



Data Article

Dataset of service life data for 100 building elements and technical systems including their descriptive statistics and fitting to lognormal distribution



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ABSTRACT

This article presents the descriptive statistics of service life data of building elements, gathered through an international, European and Swiss literature review of LCA, LCC and other sources called “Real-Estate Management sources” that include building owners, banks, insurances, associations of tenants and owners, etc. Furthermore, the properties of the fitted lognormal distribution are given. The data are structured, using a hybrid decomposition (functional decomposition, according to the eBKP-H – SN506511 and material decomposition, as well). These data and the derived statistical distributions were used in a research study, in order to quantify the uncertainty and sensitivity of the LCA and LCC output, due to the variability of the building elements' service lives.

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Specifications Table

Subject	Renewable Energy, Sustainability and the Environment
Specific subject area	Life cycle assessment in buildings
Type of data	Excel file
How data were acquired	<p>First, from 2017 to 2019, a literature review (meta-analysis) was conducted through website search engines such as Google, Google Scholar and Science Direct using keywords in English, French and German about “service life”, “lifetime”, “building”, “material”, “element”, “component”. In total, about 67 sources and 7’000 service lives data were collected for the different building elements.</p> <p>Second, from 2018 to 2019, in the framework of the IEA-EBC Annex 72 project, a survey on national building Life Cycle Assessment (LCA) Methodologies including a table to fill in on national service lives data was conducted. It allows to collect additional service lives data in this specific application The template (Excel® spreadsheet) for reporting the service lives in the two types of data collection used a common basis defined by the University of Applied Sciences of Western Switzerland (HES-SO) in the framework of the Swiss Federal Office of Energy (SFOE) DUREE and IEA-EBC Annex 72 projects [3].</p> <p>Finally, all collected service lives data were integrated in an Excel database to derive statistical distributions for the probabilistic building LCA and LCC studies.</p>
Data format	Raw data and analysed data
Parameters for data collection	Service life data were collected for the following building categories: structural work, technical systems, façade elements and coatings, roof elements and interior layout, classified according to the Swiss eBKP-H classification, from the Centre for Building Rationalisation (CRB) [2]. Four main levels of details were employed from the eBKP-H classification (i.e., the main groups, the groups of elements, the elements and sub-elements), while lower levels of details were added, when necessary to cover service life data of more detailed components and systems.
Description of data collection	All the identified literature sources were grouped in an Excel database. The service life data correspond to different contexts, e.g. service lives used in energy and environmental life cycle assessment (LCA), life cycle cost analysis (LCC) and building management applications (e.g., professional building owners, bank, insurance sector, association of tenants, and other sources). In addition, data were collected in an international level, i.e. coming from Switzerland or other International and European countries, i.e. France, Germany, Belgium, UK, USA, Canada and Australia.
Data source location	The data collection was performed at an international level, focusing mainly in Europe and Switzerland. The detailed list of the sources can be found in the website of the Swiss Federal Office for Energy ‘DUREE’ research project [3]: https://www.aramis.admin.ch/Texte/?ProjectID=38626
Data accessibility	The full datasets are only available with this article
Related research article	<p>Author’s name Kyriaki Goulouti, Pierryvyes Padey, Alina Galimshina, Guillaume Habert, Sébastien Lasvaux</p> <p>Title Uncertainty of building elements’ service lives in building LCA & LCC: what matters? [1]</p> <p>Journal Building & Environment</p> <p>https://doi.org/10.1016/j.buildenv.2020.106904</p>

Value of the Data

- The collected data reflect the variability of the building elements’ service lives, amongst the different contexts of use/application and countries.
- The flexibility of the structure of the data, according to the SN 506,511 standard [2] and the additional added sub-categories, enables extracting service lives for different level of details (LOD), in BIM-based building LCA and LCC studies (e.g., for a screening or detailed assessment).

- Through the descriptive statistics, reference values of service lives are provided to the scientific community for further LCA and LCC analysis within a deterministic framework.
- The properties of the fitted lognormal distribution for the service lives can be used by the scientific community for further probabilistic building LCA and LCC studies.

1. Data Description

The data available in this article constitute service lives in years of different building elements. The meta-analysis of the collected data, available in this article, include the descriptive statistics of building elements (min – max, deciles, quartiles, median. In addition, the fitting properties of the lognormal distributions (meanlog and sdlog) are provided, as well as the goodness of fit (p-value). [Table 1](#) presents an example of the meta – analysis, for six building elements. In addition, the empirical and theoretical densities are presented in [Fig. 1](#).

2. Experimental Design, Materials and Methods

All the raw service life data used, for the meta – analysis are described in [\[3\]](#). The following presents the two steps of the meta – analysis of the service lives: a) the descriptive statistics and b) the lognormal fitting.

a) Descriptive statistics

An Excel file was created and the data were structured, according to the Swiss eBKP-H classification scheme, which includes the aforementioned five main groups and two sub-categories for each main group (intermediate element level and detailed element level). The lines of the Excel spreadsheet represent the building elements and the different sub-categories, while the columns represent the different international sources. The service lives were inserted in the main group, if the source communicated generic service life data, or in the sub-categories, in case that the values represented more detailed materials. In case that no generic value was available, an Excel function was created in order to calculate the mean from the sub-categories, for each source. Finally, the descriptive statistics were calculated for each building element, main group and sub-category.

b) Lognormal fitting

Input service lives data constitute independent positive random quantities, for which the use of the lognormal process is well justified [\[4\]](#). The goodness of fit was evaluated through the

Table 1
Service life dataset of six building elements.

Building element	Number of data	Min	Decile 1	Quartile 1	Median (Quartile 2)	Quartile 3	Decile 9	Max	meanlog	sdlog	p-value
Electrical installations	64	8	15	20	30	39	50	80	3324	0,463	0,683
Heat production	61	5	13	15	19	22	25	30	2905	0,295	0,544
Compact facade (external thermal insulation & rendering)	41	22	25	30	38	45	56	80	3,63	0,32	0,72
Windows	68	5	17	23	30	40	50	60	3,37	0,46	0,49
Flat roof	62	15	20	25	30	40	50	100	3,46	0,40	0,26
Partition walls, doors	62	15	21	30	40	50	66	97	3,64	0,43	0,95

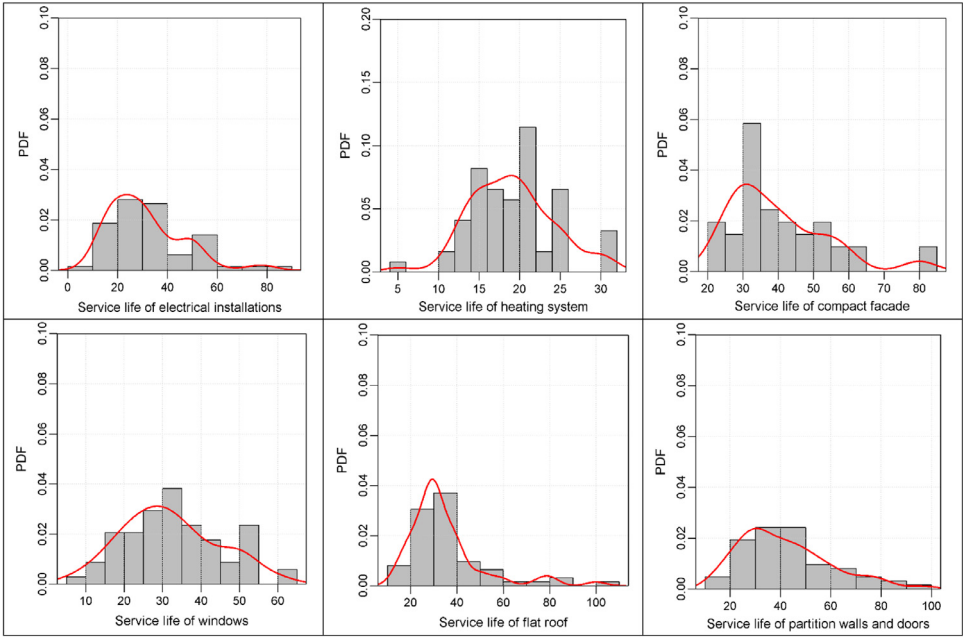


Fig. 1. Example of empirical and theoretical PDF for six building elements (electrical installations, heating system, compact facade with exterior insulation, windows, flat roof including insulation, partition walls and doors), usually included in building LCA and LCC studies (e.g. in [1]).

p-value, according to the Anderson – Darling Test [5]. The results, confirmed the initial hypothesis of the lognormal distribution, (p-value > 0.05).

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Supplementary Materials

Supplementary material associated with this article can be found in the online version at doi:[10.1016/j.dib.2021.107062](https://doi.org/10.1016/j.dib.2021.107062).

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