Agenzia nazionale per le nuove tecnologie,
l'energia e lo sviluppo economico sostenibile

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FAIR Platforms?

Experience with the EU Building Stock Observatory

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EERAData. Supporting technologies for FAIRification, 16th March 2022

Building Data – FAIR is far

The Evaluation of the EPBD 2010/31/EU stated that there is a lack of quality, reliable and consistent data about MS building stock

Directive (EU) 2018/844 (30 May 2018) amending EPBD and EED

- **Article 10:** *(6a) Databases for EPCs shall* ***allow data to be gathered*** *on the measured or calculated energy consumption (at least for public buildings ….(6b)* ***aggregated anonymised data*** *….for statistics and research, owners.*

- **Article 2a:** *Better evidence-based (renovation) decisions are needed to improve performances of the building stock …..* The **availability of consistent and reliable data** is a major factor for measurable indicators.

1st launched in November 2016

1st Phase BPIE 2015-2016
2nd phase RICS 2017-2018
Update 2021-2024?

Sources:
National statistical offices
Eurostat,
EU projects (ODYSSEE, EPISCOPE, ENTRANZE, TABULA, COMMONENERGY, ZEBRA
…
Other literature

EU Building Stock Observatory Database

250 indicators on: *building stock characteristics, building renovation, nZEBs, energy consumption, building shell performance, technical building systems, certification, financing, energy poverty and energy market*.

In **2019*** only 13% had been populated (RICS)

Weakness:

- Data-sharing
- Data consistency and quality
- Terminology and definitions
- Interoperability (digitalisation, automation)

First Analysis from EERADATA (2020)

Selected Database: (Includes several DB: see list at page) PARTIAL/INCOMPLETE

EU Building Stock Observatory (https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-buildings/eu-bso_en)

Description
BSO is a European Commission initiative established in 2016 as part of the Clean energy for all Europeans package, to monitor the energy performance of buildings across Europe. The EU BSO is an "essential piece" of the EU's building energy efficiency policies
Objectives
• To provide a snapshot of the energy performance of the EU built stock in a consistent and comparable manner • To set a framework for the continuous monitoring of the EU built stock (and of EPBD and RED implementation)
Territorial and Time Boundary
28 EU Member States - 2015-2019
Content layout
Database - Datamapper – Thematic and Country Factsheets (single country 2016). Every set of data can be viewed per **topic**, **year** and **country**, or the EU as a whole. Data is presented in summary **tables** and **graphs** Possible to select multiple years and display the associated data It is possible to choose Chart types: Bar chart, Line, Area, Pie, Table options and to Display: ISO (alpha-2) country code, data quality, comment
Data source:
Different data sources well displayed. Data sources are provided by default in the result data tables. Detailed long sources can be visualized through "i" icon. See list below for data sources
Downloadable Excel version: En excel fil can be downloaded by item or by country Moreover, graphs and tables allow for the data to be downloaded in a number of formats
Definitions: according to various sources

Data - Indicators		
There are 250 indicators feeding into the BSO database. Data is organised in **topics** and subtopics The database in un course of refinement/update: Datamapper displays the following indicators (different form ongoing database) (references are the most recurrent ones)		
Topic	Subtopic	Sub-sub-topic
building stock characteristics	Building stock (N. dwellings) [6]	
	Floor area	
	typology [7]	non residential [5][6]
		Residential [5]
	age band [5][6]	
	ownership [7]	
	occupancy [7]	
	location (urban) [7]	
	construction (new/total) [6][7]	
	Renovation [4]	
building shell performance	overall heat loss	
	heat loss – floors [6][7]	
	heat loss – walls [6][7]	
	heat loss – roofs [6][7]	
	heat loss – windows [6][7]	
technical building systems	efficient heating [5][6]	condensing boilers
		heat pumps
		solar water heaters
		electric cookers
		fluorescent lighting
		double glazing
nearly zero-energy buildings (nZEB)	Residential [12]	
	non residential [12]	
	energy performance	
building renovation		
energy consumption	gas residential [1]	
	electricity-non residential [1]	
	residential energy use (m^2)	
	Non-residential energy use (m^2)	
	Space heating (residential)	
	Domestic hot water	
	Cooking	
	Lighting	
	water	
certification	EPC residential [4][14][13]	
	EPC non residential [4]	
	EPC residential by Label [14]	
	EPC non residential by Label [14]	
financing		
energy poverty	Risk of poverty [1]	
	Inadequate housing [1]	
	Inadequate heating [1]	
	Rooms per person	Multi-family [1]
		Single-family [1]
	Excess winter mortality [1]	
	Households expenditures	Euros per capita [1]
		Housing, energy and water (share) [1]
		Energy (electricity, gas, etc.) [1]
		Arrears on utility bills [1]
energy market	Electricity (liberalisation date)	
	Gas (liberalisation date)	

Sources of EU BSO data			
1	Eurostat	30 (28 + CH , NO)	2007-2018
2	EU JRC/EASME		
3	National Census (official statistics)		
4	ZEBRA2020 (IEE project)	AT, BE, CZ, DK, FR, DE, IT, NL, NO, PL, LI, LU, RO, SK, ES, SE UK	2014-2016
5	Entranze (IEE project 2017)	AT, FI, DE, ES, BG, BE, FR, CZ	2012-2014
6	Inspire	22 MS + 4 EFTA + 3 non member states	2015-2018
7	Tabula (IEE project)	17 MS	2009-2012
8	Odyssee (EU project)	All 29 MS	To date
9	Other EU Projects (H2020 2018-2019?)		
10	Market providers		
11	CTI (Italy)		
12	EC ENER/C3/2016-547/02/SI2.753931 Tender on nZEBs and renovation	28 MS (surveys by NAVIGANT)	2012-2016
13	REQUEST2ACTION	9 EU MS	2014-2017
14	EPC-register		

[*] Reference to source

The BSO currently contains approximately 70,000 data points (2,400 per MS): **67% are not populated with any data** (most significant data gaps: *Building stock characterisation; Technical systems for Non-resident*

Of the 13% of data present in the BSO database, approximately:

- 8% is sourced from high quality, reliable data: Nat. Statistics, Eurostat and Odyssee
- 5% is sourced from completed EU Projects: Tabula, Entranze, Inspire etc.)
- 4% of the data entries are regularly inputted for each year and cover each MS
- 9% of the data entries are temporally inputted yearly (1-5 entries) and sporadically inputted across MS

(It will be possible to add regional and MS data when new data becomes available)

References:

A report sums up the work done in the scope of the Building Stock Observatory project from February 1, 2015 to June 31 2016 (1st contract service lead by BPIE BE) Last update: 2018 (Methodology)

2nd Contract service in course (lead by RICS UK). Next update **27 May 2020.**

But difficult to assess against FAIR Guiding Principles …

https://www.go-fair.org/fair-principles

Is BSO data Findable?

F1: Yes,

F2: Yes,

F3: Yes,

F4: No

Assessment provided by EERADATA in 2020.

The first step in (re)using data is to **find them**. Metadata and data should be easy to find for both humans and computers. Machine-readable metadata are essential for automatic discovery of datasets and services

- *F1. (Meta)data are assigned a globally unique and persistent identifier*
- *F2. Data are described with rich metadata (defined by R1 below)*
- *F3. Metadata clearly and explicitly include the identifier of the data they describe*
- *F4. (Meta)data are registered or indexed in a searchable resource*

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Is BSO data Accessible?

A1: Yes,

A1,1: Yes,

A1,2: Yes,

A2: No

Assessment provided by EERADATA in 2020.

Once the user finds the required data, she/he/they need to know how they can be **accessed**, possibly including authentication and authorisation.

- *A1. (Meta)data are retrievable by their identifier using a standardised communications protocol*
- *A1.1 The protocol is open, free, and universally implementable*
- *A1.2 The protocol allows for an authentication and authorisation procedure*
- *A2. Metadata are accessible, even when the data are no longer available*

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Is BSO data interoperable?

I1: Yes

I2: Yes

I3: No

Assessment provided by EERADATA in 2020.

The data usually need to be **integrated with other data**. In addition, the data need to interoperate with applications or workflows for analysis, storage, and processing.

- *I1. (Meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.*
- *I2. (Meta)data use vocabularies that follow FAIR principles*
- *I3. (Meta)data include qualified references to other (meta)data*

Is BSO data reusable?

R1: Yes

R1.1: No

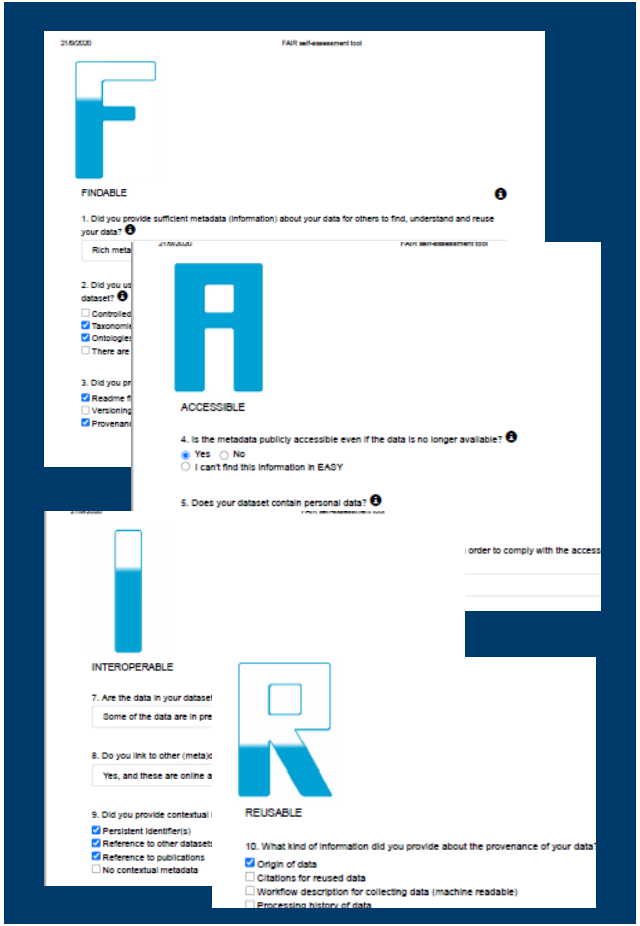
R1.2: Yes

R1.3: No

Assessment provided by EERADATA in 2020.

The ultimate goal of FAIR is to optimise the **reuse** of data. To achieve this, metadata and data should be well-described so that they can be replicated and/or combined in different settings.

- *R1. (Meta)data are richly described with a plurality of accurate and relevant attributes*
- *R1.1. (Meta)data are released with a clear and accessible data usage license*
- *R1.2. (Meta)data are associated with detailed provenance*
- *R1.3. (Meta)data meet domain-relevant community standards*



Assessement using SATIFYD tool

✓ Find:

- Data sources provided (Links)
- Data quality displayed (5-star system)
- Taxonomies/Ontologies
- Additional documentation provided
- Methodology of calculation in comments (not too comprehensive)

✓ Access:

- Metadata difficult to access
- No usage linceses: Open access
- No personal data contained

✓ Interoperability

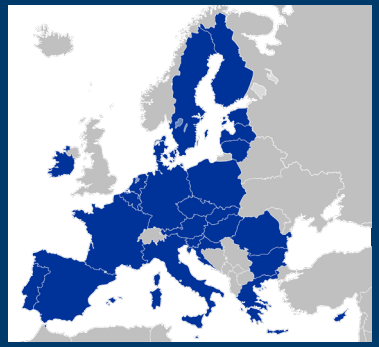
- Indicators in a table or graph and can be downloaded in CSV format
- Link to other metadata (that are online accessible).
- Contextual information on related datasets: Good

✓ Reuse:

- Information about the provenance of data<. Limited to the origin (no history)
- Domani standard?

73% FAIR.
Limitation of the human evaluation?

Recent developments related to the BSO



European Commission has supported wide-scale data collection and processing inviting all relevant stakeholders(*) to improve and strengthen data collection (**H2020 Calls: "Building stock data 4.0":**

BuiltHub Umbrella project (*2020-2024)*

- *Building data sharing, aggregation, analysis and access (platform): 30 datasets (stock, socio-economic, climatic)*
- *Promising durable (FAIR - Findable, Accessible, Interoperable, Reusable) dataflow and collection*