

Tackling the energy crisis through data sharing

3 March 2023, 9:00-11:30



This project has received funding from the EU's Horizon 2020 program under grant agreement no 957026.



Andreas Jäger

ICLEI Europe

Sustainable Resources, Climate and Resilience





Agenda

Part 1 – Strategic Panel (70 minutes)

- Panel: Tackling the energy crisis with data and data communities
- Audience questions

5 minute stretching break

Part 2 – Workshop (70 minutes)

- BuiltHub in a Nutshell: What is it, and how does it relate to the energy crisis?
- Introducing the BuiltHub Platform
- Workshop portion: what do *you* think?
- Audience questions

Coffee break to follow

Speakers



Ghazal Etminan

Senior Research Engineer, Austrian Institute of Technology (AIT), Austria

Dr. Hans-Martin Neumann

Urban Development Director (Head of Planning, Technology & Environment), Magistrate of Linz, Austria



Florin Vondung

Senior Researcher, Wuppertal Institute for Climate, Environment and Energy, Germany



5 minute stretching break

Speakers



Iná Maia

PhD Candidate at Energy Economics Group (EEG),
University of Vienna, Austria

Gianluca Grazieschi

Post-Doc Researcher, Institute for Renewable Energy,
EURAC Research



Simon Pezzutto

Team Leader, Institute for Renewable Energy,
EURAC Research

BuiltHub in a Nutshell

H2020 Coordination and Support Action (CSA)
October 2020 - September 2024

Main goals

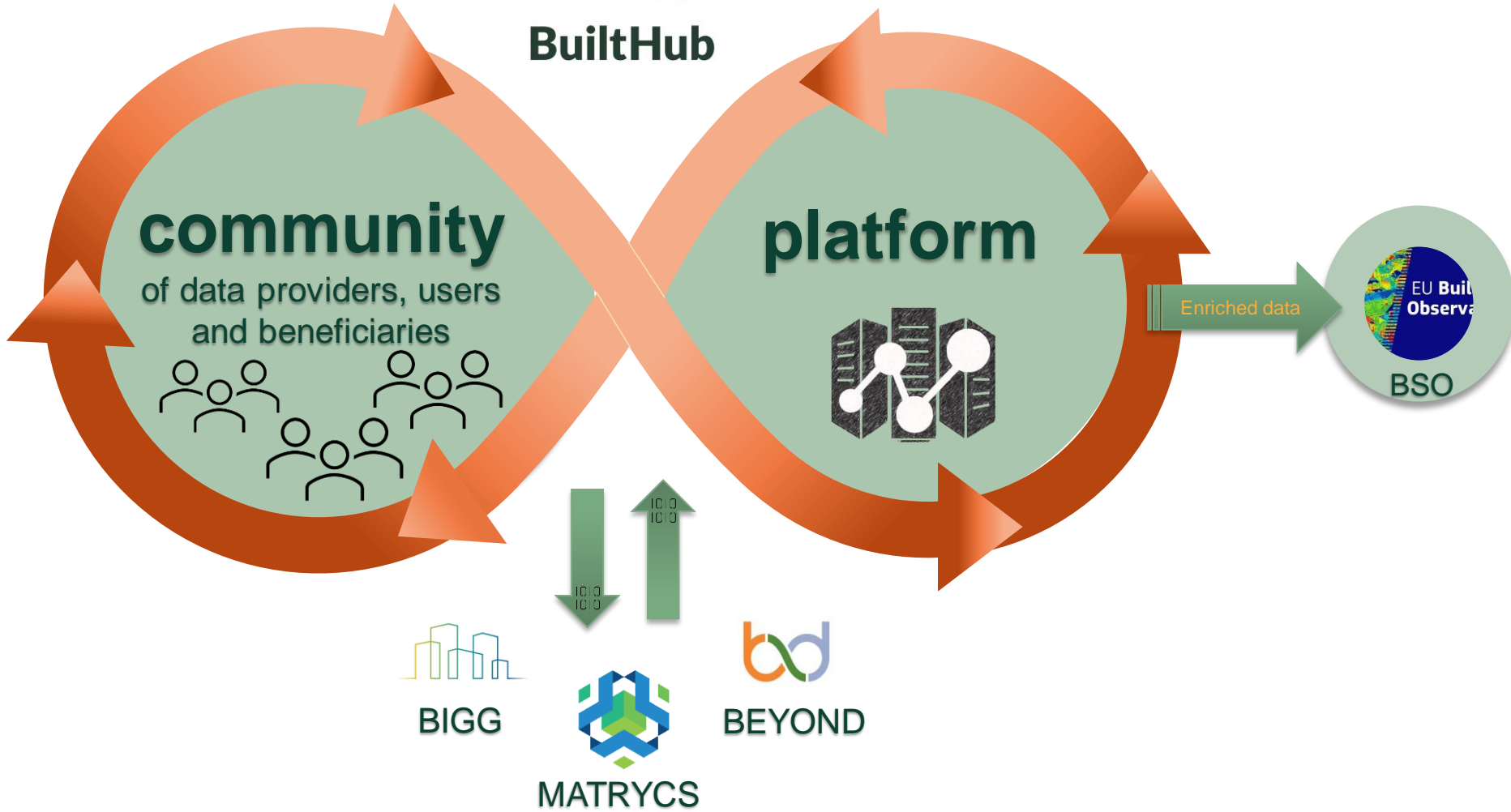
- Develop a **roadmap for sustained dataflow** to the EU Building Stock Observatory (BSO)



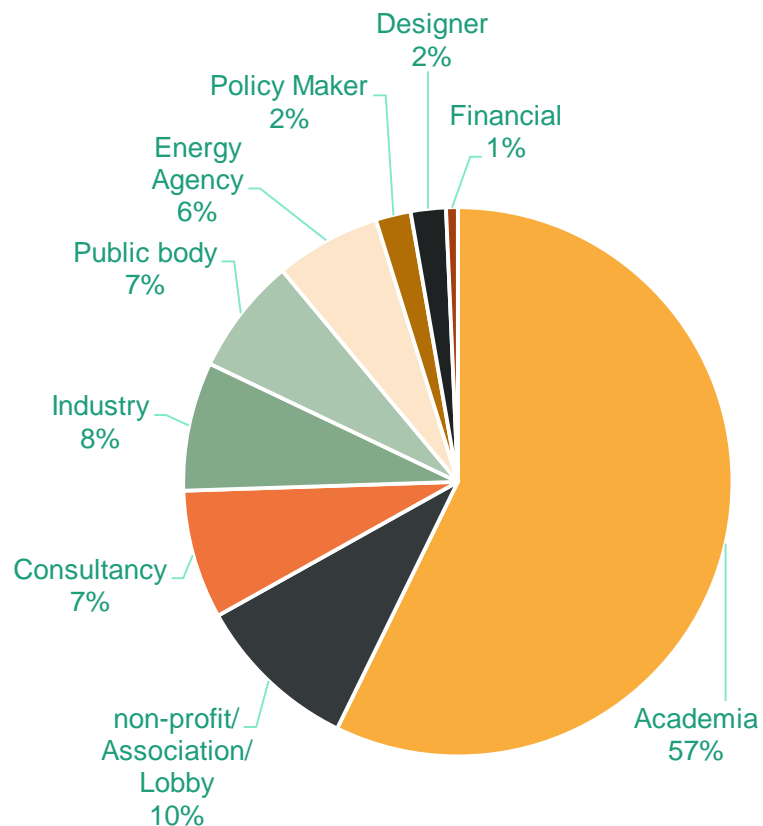
- Build and engage a **community of building data users and contributors** through the BuiltHub Platform

*leads to standardised data governance and services

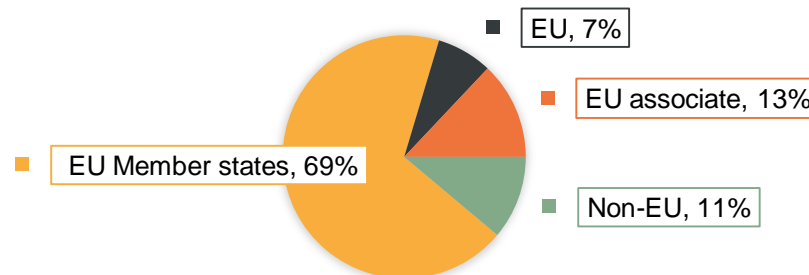




Stakeholder representation



Geographical representation



Collaborators



Supporting policy-making via integrated techno-socio-economic datasets

- **Socio-economic barriers** as a key reason for low building renovation rates (1% annually!)
- **Deep-renovation** is identified as crucial to supporting the EU's natural gas phase-out and fuel independency

→ **Integrated (techno-socio-economic) datasets** are vital for building policy measures aiming circumvent the negative consequences of high gas prices.



BuiltHub encourages the creation of techno-socio-economic datasets, by:

Exploring existing EU-datasets

Assessing how to (automatically) to match them to generate a techno-socio-economic dataset

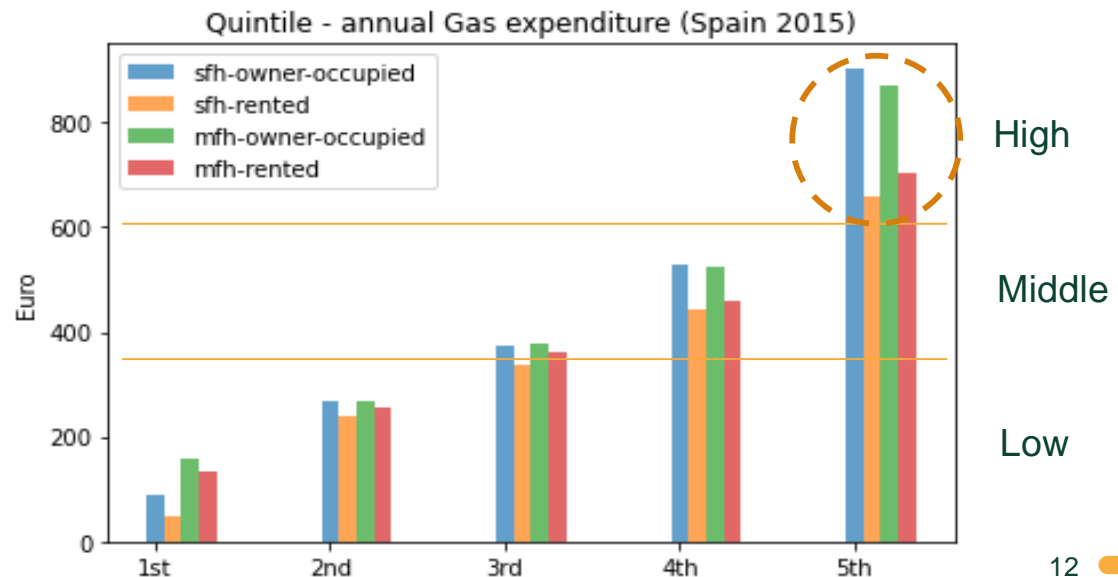
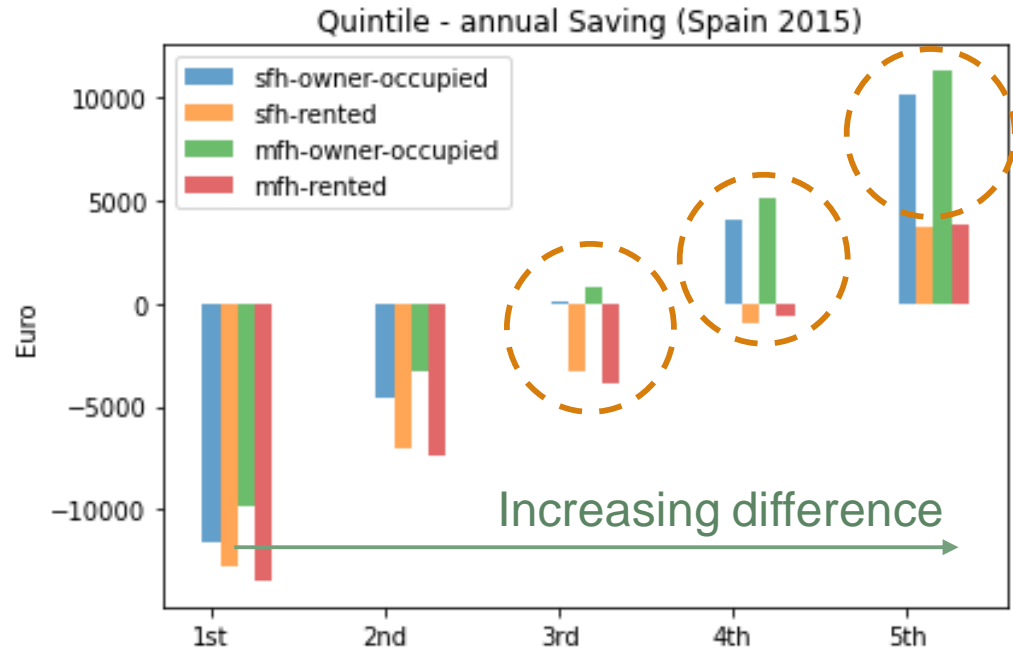
This is achieved by:

- Accessing EU Statistics on Income and Living Conditions and the Household Budget Survey
- Developing and testing a methodology to merge the datasets
- Providing first insights through an explorative data analysis about a household savings and natural gas expenditure



Results

- **56%** households consume natural gas
- **Ownership status** plays a relevant role: rented vs. owner-occupied
- From **3rd quintile** the “savings” difference increases significantly
- **16%** have high natural gas consumption (higher than 600 Euros/year)



Conclusions

The generated techno-socio-economic synthetic dataset provides useful information about the **relation** between **household budget restrictions, natural gas expenditure** and potential **investment** on deep renovation.

Practical Implications

- Robust method to merge EU-SILC and HBS datasets via logistic regression (scientific publication will be soon available open source)
- Limitations to automatically repeat the work-flow due to high modelling and statistical knowledge necessary -> BuiltHub service and part of the business model

Policy Implications

- **Higher natural gas prices alone** insufficient to stimulate deep renovations
- Boosting renovation activities and financing/incentive scheme design should be end-user targeted taking into account the **heterogeneity of household types**
- **Rented single family** houses identified as the **most vulnerable** household type, due to their low income and saving
- **Owner-occupied single-family houses** have highest natural gas expenditure (group with the **highest energy saving potential**)

Building stock decarbonisation – the role of construction and demolition waste

Construction and demolition waste (C&DW) is mainly composed of mineral materials (concrete, bricks, tiles and ceramics, stones, mortars, gypsum).

- Within the BuiltHub project, a **first exploratory case study on C&DW** was developed, aiming to:
 - **Quantify** the climate change and economic benefits achievable through the recycling of the mineral component of C&DW
 - Combine Eurostat data about C&DW with unitary GWP and cost savings (kgCO₂eq/ton, €/ton) to quantify total environmental and cost benefits





Steps taken

Estimate amount of mineral C&DW generated across EU member states



Collect data about C&DW recovery rates in EU countries

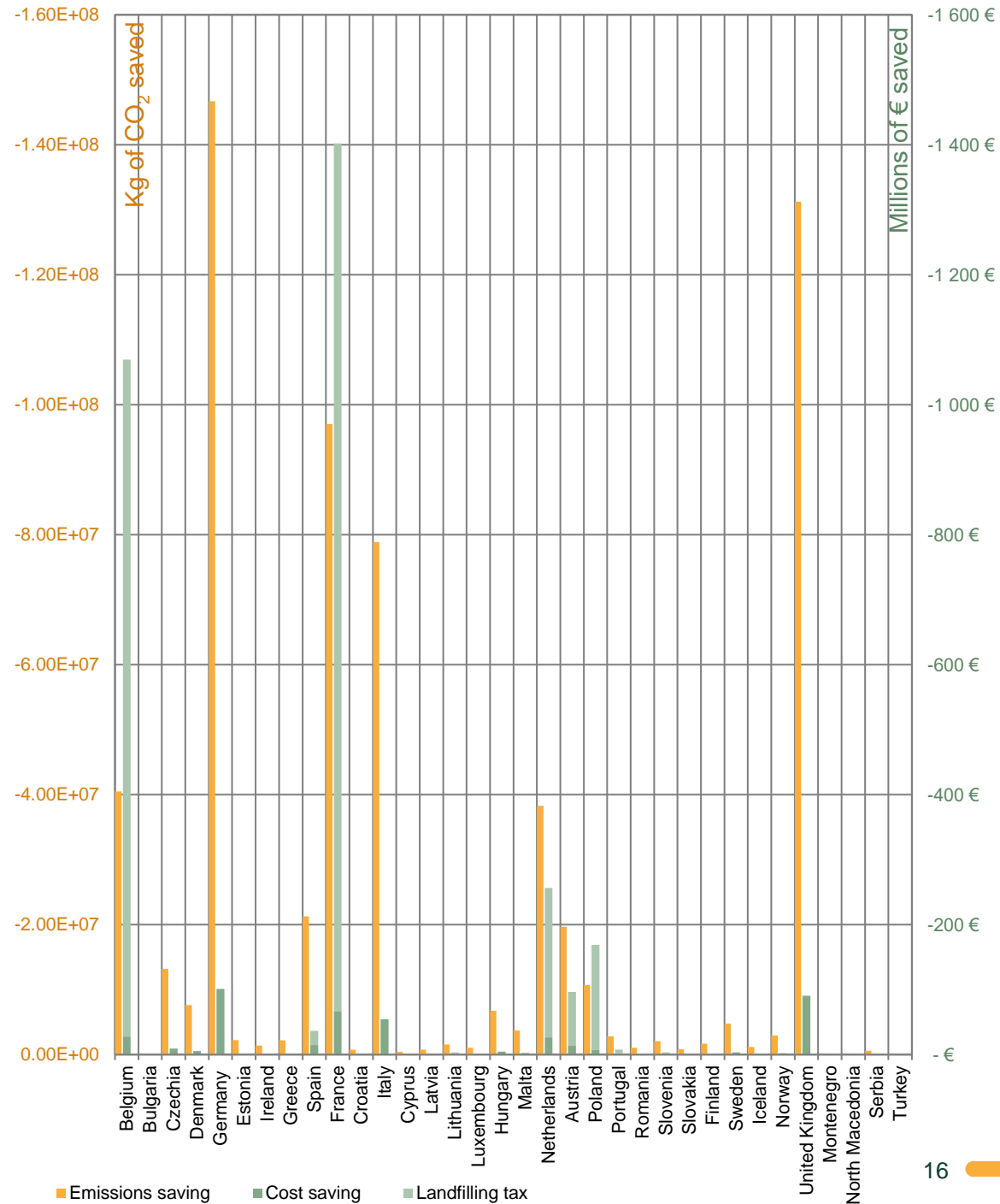
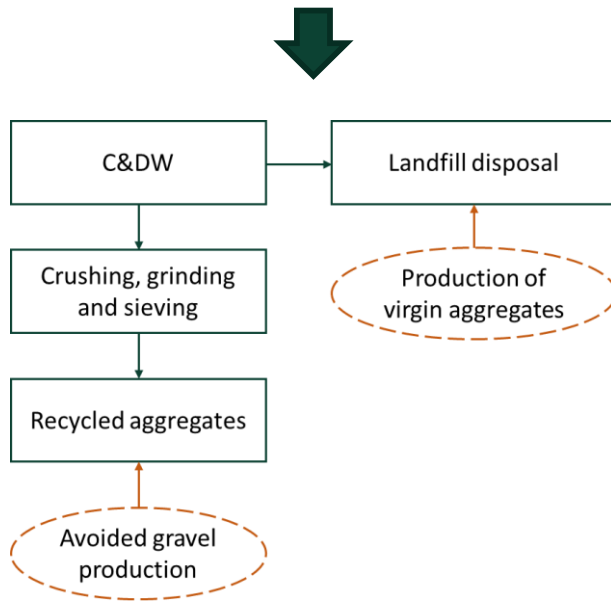


Apply LCA and LCC methodologies to determine the environmental and economic benefits achievable through backfilling recycling



Results

- GWP 100y saving equal to: **2.10 kg CO₂eq/ton**
- LCC saving equal to: **1.50 €/ton** (excluding taxation)



Conclusions

C&DW recycling is environmentally beneficial and economically profitable since it avoids the production of virgin aggregates (via quarrying and mining) and subsequent environmental impacts and economic expenses.

Practical Implications

- **Transportation distances increase** leads to the neutralization of the economic and environmental convenience of recycled materials. For long distances, the use of closer landfill sites may be preferable
- More detailed data are necessary to define additional robust assessment indexes: e.g., amount of C&DW that can be upcycled in **recycled concrete**, etc.

Policy Implications

- **Landfill taxation is not enough:** new policy instruments should enhance C&DW recycling and set new ambition levels
- The promotion/incentive of **eco-design** and **waste separation** is the preferred pathway and prefabrication can play an interesting role in this field

Building stock renovation planning

Challenges

- Lots of **data gaps** in the **EU Building Stock Observatory (BSO)**
- **Primary data** and detailed metadata **missing**
- Scarce information on **renovation rates**
- Missing details on **performed renovation measures**
- Information **incomparable**
 - **Floor area**: gross, net, useful, heated, occupied, for renovation
 - **Energy**: primary, final, delivered, demand, consumption, needs
 - **Renovation**: energy-related, light, deep

Solution

BuiltHub aims to provide solutions to these challenges through a Community, data governance and analytics, and a roadmap.

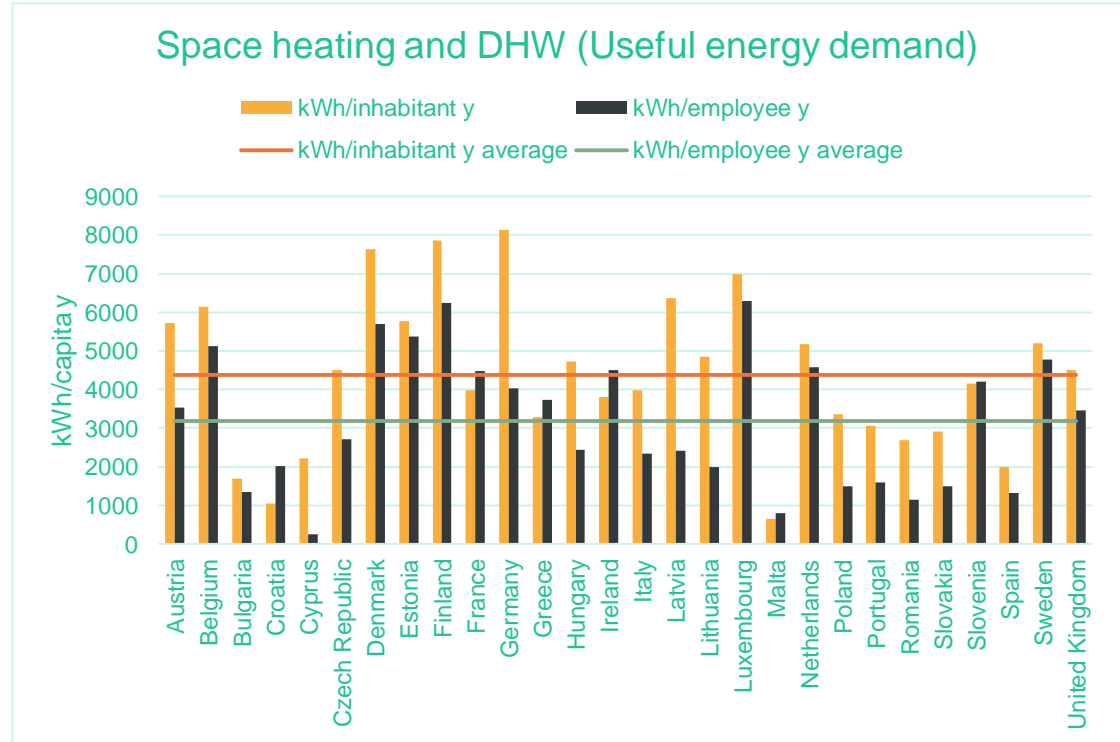


Legend

A	Building stock related datasets
B	Socio-economic datasets
C	Climatic datasets

Dataset #	Topic type	Name	Content
1	A	Horizon 2020 HotMaps project: Building stock analysis	Complete building stock analysis for the EU27+UK. Data related to final energy consumption and demand for both residential and non-residential sectors per building type and construction vintage (i.e. space heating, cooling, domestic hot water, construction materials and methodologies, thermal transmittancy, household occupancy, etc.).
2	A	IEE TABULA project: Typology Approach for Building Stock Energy Assessment	Building stock data focused on technical systems for heating, cooling and domestic hot water production in different buildings types. Final energy consumption and envelope performance data also available.
28	C	EDGAR (Emissions Database for Global Atmospheric Research) CO2 Emissions	Carbon Dioxide (CO₂) emissions by country and sector (buildings, transport, other industrial combustion, power Industry, etc.) for the years 1970-2018. Expressed in MtCO ₂ /year.
29	C	CORDEX - Regional climate model data on single levels for Europe	Climatic data for Europe expressed in daily, monthly and seasonal mean values as well as 3 or 6 hour resolution, as well as data for air temperature, wind speed, atmospheric pressure and humidity.
30	C	PVGIS - Photovoltaic Geographical Information System	Solar radiation data that takes into account both day and night, expressing the solar radiation raster map in W/m ² .

BuiltHub data analysis and transformation



Data sources: HotMaps project, Statistische Ämter des Bundes und der Länder 2020, EUROSTAT, World Bank.

Introducing the BuiltHub Platform

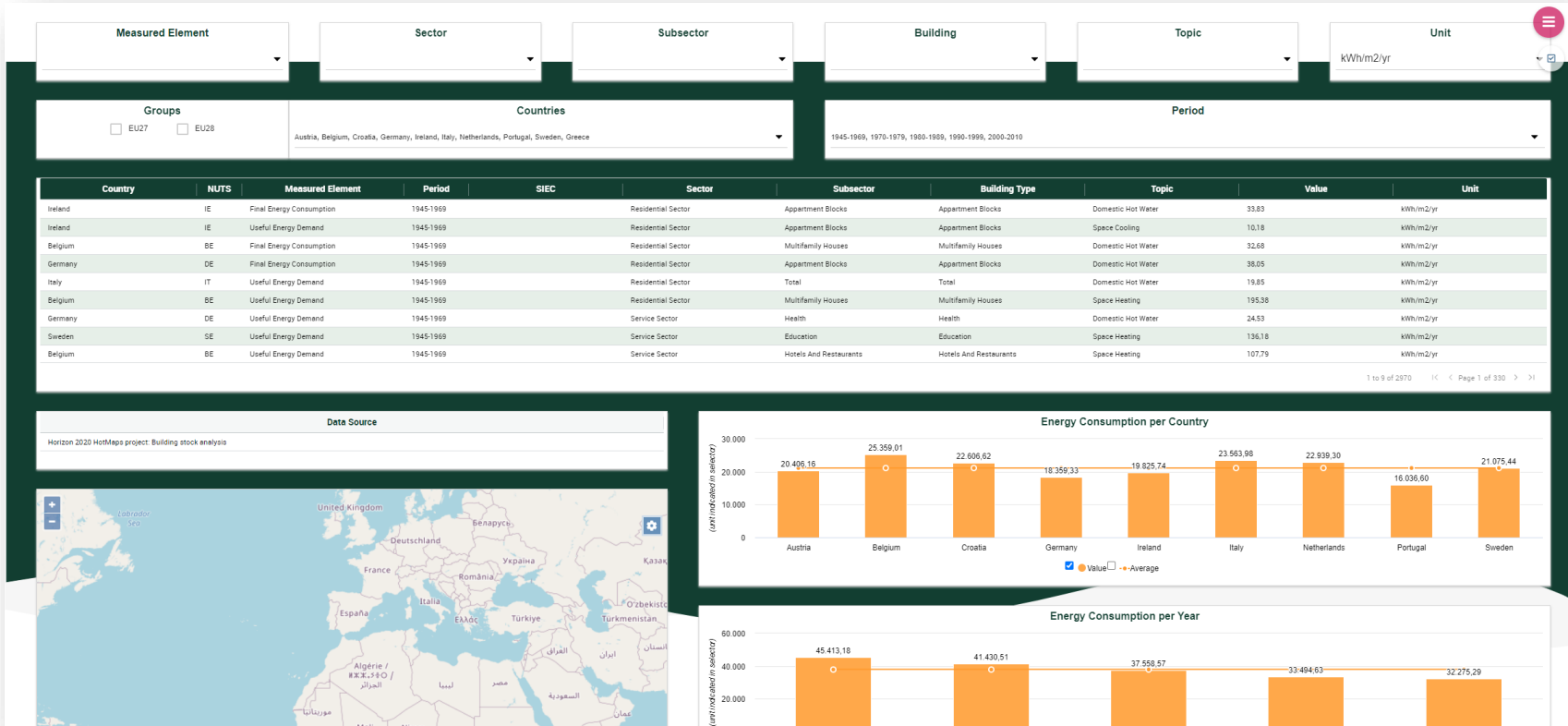
Demonstration of the key functionalities

- Integration and data sheets ingestion:
 - Datasheet manual upload
 - Integration with Odata
 - Integration with web URL
- Dashboards and used cases:
 - Energy consumption and energy poverty graphs
 - Building renovation and construction per district graphs

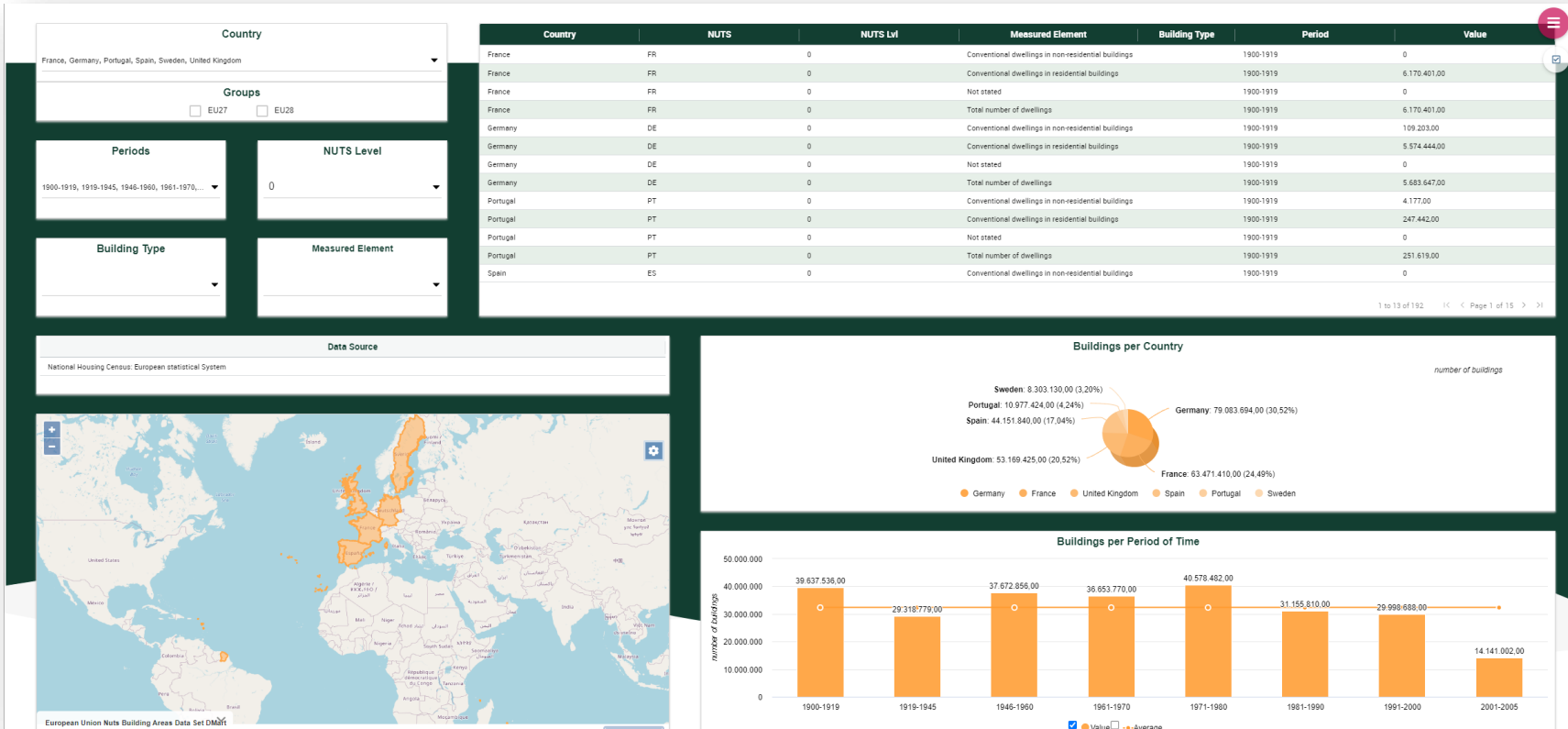




Dashboards: EU Energy Consumption

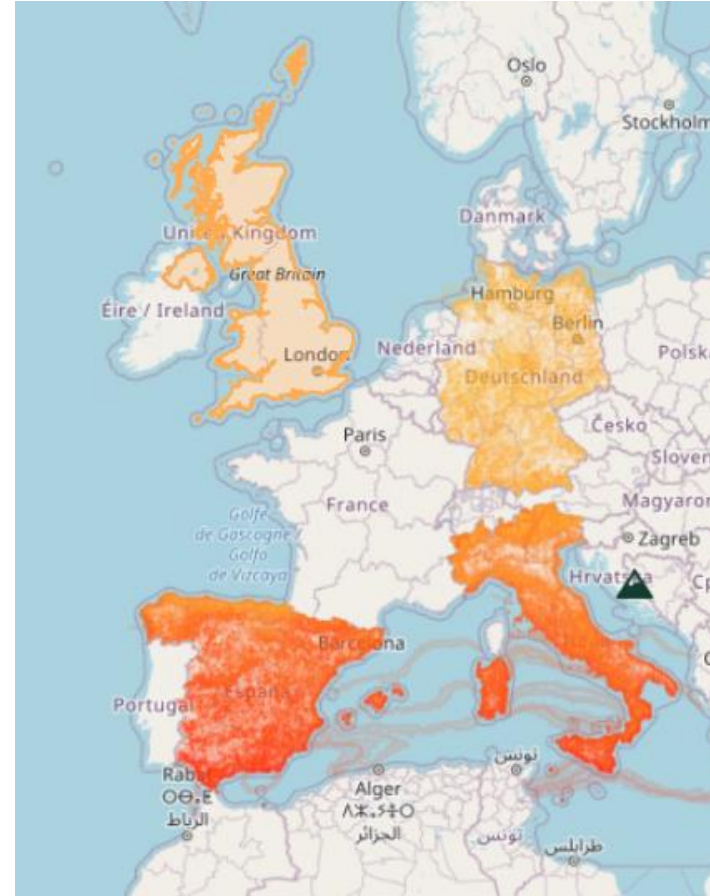
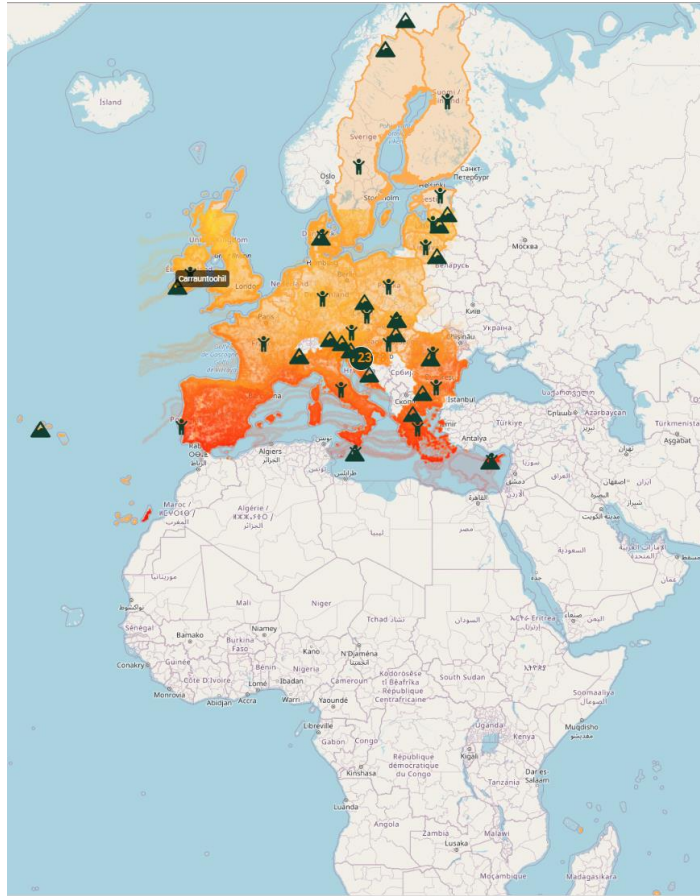


EU Building Areas data

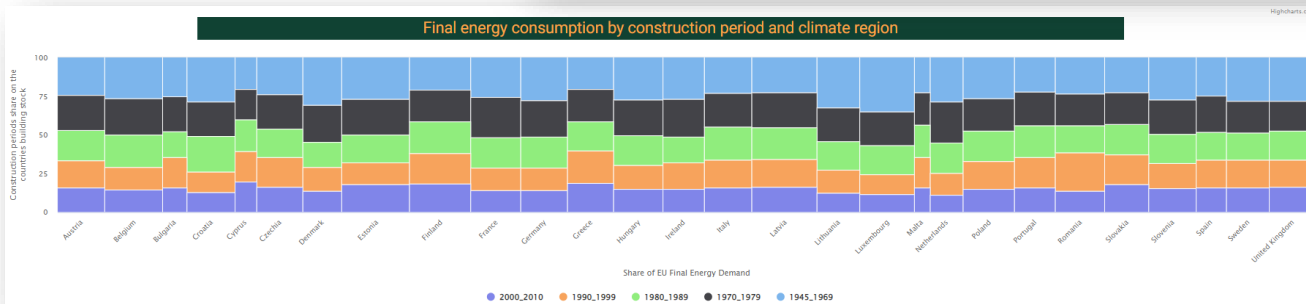
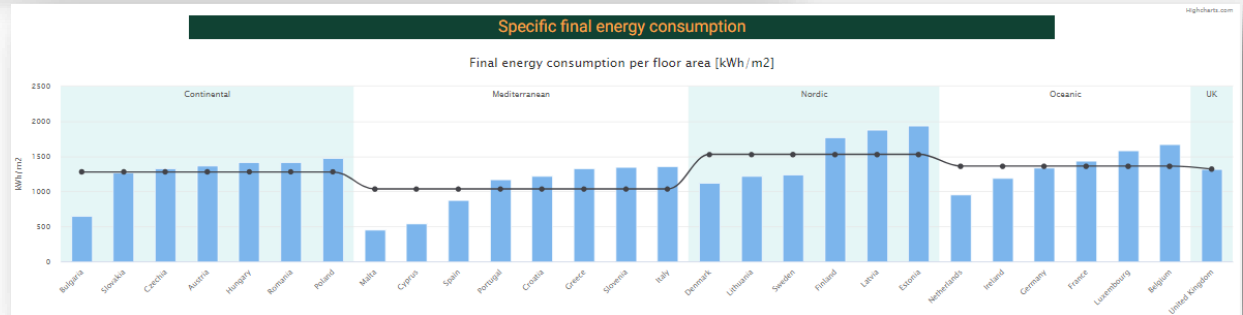
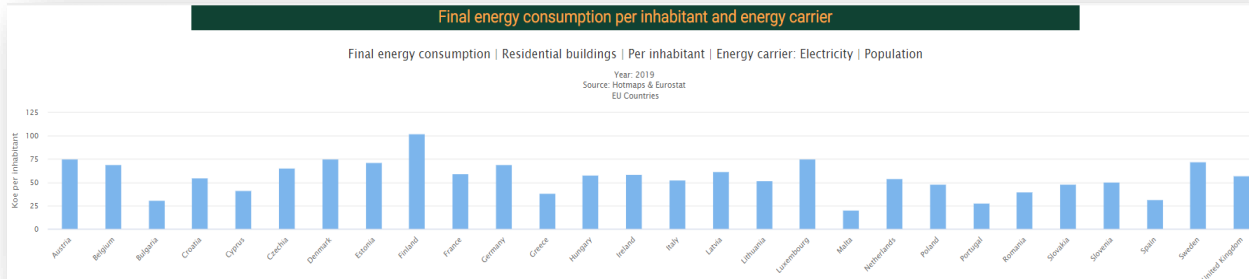




EU Geoinformation Sample

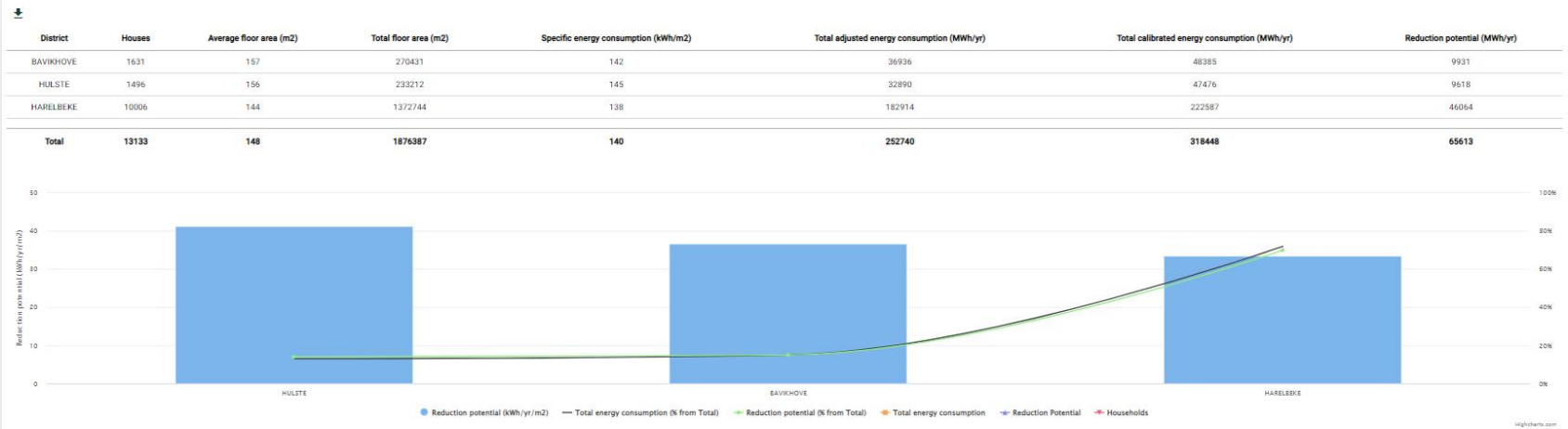


Renovation Graphs



Building and energy consumption by district

1.2 Number of housing units, average floor area, energy consumption and reduction potential per district



1.3 Energy consumption and reduction potential by district (cartographic representation)

Select sectors or districts to visualize them on the map

Sectors Districts





Workshop



Workshop questions

1. SMART BUILDING

The amount of data is increasing, such as those from sensors, smart meters, etc. How can we maximize the value of such data to develop smart and innovative building services?

2. POLICY

European cities are increasing the amount of data used in policy-making – albeit sometimes slowly or hesitantly. Is your city integrating data into its energy policies and directives? If so, how?

3. DATA COMMUNITIES

How do we motivate different stakeholders, such as environmental and energy agencies, energy sector companies, academia and public authorities, to share their data?



Thanks for joining us!



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#WSED





Next session, starting at 12:00

Supporting EPC and energy efficiency service (EES) providers in decarbonising buildings

Organised in the context of the H2020 projects REFINE and FinEERGO-Dom





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