Sustainable sorption heat pumps for residential applications

Research Data Summary

List and describe all datasets or research materials that you plan to generate/collect or reuse during your research project. For each dataset or data type (observational, experimental etc.), provide a short name & description (sufficient for yourself to know what data it is about), indicate whether the data are newly generated/collected or reused, digital or physical, also indicate the type of the data (the kind of content), its technical format (file extension), and an estimate of the upper limit of the volume of the data.

Dataset name / ID	Description	New or reuse	Digital or Physical data	Data Type	File format	Data volume	Physical volume
		Indicate: ***N****(ew data) or* ***E****(xisting data)*	Indicate: **D**(igital) or **P**(hysical)	Indicate: **A**udiovisual **I**mages **S**ound **N**umerical **T**extual **M**odel **SO**ftware Other (specify)		Indicate: <1GB <100GB <1TB <5TB >5TB NA	
Software codes	Software codes for the models developed during the whole project	N	D	SO	.m .py .ees	<1GB	
Simulation results	Results obtained by running the software	N	D	I, N	.pdf .cvs .svg	<100GB	
experimental setup specifications	Description and design specifications of the experimental setups	E	D	T, I	.pdf .dwg	<1GB	
experimental data	Testing conditions and measured values	E and N	D	T, N	.pdf .cvs	<1GB	
experimental samples	Prototypes used in the experimental test	E and N	P	M	-		<1.00 m^3

If you reuse existing data, please specify the source, preferably by using a persistent identifier (e.g. DOI, Handle, URL etc.) per dataset or data type:

Some of the reused data comes from previous research conducted by scholars at the University of Edinburgh (the partner university), who have worked on related subjects. Their findings are published in the following research papers: https://doi.org/10.1002/ente.202300548.
The remaining portion of reused data was experimentally generated at the University of Edinburgh but has not been published. It is stored in the University of Edinburgh's cloud system, under the supervision of the project lead at UoE (Giulio Santori).

Are there any ethical issues concerning the creation and/or use of the data (e.g. experiments on humans or animals, dual use)? If so, refer to specific datasets or data types when appropriate and provide the relevant ethical approval number.

- No

Will you process personal data? If so, please refer to specific datasets or data types when appropriate and provide the KU Leuven or UZ Leuven privacy register number (G or S number).

- No

Does your work have potential for commercial valorization (e.g. tech transfer, for example spin-offs, commercial exploitation, …)? If so, please comment per dataset or data type where appropriate.

- No

Do existing 3rd party agreements restrict exploitation or dissemination of the data you (re)use (e.g. Material or Data transfer agreements, Research collaboration agreements)? If so, please explain in the comment section to what data they relate and what restrictions are in place.

- No

Are there any other legal issues, such as intellectual property rights and ownership, to be managed related to the data you (re)use? If so, please explain in the comment section to what data they relate and which restrictions will be asserted.

- Yes

According to the Partnership Agreement governing the joint supervision and award of a joint doctoral diploma/degree between KU Leuven and The University of Edinburgh:

Article 17 – Intellectual Property

17.1 For the purposes of this Article 17:

17.1.1"Background Intellectual Property" means all intellectual property, information, data, software, and materials belonging to a party that are provided by that party to the other for use in connection with this agreement (whether before or after the date of this agreement), but not intellectual property in the Foreground Intellectual Property.

17.1.2"Foreground Intellectual Property" means all intellectual property, information, data, software, and materials identified, created, or first reduced to practice or writing in the course of this agreement.

17.1.3*"Intellectual Property" means all patents and other rights in inventions, whether or not those inventions are patented or patentable; rights in confidential know-how; design rights and other rights in designs; copyrights; database rights; registered and unregistered trademarks; and all other intellectual property rights, in each case whether registered or unregistered, including applications for the grant of any such rights and rights of renewal in respect of any such rights; and all other forms of protection having similar or equivalent effect in any part of the world.

17.2 Any Background Intellectual Property shall remain the sole and exclusive property of the party to whom that Background Intellectual Property belonged prior to the commencement of this agreement. Each party grants to the other a non-exclusive, non-transferable license to use that party's Background Intellectual Property to the extent necessary to fulfill the other party's obligations under this agreement.

17.3 Any Foreground Intellectual Property shall be, subject to written agreement to the contrary by the parties, the sole and exclusive property of the party creating or developing it (or whose employee created or developed it). Each of the parties grants to the other party a non-exclusive, non-transferable license to use that party's Foreground Intellectual Property to the extent necessary to fulfill the other party's obligations under this agreement.

Documentation and Metadata

Clearly describe what approach will be followed to capture the accompanying information necessary to keep data understandable and usable, for yourself and others, now and in the future (e.g. in terms of documentation levels and types required, procedures used, Electronic Lab Notebooks, README.txt files, codebook.tsv etc. where this information is recorded).

To ensure that the data remains understandable and usable both now and in the future, a structured approach to data management, documentation, and organization will be implement.

Firstly, consistent naming conventions for files and folders will be adopted to maintain clarity and uniformity. The folder structure will follow a hierarchical system based on work packages or tasks, which will serve as the primary reference for naming folders. File names will include relevant information, such as the file content (e.g., code, simulation, measurement), the date of data

capture, and the reference person responsible for the file's creation.
Additionally, each folder will contain a `README.txt` file that provides a detailed overview of the folder's contents, a description of the data dictionary used, and a list of keywords to facilitate future searches. This file will serve as a comprehensive guide for understanding and navigating the dataset.
All modifications and processing steps applied to the dataset will be meticulously documented. For significant changes, a new version of the dataset will be created, following a hierarchical numbering system (e.g., v1.0, v1.1), to track the dataset's evolution.
To maximize interoperability, the data will conform to standard formats such as `.csv`, `.txt`, `.pdf`, and `.py`. Whenever feasible, open-source software will be used to enhance data accessibility and longevity. This structured approach will ensure that the data is accessible, comprehensible, and usable for both myself and others in the long term.

Will a metadata standard be used to make it easier to find and reuse the data?
If so, please specify which metadata standard will be used.

If not, please specify which metadata will be created to make the data easier to find and reuse.

- Yes

The metadata model (DataCite) of RDR at LU Leuven will be used

Data Storage & Back-up during the Research Project

Where will the data be stored?

- OneDrive (KU Leuven)
- Other (specify below)

OneDrive (The University of Edinburgh)

How will the data be backed up?

- Other (specify below)
- Standard back-up provided by KU Leuven ICTS for my storage solution

- Software codes and code descriptions will be stored in a GitHub repository.
- The physical data/samples will be collected and stored in a dedicated space in the Process Lab at the University of Edinburgh

Is there currently sufficient storage & backup capacity during the project?

If no or insufficient storage or backup capacities are available, explain how this will be taken care of.

- Yes

How will you ensure that the data are securely stored and not accessed or modified by unauthorized persons?

- All the above-mentioned repositories require an authentication to access the data, this allows access only to people participating in the project and authorized by the storage owner.
- The Process Lab at the University of Edinburgh can be accessed only with a badge.

What are the expected costs for data storage and backup during the research project? How will these costs be covered?

No costs are foreseen for the above-mentioned storage systems, at least for the size of the storage expected so far (< 2TB in OneDrive for Business).

Data Preservation after the end of the Research Project

Which data will be retained for 10 years (or longer, in agreement with other retention policies that are applicable) after the end of the project?

In case some data cannot be preserved, clearly state the reasons for this (e.g. legal or contractual restrictions, storage/budget issues, institutional policies...).

- All data will be preserved for 10 years according to KU Leuven RDM policy

Data will be selected and redundant and temporary data generated while running the project will be discarded.

Where will these data be archived (stored and curated for the long-term)?

- KU Leuven RDR
- Other (specify below)

Edinburgh DataShare (a digital repository of research data produced at the University of Edinburgh)

What are the expected costs for data preservation during the expected retention period? How will these costs be covered?

For the expected volume of the archived data, no costs are expected.

Data Sharing and Reuse

Will the data (or part of the data) be made available for reuse after/during the project?
Please explain per dataset or data type which data will be made available.

- Yes, as embargoed data (temporary restriction)

The embargo applies to data used in publications or software codes in the development phase.

If access is restricted, please specify who will be able to access the data and under what conditions.

Members of the research groups at KU Leuven and also the partner university (the University of Edinburgh) will be able to access all the data.

Are there any factors that restrict or prevent the sharing of (some of) the data (e.g. as defined in an agreement with a 3rd party, legal restrictions)?

Please explain per dataset or data type where appropriate.

- No

Where will the data be made available?

If already known, please provide a repository per dataset or data type.

- KU Leuven RDR (Research Data Repository)

Aslo, the University of Edinburgh Data Repository

When will the data be made available?

- Upon publication of research results

Which data usage licenses are you going to provide?

If none, please explain why.

- Other (specify below)
- CC-BY 4.0 (data)
- GNU GPL-3.0 (code)

Do you intend to add a persistent identifier (PID) to your dataset(s), e.g. a DOI or accession number? If already available, please provide it here.

- Yes, a PID will be added upon deposit in a data repository

What are the expected costs for data sharing? How will these costs be covered?

No costs expected

Responsibilities

Who will manage data documentation and metadata during the research project?

The PhD student, creating the data.

Who will manage data storage and backup during the research project?

The PhD student, creating the data.

Who will manage data preservation and sharing?

The PI and co-PI of the project, Alessia Arteconi and Giulio Santori

Who will update and implement this DMP?

PI of the project (Alessia Arteconi)