, Cyprus, Estonia, and Spain with the aim to evaluate the real-life potential of the SmartLivingEPC technologies. The demonstration case studies that were tested are presented below:

- One demonstration building was CERTH/ITI nZEB Smart House at CERTH premises in **Thessaloniki, Greece**, a 316 m^2 rapid prototyping demonstration infrastructure shaped as a real residential household. The house is representative of a single-family, detached residential building and is already equipped with many IoT, smart home solutions that provide a lot of information about its operational characteristics. The existing infrastructure of the building was extended to incorporate the proposed software tools. The intention was the experimentation with the energy assessment and renovation-support tools, to assess their applicability in real-life situations and their usability along with any margins for further developments. It is equipped with a 9.57kWp PV system a 5kWh Li-on battery, and a custom BMS for monitoring and control.
- Demonstration building #2 was Frederick University's main building on Limassol Campus in **Cyprus**. It is a three-story 4021 m2 building, built in 1996. The construction of the building is representative of that era since it follows the average practices of Cypriot buildings. That means it is a structure of reinforced concrete with brick walls and double-glazed windows. The Frederick's Limassol campus building is a mixed-use building, hosting educational, administrative, and other services. The building hosts a total of 10 labs, 4 studios, 12 classrooms, 31 office spaces, and a cafeteria restaurant on its ground floor. The building accounts for approximately 715 users, both academic staff, administrative staff, and students for 2021 and it includes central control of HVAC equipment, but no relative sensors yet

- Ehituse Mäemaja is a flagship reconstruction project of Tallinn University of Technology in **Tallinn, Estonia**, where structural and road engineering, HVAC and building physics laboratories as well as some auditoriums are located. The 3411 m^2 building is equipped with modern HVAC solutions, including mechanical supply and exhaust ventilation with heat recovery, low-temperature heating with water radiators and ceiling panels, and cooling with active chilled beams and ceiling panels. Demand-based control is utilized where possible to match the actual loads and energy needs of the building. Most of the roof area is covered with photovoltaic panels (60 kWp), which are served by two 25 kW inverters. The building has a high number of sensors and meters installed to monitor and control the performance of the building through a dedicated BMS.
- The Demo Site of **Leitza** comprises a pilot building complex (a single-family house, a mixed-use building, a private flat, a school building, a town hall and a sports center). In total, it is a living area of 10,671 m^2 in an urban area of 47,120 m^2. Buildings and neighborhood-scale infrastructures did not intially have IOT equipment, nor equipment for monitoring operating characteristics. All this type of equipment was implemented according to the needs of the project. The scope of the experimentation in these buildings extended further than the buildings themselves, as the aim was to obtain and study performance data on a neighborhood scale. One of the buildings, the CS7_town hall, is connected to a PV system of 4,14kWp in individual self-consumption mode. Another PV installation of 220kWp was installed on the roof of the sports center for self-consumption shared among the members of the energy community.

7.3 Methodology & Guidelines for the delivery of Informed Consent

By carefully defining and managing the Use Cases for each pilot demonstrator, Pilot-Specific Work Packages (WP4, WP5 and WP6) also managed the consent procedures. It was anticipated that various end-users (building owners, tenants, etc.) would freely enroll in the SmartLivingEPC pilot trials by completing the consent form prepared through envisaged actions in these WPs. In order to respect privacy and ethical concerns raised by the data to be collected and analyzed, all of these procedures, starting with the design of the observational study, were planned in close cooperation with the SmartLivingEPC EAB. The consortium took the proper actions under the direction of the Ethics Manager and the EAB for excluding that:.

1. Data were collected on pilot trial participants without their explicit informed consent; no one who was unable to give their informed consent freely and voluntarily due to old age, ongoing medical and/or psychological disorders, or mental incompetence was included in the study;
2. The project's data were sold or utilized for any other reasons not explicitly stated in the project's objectives.
3. Data that is not necessarily required to complete the current study were gathered; Any level of the project followed a data minimization policy, which was overseen by the project's ethical/privacy component;
4. Any ancillary personal information collected during the observation were erased right afterwards. However, it was intended to reduce this type of supplementary data as much as feasible.

Additional focus was placed on complying with the Council of Europe's Recommendation R(87)15 on the processing of personal data for police purposes, Art.2 [7] and this was the focus of a few sessions split between the project's technical and ethical components.

A two-step process was used to obtain end-user enrolment, followed by the consent procedure for the pilot demonstrator implementation at each pilot site:

1. At first each partner who was responsible for the pilot set up an oral presentation for the participants' pilot end-users to carefully outline the degree of privacy invasion involved in the execution of each pilot implementation. If a participant would choose to use their right to secrecy, they were to be removed from the pilot.

[7] https://rm.coe.int/168062dfd4

2. Then, either at the conclusion of the presentation or a few days later, participants were asked to read and sign an informed consent form that summarizes the oral explanation in both simple English and the local language. The experimental protocol included the informed consent forms that were utilized, and upon request, they would be forwarded to the European Commission in both English and the local language.

A template of such a consent form, that was adopted as required per pilot use case, is provided in the Annex B.

8 Conclusions

The third version of the SmartLivingEPC Data Management Plan built upon the foundational work established in the former two deliverables. In this final version, we have refined and updated the datasets for the platform's calculation modules and the pilot projects, ensuring a more comprehensive and accurate representation of the data requirements for the project's operations.

One of the key conclusions remains that each partner was responsible for managing a specific type of dataset. This version has improved the identification and integration of relevant datasets, addressing the challenges faced during the initial phase. The studies and experiments conducted at the pilot sites have been instrumental in this refinement process.

The primary goal of the SmartLivingEPC Data Management Plan adhered to be the provision of the necessary infrastructure for the proper collection, publishing, and storage of metadata. This version details the mechanisms and protocols established to ensure the efficient management of data throughout the project's lifecycle.

Ethical considerations were considered a cornerstone of our data management strategy. This document reiterates the ethical guidelines and safeguards that were put in place to protect sensitive personal data. The SmartLivingEPC Ethics Advisory Board (EAB) played a crucial role in monitoring and supporting all activities related to data collection, storage, and processing, ensuring compliance with all applicable national and EU laws and regulations. The pilot ethical approach ensured that all partners had access to the data required for research while protecting sensitive information from being shared outside the project.

Through the actions outlined in T8.4, SmartLivingEPC addressed any ethical and privacy issues that arised. This final report version provides the most detailed and specific information on the Data Management Plan, reflecting the actual data analysed and the lessons learned throughout the project.

In summary, this third and final iteration of the SmartLivingEPC Data Management Plan provided the comprehensive description on the data management activities of the project, concluding the work under T8.4.

ANNEX A: Non-Disclosure Agreements (NDAs)

Non-Disclosure Agreement

CONFIDENTIAL DISCLOSURE AGREEMENT

THIS AGREEMENT dated DD/MM/YYYY, by and between [Name of the Data Owner] ("Discloser") and [Name of the SmartLivingEPC partner] ("Recipient").

WHEREAS, [Discloser] and [Recipient] anticipate that [Discloser] may disclose or provide to [Recipient] building-related data and information, energy consumption information, building occupancy information, sketches, specifications, and other materials, confidential or proprietary nature, both written and oral, with the intention to create a collaborative partnership as part of the SmartLivingEPC project's research, including, but not limited to, any and all marketing, financial, future projections and research information drafted or submitted by or on [Discloser]'s behalf, in any jurisdiction, as well as any revisions or supplements thereto (collectively, "Proprietary Information"); and

WHEREAS, [Discloser] intends to ensure that any Proprietary Information is kept confidential;

NOW, THEREFORE, [Discloser] and [Recipient] thus agree, in account of the aforementioned premises and the mutual covenants included herein, as follows:

1. Under the terms of this Agreement [Recipient] agrees to: **(i)** keep any Proprietary Information, in any form, disclosed to [Recipient] by [Discloser], in strict confidence and not disclose it to any third party (including a Recipient's Affiliates) or others or use it for [Recipient]'s own benefit or the benefit of third party or others, at any time, without the express prior written approval of [Discloser] and **(ii)** to perform all necessary and proper actions to ensure protection of the Proprietary Information against third-parties or other unauthorized access. [Recipient] shall only provide Proprietary Information obtained under this Agreement to individuals within its organization only if **(i)** it is necessary for them to know and **(ii)** they are committed in writing to maintain the Proprietary Information as confidential under the same terms as this Agreement. This paragraph 1 shall survive and continue to bind the [Recipient] its employees, agents, representatives, successors, heirs and assigns beyond the expiration or termination of this Agreement.

If [Recipient] is obliged to disclose any Proprietary Information by mandatory law or regulation or by order of a court, government department or agency, or recognized stock exchange, the [Recipient] shall promptly notify the [Discloser] of such obligation, to the extent permitted by law or regulation, allowing [Discloser] to pursue a protective order or other proper remedy or waive compliance with this Agreement's requirements.

A [Recipient] shall only disclose that part of the Proprietary Information that is legally mandated to be disclosed, based on [Recipient]'s advice, regardless of whether a protective order or other remedy is issued, or whether the [Discloser] waives compliance with this Agreement's requirements.

2. The Recipient]'s pledges and obligations] under this Agreement shall not be applicable to any Proprietary Information which: **(a)** is disclosed in a publicly available printed publication or is otherwise in accessible in the public domain due to no fault or related activity on the part of [Recipient]; **(b)** is commonly disclosed without restriction to third parties by [Discloser], or is authorized for release by the [Discloser] in writing; or **(c)** is proven to [Discloser] by accompanying documentation to have been known by [Recipient] before receipt from [Discloser] and/or to have been developed by [Recipient] totally independent of any disclosure by [Discloser] within ten (10) days of disclosure.

3. All property provided to [Recipient] from [Discloser], enclosing all Proprietary Information, shall remain the sole property of [Discloser] at all times, and in no way this Agreement shall be interpreted as grant to [Recipient] of any patents, licenses or related rights to such property and Proprietary Information disclosed to [Recipient] hereafter.

4. On [Discloser]'s demand, [Recipient] shall hand back all documents, drawing and other materials, including all Proprietary Information and all manifestation thereof, that have been provided to [Recipient], along with all copies and reproductions thereof. The [Recipient] must destroy all copies of any Proprietary Information unless required otherwise by mandatory law. The [Recipient] shall acknowledge in writing the compliance with the obligations under this paragraph 4.
5. The Proprietary Information is disclosed "as is", without express or implied representation or warranty, concerning its accuracy or completeness. Each Party hereby acknowledges and accepts that the [Recipient] is solely responsible for all conclusions drawn from the Proprietary Information by the [Recipient]. In any manner and on any legal ground, the [Discloser] shall have no liability in regard to the Proprietary Information, inaccuracies therein, or omissions therefrom.
6. The Parties also agree to the terms and conditions listed below:
    a. For any acts or failures to act that result in a violation of this Agreement's terms, the [Recipient] agrees to be completely responsible and liable to the [Discloser]. Any violation by [Recipient] concerning any of [Recipient]'s obligations under this Agreement will entail the irreversible inquiry to [Discloser] for any damages and other legal remedies that will be insufficient. In order to enforce any of these obligations, [Discloser] will be entitled to provisional and permanent injunction or other equitable relief to prevent, cease and/or restrain this Agreement's breach.
    b. If any term of this Agreement is deemed as invalid or ineffective, then such term shall be construed and restricted to the extent necessary, or disjoined if required, to rule out such invalidity or ineffectiveness, without impacting the other Agreement's terms.
    c. In the event of any disagreement over whether information or matter is considered Proprietary Information under this Agreement, [Recipient] shall have the obligation to prove both that the aforementioned information or matter is not Proprietary Information and that it does not comprise a trade secret.
    d. No failure or delay by either party in exercising any rights under this Agreement will be construed as a waiver of that or any other right. A waiver or permission provided by either party on any one occasion is valid for that occasion only and will not be regarded as a bar to or waiver of any right on any other occasion.
    e. The parties hereto, as well as their respective successors and assigns will be bounded by this Agreement which will inure to their benefit.
    f. This Agreement is governed by and will be interpreted in conformity with the laws of {COUNTRY}, and the courts of {TOWN}, {COUNTRY} shall serve as the sole forum. (TOWN and COUNTRY are considered as the town and the country of the Discloser respectively).
    g. This Agreement supersedes any prior written agreement between [Discloser] and [Recipient] concerning the subject matter of this agreement; in the case of any discrepancy or dispute between the terms of such agreements, the terms protecting Proprietary Information to a greater extent shall take precedence.

This Agreement may not be amended, in whole or in part, without a written agreement signed by [Discloser] and [Recipient].

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

[Discloser]	[RECIPIENT]
By: _____	By: _____
Signature	Signature
_____	_____
Printed Name	Printed Name
_____	_____

Title	Title

Annex B: Informed Consent Form Guidelines

Consent Form

Project Purpose

- A commonly comprehensible written description of the project and its aims, also targeted to people who are unfamiliar with the project scope (2-3 paragraphs)

Project Progress Schedule

- The progress plan of the project and the corresponding testing and assessment procedures (1-2 paragraphs)

Disclaimer Rights

- Advice on unfettered disclaimer rights on their agreement.

Voluntary Participation Form

1. General Information
    - Participant basic information
    - ID (reference code) of the participant, which will be used throughout the pilot trial execution)
2. Study Information
    - Details about the pilot Use Case
3. Participant's Questionnaire
    - has been fully informed on the purpose, duration, activities of the study;
    - has been informed on the rights to oppose to participation or to resign from the study and about the corresponding consequences.
    - has been informed on the contact person in case of questions and queries about the study.
    - had adequate time to reach a decision regarding the participation in the study.
    - understands that he/she can resign from the study at any time without having to provide any justification regarding his/her decision.
    - has been warned about potential effects, difficulties and dangers.
    - has been informed about the sensors equipment that will be utilized to collect field-level data.
    - has been informed about the security of the study data and results.
    - has been ensured about the confidentiality of his/her personal information. Publications of the study results do not allow the personal data disclosure, due to the principle of anonymity. Always under the confidentiality principles.
4. Signed Consent to Participate
    - A signed consent of the participant allowing the study responsible to examine and evaluate the data gathered during the study.

Annex C: Informed Consent Form template

This project has received funding from the European Union's Horizon Europe research and innovation programme

Advanced Energy Performance Assessment towards Smart Living in Building and District Level

Grant Agreement No 101069639

Start date	01 July 2022	**Duration in Months**	36
Project Coordinator	Dr. Dimosthenis Ioannidis Center for Research and Technology Hellas (CERTH) (GR)		
Project partners	https://www.smartlivingepc.eu/en/partners		
Project website	https://www.smartlivingepc.eu/		

Purpose of the study

This document was created in the frame of the SmartLivingEPC project (Grant Agreement N°: 101069639), funded by the European Union's Horizon Europe research and innovation programme.

SmartLivingEPC project aims to deliver a certificate which will retrieve the necessary assessment information of buildings energy performance through a set of cutting-edge design and monitoring tools and services.

The new methodologies to be developed, will be based on existing European standards, whereas at the same time, they will trigger the development of new technical standards for smart energy performance certificates. The new certification scheme will also expand its scope, covering aspects related to water consumption, as well as noise pollution and acoustics. SmartLivingEPC certificate will be fully compatible with digital logbooks, as well as with building renovation passports in order to allow the integration of the building energy performance information in digital databases. A special aspect of SmartLivingEPC will be its application in building complexes, with the aim of energy certification at the neighbourhood scale. SmartLivingEPC aspires to develop two parallel schemes, one at the building level (Building EPC) and one at the level of building complex level (Complex EPC), with the ultimate goal in the near future of certification of building complexes, based on the certification of individual units, as well as on additional aspects following an integrated participatory and neighbourhood-based approach. 15 partners and 2 affiliated entities from 12 EU countries, including 2 EU level umbrella organisations based in Brussels will collaborate and provide their expertise and resources within the 36 months of SmartLivingEPC lifetime.

The following page of the document contains the consent form for collecting the above data through measurements and records in your place.

Voluntary Participation Consent Form for the SmartLivingEPC project

1. Volunteer's Information

Full name	
Reference code	

2. Study Elements

Country	
Infrastructure type	
Infrastructure address	
Representative of the pilot	

3. Volunteer Questionnaire

I have read the SmartLivingEPC information sheet, providing more insights about the project (goals, expected duration and procedures of the study).	Yes	No
I was orally informed about the goals, expected duration and procedures of the study by the responsible person.	Yes	No
I was informed of my right to object to participate or to quit the study.	Yes	No
I was informed and I am aware of the contact person, in the case I have questions and queries about the study or about my personal data being gathered.	Yes	No
I was provided with a copy of my filled in consent form.	Yes	No
I was provided enough time to reach a decision regarding my participation in the study.	Yes	No
I comprehend that I can quit the study at any time, without having to provide any justifications and to demand discarding my personal data.	Yes	No
I have been informed of the recording equipment that will be installed in my environment for the purposes of data collection.	Yes	No
I was informed about the storage procedures of the study data.	Yes	No
I was informed about the personal data that will be gathered, the processors and the procedures that will take place, as well as my rights according to the General Data Protection Regulation. Publication of study results does not disclose personal data. Always according to the principles of confidentiality, I approve the utilization of the information by researchers involved in the study and signing respective NDAs, for the purpose of the study and only for this.	Yes	No
I agree to the use of the collected data also after the completion of the SmartLivingEPC project.	Yes	No

I agree to participate in the study	Yes	No

Date: _____ Signature: _____

HE Grant Agreement Number: 101069639
Document ID:
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Advanced Energy Performance Assessment towards Smart Living in Building and District Level

https://www.smartlivingepc.eu/en/

https://www.linkedin.com/company/smartlivingepc/

https://twitter.com/SmartLivingEPC

https://www.youtube.com/channel/UC0SKa-20tiSabuwjtYDqRrQ

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