D2.2
Data Management Plan. Updated version

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Version	2.0		

WHO WE ARE

The ECF consortium consists of ten partners. The project is coordinated by Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas-CIEMAT.

Name	Country	Logo
Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas – **CIEMAT**	ES	
Instituto Superior Técnico. University of Lisbon. **IST**	PT	
Universidad de Sevilla **USE**	ES	
University of Jyväskylä **JYU**	FI	
Universitat Autònoma de Barcelona **UAB**	ES	
Meda Research Ltd **MedaResearch**	RO	
Instituto de Soldadura e Qualidade **ISQ**	PT	
Trebag Szellemi Tulajdon Es Projektmenedzser Korlatolt Felelossegu Tarsasag **TREBAG**	HU	
Smartwatt Energy services SA **Smartwatt**	PT	
Que Technologies Kefalaiouchiki Etaireia **QUE**	GR	
ENLITIA S.A. **ENLITIA**	PT	

ABOUT THE PROJECT

Through a multidisciplinary, transdisciplinary and participatory process, ECF4CLIM develops, tests and validates a European Competence Framework (ECF) for transformational change, which will empower the educational community to take action against climate change and towards sustainable development.

Applying a novel hybrid participatory approach, rooted in participatory action research and citizen science, ECF4CLIM co-designs the ECF in selected schools and universities, by: 1) elaborating an initial ECF, supported by crowdsourcing of ideas and analysis of existing ECFs; 2) establishing the baseline of individual and collective competences, as well as environmental performance indicators; 3) implementing practical, replicable and context adapted technical, behavioural, and organisational interventions that foster the acquisition of competences; 4) evaluating the ability of the interventions to strengthen sustainability competences and environmental performance; and 5) validating the ECF.

The proposed ECF is unique in that it encompasses the interacting STEM (Science, Technology, Engineering, and Mathematics) -related, digital and social competences, and systematically explores individual, organisational and institutional factors that enable or constrain the desired change. The novel hybrid participatory approach provides the broad educational community with: an ECF adaptable to a range of settings; new ways of collaboration between public, private and third-sector bodies; and innovative organisational models of engagement and action for sustainability (Sustainability Competence Teams and Committees).

To encourage learning-by-doing, several novel tools will be co-designed with and made available to citizens, including a digital platform for crowdsourcing, IoT solutions for real-time monitoring of selected parameters, and a digital learning space. Participation of various SMEs in the consortium maximises the broad adoption and applicability of the ECF for the required transformational change towards sustainability.

LEGAL NOTICE

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1 DATA SUMMARY

The purpose of the data collection is to generate suitable empirical evidence for the validation of both the Roadmap and the impact of the interventions, which are two of the main objectives in the project.

Several datasets will be collected and generated along the project. The initial development of the ECF4CLIM competence framework entails a crowdsourcing exercise (workshops and eDelphi exercise) that generates data related to the perceptions and attitudes on factors impeding and facilitating a shift towards a more sustainable school. The assessment of the individual and collective competences as well as the assessment of the environmental performance of the demonstration sites also generates several types of data. The sensors and meters installed in our demonstration sites also generate real time data of some parameters. Finally, the process of designing, implementing and evaluating the interventions will generate data sets describing the interventions proposed and implemented

This document has been produced following the updated version of the "Guidelines on Data Management in Horizon 2020" released by the European Commission Directorate - General for Research & Innovation.

The Data Management Plan covers the complete research data life cycle. It describes the types of research data that has been and will be generated or collected during the project, the standards used, how the research data will be preserved and what parts of the datasets will be shared for verification or reuse (Figure 1).
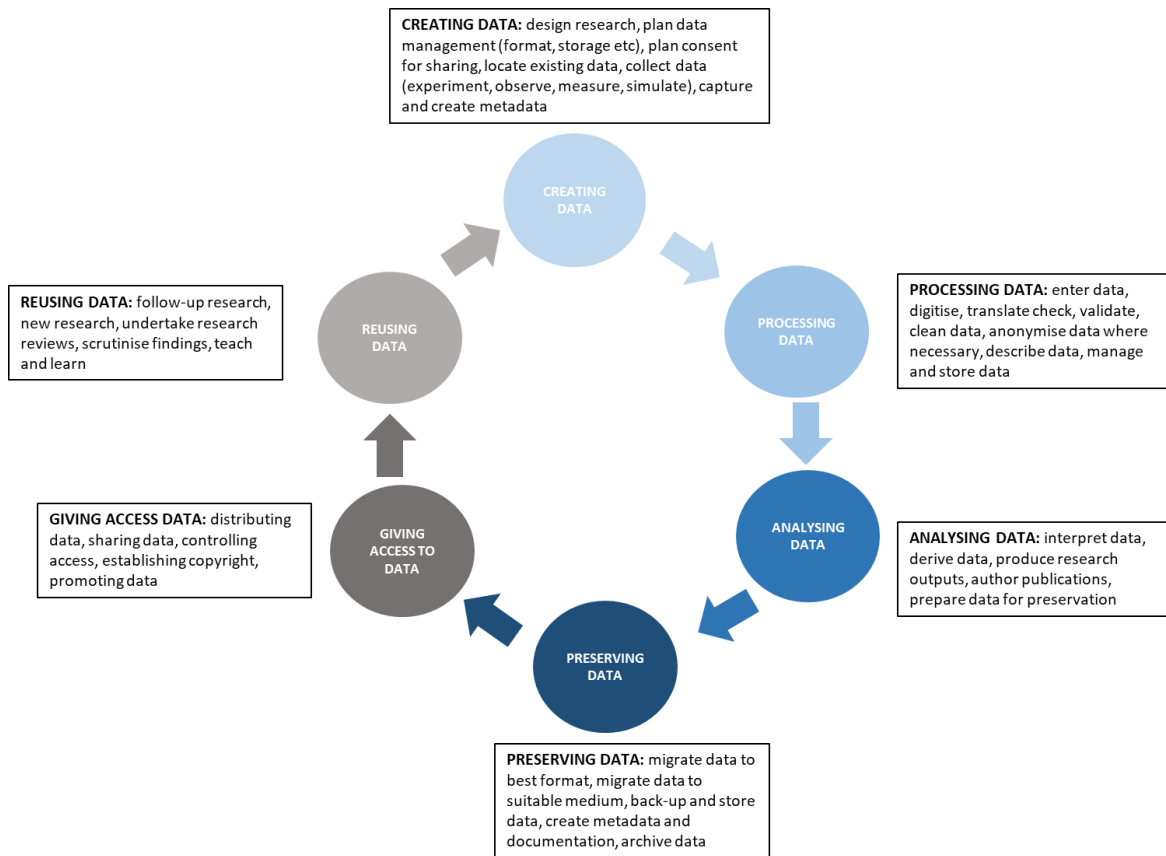
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CREATING DATA: design research, plan data management (format, storage etc), plan consent for sharing, locate existing data, collect data (experiment, observe, measure, simulate), capture and create metadata

REUSING DATA: follow-up research, new research, undertake research reviews, scrutinise findings, teach and learn

PROCESSING DATA: enter data, digitise, translate check, validate, clean data, anonymise data where necessary, describe data, manage and store data

GIVING ACCESS DATA: distributing data, sharing data, controlling access, establishing copyright, promoting data

ANALYSING DATA: interpret data, derive data, produce research outputs, author publications, prepare data for preservation

PRESERVING DATA: migrate data to best format, migrate data to suitable medium, back-up and store data, create metadata and documentation, archive data

Figure 1: Research data life cycle (adapted from UK data archive
https://ukdataservice.ac.uk/learning-hub/research-data-management/)

2 DESCRIPTION OF TYPE OF DATA TO BE GENERATED ALONG THE WPS

The types and formats of the datasets to be generated along the project as well as its origin are described below.

1.   Developing and validating the ECF: (wp3) Lead partner: JYU

→   **Crowdsourcing workshops**
  o   Sociodemographic profiles: country, professional group (policy-makers, civil society, practitioners, teachers, students)
  o   Content: Perceptions and attitudes on factors impeding and facilitating a shift towards a more sustainable school
    • Raw data: recorded discussions and participant notes in Excel/post-it notes
    • Analysable data: summary memos in Word

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- o Individual & collective competences for a low carbon economy and sustainability
- → **eDelphi**
  - o Sociodemographic profiles: (country, organisation, position)
  - o Perceptions concerning how to foster things that enable sustainability in education; how to solve the challenges cause by things that constrain sustainability (adopting sustainable practices) in education.
  - o Perceptions concerning Individual & collective competences for a low carbon economy and sustainability: what they mean in practice and how to foster them

2.   Individual and collective competences: Social sciences methods and techniques (wp4 –wp5-wp6). Lead partners: UAB, CIEMAT, JYU and USE

A variety of **social sciences methods and techniques** will be implemented along the WPs in order to:

- establish the baseline of individual and collective competences,
- implement practical, replicable and context adapted behavioural, and organisational interventions that foster the acquisition of competences; and
- evaluate the ability of the interventions to strengthen sustainability competences

The kind of data that will be generated through the implementation of the different social sciences methods and techniques is described below.

- → **(short) Survey data:** quantitative data bases sets including
  - o Sociodemographic data: country, educational level, gender and age
  - o Perceptions and attitudes towards sustainability and climate change
  - o Individual competences for a low carbon economy and sustainability
- → **Reconvened focus groups data:** audio recordings and (partial) transcripts of the group discussions
  - o Sociodemographic data: country, educational level, gender and age
  - o Perceptions and attitudes towards sustainability and climate change
  - o Behavioural insights: mobility patterns, energy consumption habits, waste generation practices, etc.
  - o Individual & collective competences for a low carbon economy and sustainability
- → **Participant observation data:** observer's notes (field diary)
  - o Perceptions and attitudes towards sustainability and climate change
  - o Behavioural insights: mobility patterns, energy consumption habits, waste generation practices, etc.
  - o Individual & collective competences for a low carbon economy and sustainability

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→ **Secondary sources data:**
  o Collective competences for a low carbon economy and sustainability (legislative frameworks, performance agreements or other governing tools, institutional strategies pertaining to sustainability

→ **Interventions related data**
  o Excel files with the data related to the design, implementation and evaluation of the interventions proposed and implemented in the demonstration sites

3.   Environmental performance: environmental monitoring methods and techniques (wp4 –wp5-wp6). Lead partner: IST

→ **(short) Survey data:** quantitative datasets including
  o Sociodemographic data: country, educational level, gender and age
  o Mobility patterns: Transport modes, number of trips and distances to the school
  o Consumption patterns: Use of second-hand books, repairments
  o Energy efficiency behaviours: use of energy efficiency labelling information, shut down electronic equipment when not used
  o Behavioural data on waste separation at home

→ **Data collected from bills:**
  o Energy consumption (electricity, gas, other fuels…)
  o Water consumption
  o Material consumption (paper, books, pens, ink, computers, cleaning material, chemicals, ….)

4.   IoT ecosystem data: environmental monitoring using IoT: wp7. Lead partner ISQ

→ **Data from observation (sensors and metering equipment installed in school premises):**
  o Temperature, CO_2 and other air quality data
  o Electricity consumption

5.   Visual recording and photographs

→ **Photographs and videos taken in the different activities of the project**
  o Crowdsourcing workshops
  o Sustainability Competence teams' meetings
  o Sustainability Competence committees' meetings
  o Any other project related activity

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Non-digital data collected (surveys in paper, interview notes, etc…) will be converted to a digital format using Microsoft excel, word or power point.

We will not use any existing data in this project.

The data generated during the ECF4CLIM project can be useful to other researchers working in sustainability competence frameworks, sustainable behaviour, educational strategies, environmental performance, individual and collective competences,
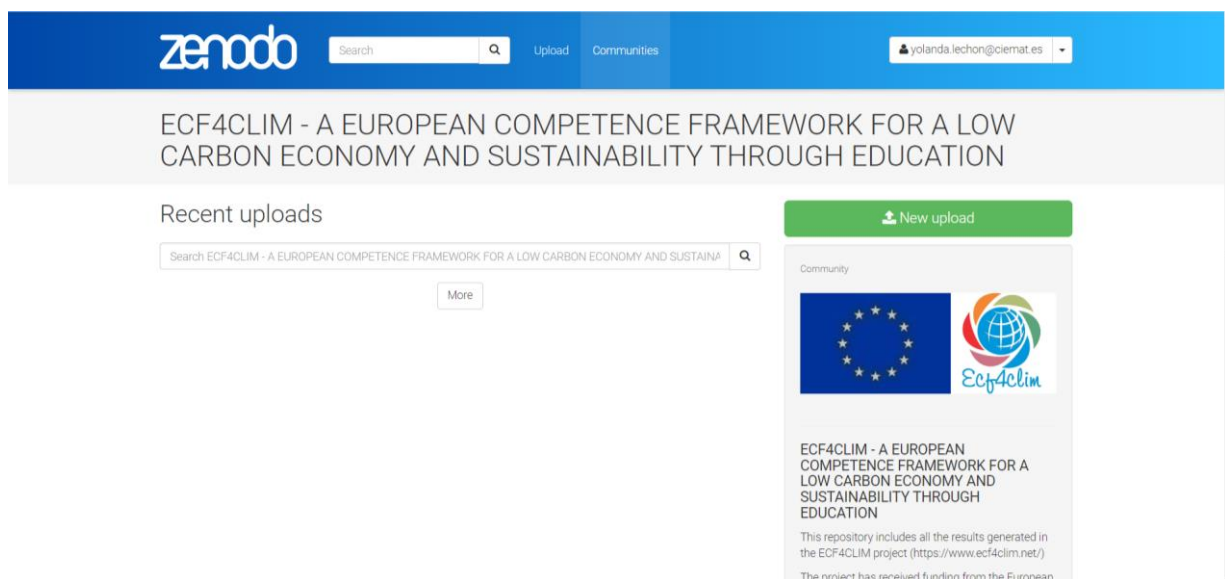
3   THE ECF4CLIM DATA REPOSITORY

3.1 The ECF4CLIM Zenodo community

To make data generated during the ECF4CLIM project publicly available we will use the Zenodo repository. A project page (community) has been setup for easy upload and download of project datasets and publications.

https://zenodo.org/communities/ecf4clim

This repository will include the totality of the project generated data that will be made finally public.

3.2 The ECF4CLIM personal data repository

To share data (that could include personal data) between ECF4CLIM partners a secure data repository will be created and hosted at CIEMAT and will be accessible only to the project partners.

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The security measures that will be implemented to prevent unauthorized access to personal data or the equipment used for processing are detailed in deliverable D1.1. and are summarised below:

- Security policies

CIEMAT's Information Security Policy

- Security regulations

CIEMAT's internal norms for the use of IT resources

- Authorisation process

A formal process will be established for authorisations

  o   Identification

Each user that access the system will have a unique identifier

  o   Access requirements

Information and system resources will be protected with a mechanism that prevents them from being used, except entities that have sufficient access rights.

  o   Access rights management process

The access rights of each user will be restricted, based on the following principles:

a)   Minimum privilege. The privileges of each user will be reduced to the minimum that is strictly necessary for the user to fulfil his/her obligations. In this way any accidental or deliberate damage that could be caused by an entity will be restricted.

b)   Need to know. The privileges will be limited so that users are only allowed to access the information they need to know to comply with their obligations.

c)   Authorisation capability. Only staff who are authorised to do so may know, alter or cancel authorisation to access the resources, in accordance with the criteria set forth by the responsible for those resources.

  o   Authentication mechanism

•   Credentials will be activated once they are under the effective control of the user.

•   The credentials will be under the sole control of the user.

•   The user shall acknowledge that he has received them and that he knows and accepts the obligations involved in their possession, in particular the duty of diligent custody, protection of their confidentiality and immediate information in the event of loss.

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• The credentials will be changed periodically according to the organization's policy, depending on the category of the system being accessed.

• Credentials will be removed and disabled when the entity (person, team or process) they authenticate terminates its relationship with the system

　　o Recording of user activity

The activities of system users will be recorded

- Safe perimeter

A firewall system is installed to separate the internal and external networks. All traffic crosses that firewall which only allow previously authorised flows to cross it.

- Protection of web services and applications

A Web site authentication certificate will be used in accordance with the relevant European standards according with the Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market.

3.3 Working space

The data and results that do not contain any personal data will be stored under the following link:
https://drive.google.com/drive/u/4/folders/1u6jzh3WGF19pt72kP8uDuvEVsePPsn0c

It is only accessible to consortium members.

The archive will serve as central data storage for the consortium members and will facilitate the collaborative work on deliverables.

4 FAIR DATA

4.1 Making data findable, including provisions for metadata

To ensure accessibility beyond the duration of the project, the use of proprietary data formats will be avoided where possible and open licences will be used. The data, metadata and documentation will be deposited in repositories online as well as at CIEMAT repository. As data is multi and interdisciplinary the catch-all repository Zenodo (zenodo.org) will be used. Using Zenodo, our data will be safe and every dataset will be assigned a Digital Object Identifier (DOI), to make them citable and trackable. In Zenodo data are described with rich metadata compliant with DataCite's Metadata Schema minimum and recommended terms.

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As for the version numbers, data set will be easily updateable using the Zenodo versioning feature.

We will follow the next naming convention: WP number and, type of data set (developing and validating the ECF; individual competences; collective competences; environmental performance, IoT ecosystem),   followed by a short description of the specific content (i.e., Wp3_ECF_Fisnish workshop1)

Keywords will be used to optimize the possibilities for re-use. We have identified the following keywords: competence framework, education for sustainability, individual competences, collective competences, environmental performance, sustainable behaviour, participatory research, IoT data, educational community engagement.

4.2 Making data openly accessible

Before making data openly accessible, raw data will be treated. Only anonymized data will be available. Sensitive and personal data will not be made publicly available, according to data protection regulations. These data will be stored by the designated personal data collection responsible person according to the procedure specified in deliverable D1.1.

As mentioned before, the data will be made available using the Zenodo repository. Data in Zenodo is available by downloading the dataset and no specific software is needed. No restriction on use will be imposed. We do not anticipate the need for a data access committee. In principle, there is no need to identify the person to access and to download the data selected.

4.3 Making data interoperable

Research data produced during the project execution will be made accessible to other researchers, institutions, organisations, countries through its uploading in Zenodo.

Data and metadata vocabularies will be the ones used by Zenodo.

We do not foreseen the generation of new ontologies.

4.4 Increase data re-use (through clarifying licences)

No licencing procedures for the research data are foreseen. Research data will be made available once the research papers using these data are published. All the data produced (except non anonymized personal data) will be made available to third parties without restrictions. Research data will enjoy long term preservation as it will be uploaded in Zenodo. Explicit data quality assurance processes have not been defined. Partners involved in the collection and use of these data will provide explicit guidelines (training sessions) on how to collect and treat them.

5 ALLOCATION OF RESOURCES

Storing our datasets in Zenodo is free of charge, so no budget is required. Regarding open access publications, each technical partner has a budget devoted to finance the open access fees for the scientific publications.

Data management responsibilities will be on the partners responsible for collecting and processing the data.

6 DATA SECURITY

Research data uploaded to Zenodo is stored safely for the future in CERN's Data Centre for as long as CERN exists.

Datasets containing personal data are stored in CIEMAT repository following the security measures explained in D1.1.

7 ETHICAL ASPECTS

Ethical aspects have been extensively documented in deliverables D1.1 and D1.2

8 DESCRIPTION OF ECF4CLIM DATASETS

Datasets in the ECF4CLIM repository will be stored according to the activity where they have been generated as described in section 1.1.

6.1. Datasets generated while Developing and validating the ECF: (wp3) Lead partner: JYU

Data set reference and name	WP3 Crowdsourcing workshops
Data set description	Data from workshops: memos of participants, recordings from workshops in Finland, reports from all partners
Standards and metadata	The dataset will be stored in word and excel files, and in atlas.ti-program formats. Metadata will include a short description of the data set and the related keywords.
Open/Raw data	Raw data
Data sharing	No data sharing
Archiving and preservation	The data is preserved on the local protected server of JYU
Estimated size	1747 notes written by participants, reports from 31 workshops, recordings from 16 Finnish workshops
Keywords	dream school, nightmare school, enablers of sustainability, constraints of sustainability

Data set reference and name	WP3 eDelphi
Data set description	Data from on-line discussions
Standards and metadata	The dataset will be stored in excel files, and in atlas.ti-program formats. Metadata will include a short description of the data set and the related keywords.
Open/Raw data	Raw data
Data sharing	No data sharing
Archiving and preservation	The data is preserved on the local protected server of JYU
Estimated size	Answers of 68 participants, including about 13 800 words of discussion
Keywords	enablers of sustainability, constraints of sustainability

6.2. Data sets generated while assessing individual and collective competences: (wp4 –wp5-wp6). Lead partners: UAB, CIEMAT and JYU

Data set reference and name	WP4 Short survey WP4_Individual competences
Data set description	This dataset includes the answers from the short questionnaires designed to analyze the individual competences at the beginning of the project and at the end of the project
Standards and metadata	The dataset will be stored in excel and SPSS (Statistical Package for Social Sciences) formats. Metadata will include a short description of the data set and the related keywords.
Open/Raw data	Raw data
Data sharing	The data will be shared internally with all project partners. Treated data used for publications will be openly shared
Archiving and preservation	The raw data will be stored in the ECF4CLIM personal data repository and the treated data will be stored in Zenodo
Estimated size	Less than 1Mb
Keywords	Individual competences

Data set reference and name	WP4 Reconvened focus groups
Data set description	This dataset contains data from the group exercises conducted in the SCTs and SCCs (reconvened focus groups), as well as summaries of the debates and discussions generated.
Standards and metadata	The dataset is stored in excel and text document format. Metadata will include a short description of the data set and the related keywords.
Open/Raw data	Raw data
Data sharing	The data will be shared internally with all project partners.

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	Treated data used for publications will be openly shared
Archiving and preservation	The raw data will be stored in the ECF4CLIM personal data repository and the treated data will be stored in Zenodo
Estimated size	Less than 1Mb
Keywords	Collective competences, evocation, drivers and barriers

Data set reference and name	WP4 Documents for collective competences analysis
Data set description	This dataset includes the information collected through the analysis of laws, rules, norms, and programs related to sustainability in educational institutions.
Standards and metadata	The dataset is stored in excel and text document format. Metadata will include a short description of the data set and the related keywords.
Open/Raw data	Raw data
Data sharing	The data will be shared internally with all project partners. Treated data used for publications will be openly shared
Archiving and preservation	The raw data will be stored in the ECF4CLIM personal data repository and the treated data will be stored in Zenodo
Estimated size	Less than 1Mb
Keywords	Collective competences, normative competences, regulative competences, cultural-cognitive competences

Data set reference and name	WP5-6 Description and evaluation of Interventions
Data set description	This dataset includes the information collected at the demonstration sites concerning the nature, objectives, timeline, key tasks, and the presumed critical success factors of the planned interventions, as well as their connections with the ECF4CLIM roadmap.
Standards and metadata	The dataset is stored in excel and text document format. Metadata will include a short description of the data set and the related keywords.
Open/Raw data	Raw data
Data sharing	The data will be shared internally with all project partners. Treated data used for publications will be openly shared
Archiving and preservation	The raw data will be stored in the ECF4CLIM personal data repository and the treated data will be stored in Zenodo
Estimated size	Less than 1Mb
Keywords	Interventions, evaluation, expected success factors, ECF4CLIM roadmap

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6.3. Datasets generated in the evaluation of the environmental performance: (wp4 –wp5-wp6). Lead partner: IST

Data set reference and name	WP4 Short survey - mobility patterns
Data set description	This dataset includes the answers from the short questionnaires designed to analyze the mobility patterns at the beginning of the project and at the end of the project
Standards and metadata	The dataset will be stored in excel and SPSS (Statistical Package for Social Sciences) formats. Metadata will include a short description of the data set and the related keywords.
Open/Raw data	Raw data
Data sharing	The data will be shared internally with all project partners. Treated data used for publications will be openly shared
Archiving and preservation	The raw data will be stored in the ECF4CLIM personal data repository and the treated data will be stored in Zenodo
Estimated size	Less than 1Mb
Keywords	Mobility

Data set reference and name	WP4 Bills analysis - Energy and water consumption
Data set description	This dataset includes the information collected from energy and water bills to analyze the school consumptions at the beginning of the project and at the end of the project
Standards and metadata	The dataset will be stored in excel and SPSS (Statistical Package for Social Sciences) formats. Metadata will include a short description of the data set and the related keywords.
Open/Raw data	Raw data
Data sharing	The data will be shared internally with all project partners. Treated data used for publications will be openly shared
Archiving and preservation	The raw data will be stored in the ECF4CLIM personal data repository and the treated data will be stored in Zenodo
Estimated size	Less than 1Mb
Key words	Energy consumption, Water consumption, bills

Data set reference and name	WP4 Interview – Collection of information about green spaces, green procurement, waste management, and transports
Data set description	This dataset includes the information collected about green spaces, green procurement, waste management, and transports at the beginning of the project and at the end of the project
Standards and metadata	The dataset will be stored in excel and SPSS (Statistical Package for Social Sciences) formats. Metadata will include a short description of the data set and the related keywords.

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Open/Raw data	Raw data
Data sharing	The data will be shared internally with all project partners. Treated data used for publications will be openly shared
Archiving and preservation	The raw data will be stored in the ECF4CLIM personal data repository and the treated data will be stored in Zenodo
Estimated size	Less than 1Mb
Key words	Green spaces, green procurement, waste management, transports, environment audit

6.4. Datasets generated by the IoT ecosystem

Data set reference and name	WP7 IoT data
Data set description	Timeseries of energy consumption and indoor air quality data
Standards and metadata	Custom data model
Open/Raw data	The data are normalized and preprocessed. They are not open; they are closed and could be accessed only by authorized project frameworks
Data sharing	Only between Project frameworks: IoT Cloud to Digital Platform, User Interface: Monitoring tool web application, mobile application
Archiving and preservation	The raw data will be stored in the ECF4CLIM personal data repository and the treated data will be stored in Zenodo
Estimated size	Estimated: less than 100 gigabytes
Keywords	Energy consumption, indoor air quality

6.5. Visual recording and photographs

Data set reference and name	Wp3-Wp4-Wp5-Wp6- Wp8
Data set description	Photos and videos of different activities in the project
Standards and metadata	Image and video file types. Metadata will include a short description of the data set and the related keywords.
Open/Raw data	Raw data
Data sharing	The data will be shared internally with all project partners.
Archiving and preservation	The raw data will be stored in the ECF4CLIM personal data repository
Estimated size	1Gb
Keywords	Sustainability competences; interventions, environmental performance, individual competences, collective competences, hybrid participatory approach.

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Data set reference and name	Wp3-Wp4-Wp5-Wp6- Wp8
Data set description	Press releases for dissemination events
Standards and metadata	Informative documents. Metadata will include description of the event, information about participants profile, relevance in local community, etc.
Open/Raw data	Open data
Data sharing	The data will be shared in the official ECF4CLIM webpage, and in project social media.
Archiving and preservation	The raw data will be stored in the ECF4CLIM personal data repository
Estimated size	1 Mb
Keywords	Dissemination, report, Sustainability competences; interventions, environmental performance, individual competences, collective competences.