

FAIRiCUBE

Use Case 4



Spatial and temporal assessment of neighborhood building stock

A FAIRiCUBE use case by NILU

Use Case objective

UC4 addresses the pressing need to evaluate and map the potential for energy retrofitting and circularity in residential buildings to align with the European Union's ambitious climate goals.

Currently, buildings are major contributors to both energy demand and greenhouse gas emissions. More sustainable practices in construction hold promise for reducing environmental impact, enhancing resilience, and averting raw material price hikes.

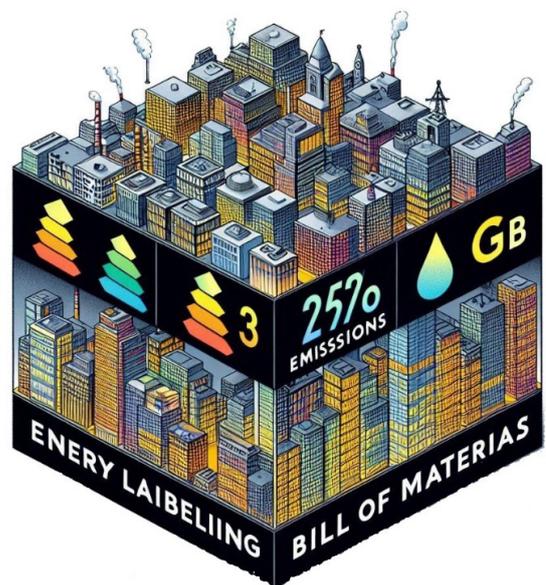
However, a significant challenge lies in the scarcity and fragmentation of data on building materials and properties. This gap impedes informed decision-making on investments and the promotion of circular and local materials.

Possible applications

UC4 aims to bridge this divide by developing an agile model which enables the assessment of in-situ materials, energy performance, and emissions of residential building stocks. The model will allow to estimate optimal renovation rates and evaluate the climate neutrality potentials in four European cities: Barcelona, Luxembourg City, Oslo, and Vienna. These assessments may also be adapted for optimization work, considering local constraints such as fiscal and climate budgets, as well as the decarbonization of energy sources. Researchers, analysts, city planners, and sustainability consultants may find the developed model useful. In addition, the developed model is crucial for the EU Green Deal to achieve energy efficiency, reduce emissions, and promote sustainable construction.

Data used

Diverse data sources will be used, including airborne surveys and ground-based repositories. Tabular data will complement missing information, facilitating comprehensive decision-making regarding energy renovation and circularity initiatives. The use case will visualize its findings using the FAIRiCUBE hub, ensuring accessibility and usability for a wide range of stakeholders.





The five use cases are



Urban adaptation to climate change (urban focus)



Biodiversity and agriculture nexus (regional focus)



Environmental Adaptation Genomics in Drosophila (regional focus)



Spatial and temporal assessment of neighborhood building stock (urban focus)



Validation of Phytosociological Methods (urban/regional focus)

Deliver the power of data cubes and machine learning (ML) to decision/policy makers and data scientists.

Why FAIRiCUBE?

There is an ever-increasing amount of earth observation data available, largely in the form of data cubes. The relevant data formats are quite mature, data is (at least partially) freely available, various data processing libraries as well as visualization and data storage tools have been developed. Additionally, compute platforms can be used, they scale well and are becoming affordable.

Despite these relevant evolvments, non-EO experts who would greatly profit by integrating these resources into their work are still struggling to make full use of the available data as well as relevant analysis and processing tools. Diverse aspects continue to confound potential users, such as:

- How to connect different data sources with storage & compute resources? What if you bring your own data?
- What computational aspects must be considered when dealing with gridded spatiotemporal data?
- How can we share tooling such as (trained) machine learning models?
- How do we visualize and share the results with the relevant stakeholders?
- How can we properly document what processing has been applied to the data? How can we include this essential provenance information?

Our vision

Within FAIRiCUBE, we demonstrate a harmonized data space, the FAIRiCUBE Hub, where we connect all the pieces required for a data science pipeline into a user-friendly framework, where everything is FAIR (Findable, Accessible, Interoperable, Reusable) and TRUSTable (Transparency, Responsibility, User focus, Sustainability, and Technology). In this manner, we illustrate how the Green Deal Data Space (GD DS) could be formed pertaining to gridded data and the analysis thereof.

Objective

The objective of the FAIRiCUBE project is to enable players from beyond classic Earth Observation (EO) domains to provide, access, process, and share gridded data and algorithms in a FAIR and TRUSTable manner.



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Partners: NILU - The climate and environmental research institute (Coordinator), Epsilon Italia, Natural History Museum Vienna, EOX IT Services, Constructor University Bremen, Wageningen University and Research, 4sfera Innova, space4environment.

