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THE SWISS PLATFORM OF LIFE CYCLE ASSESSMENT DATA IN THE BUILDING SECTOR - CONNECTING INDUSTRY, ADMINISTRATION, BUILDERS AND RESEARCH

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ABSTRACT

In late 2011 the platform life cycle inventory data in the building sector was launched. Representatives from professional public and private building owners, from building industry and associations, from public policy makers as well as from research and academic institutions joined together to enhance the application of life cycle assessment data in the building sector. Its main objective is the publication, maintenance, and extension of sector tailored life cycle assessment data.

Data are used in several national guidelines and standards related to buildings and in the 2000W society concept. Compared to other information systems, the LCA data lists prove to be efficient in terms of costs, efforts and accessibility.

INTRODUCTION

With a reduced energy consumption during the use phase of buildings, the energy embodied in the building gets more important. In buildings with low to very low operational energy demand, the energy required to build a house is equal to the energy required during operation. In further optimised buildings, the energy demand of construction is even much above the energy demand during operation as can be seen in SIA 2040 (SIA 2011a), which publishes guideline and target values regarding operation and regarding construction. According to this publication half of the greenhouse gas emissions are caused by construction, one third by induced mobility and only one sixth to the operation of the building.

Thus it is not astonishing that the environmental impacts related to the construction of buildings get more and more into the focus of building owners and planners. Even more, a comprehensive assessment including environmental impacts of buildings is considered a must when designing and commissioning buildings in the future.

Reliable and quality assured data are needed to establish an LCA of a building. The life cycle assessment data of the building sector provide these data to a large extent. The data are documented in a recommendation document (KBOB et al. 2012), issued by KBOB (co-

ordination conference of public building owners), IPB (institutional professional building owners) and eco-bau and they are frequently being used by architects and planners.

The data in the recommendation rely to a large extent on ecoinvent data v2.2 (ecoinvent Centre 2010), one of the world leading databases operated by the ecoinvent Centre, a competence centre of ETH Zürich and Lausanne, Paul Scherrer Institute (PSI), Empa and agroscope ART.

MATERIALS

The platform “life cycle assessment data in the building sector” was launched in late 2011. Representatives from professional public and private building owners, from building industry and associations, from public policy makers as well as from research and academic institutions joined together. The platform aims to enhance the consideration of environmental aspects when planning the construction or refurbishment of buildings by the application of life cycle assessment data in the building sector. The platform works on the following tasks:

- Priority setting with regard to LCI data updates and LCI data extensions, focusing on the building sector and its suppliers.
- Co-ordination of the work flow of update tasks, including data quality assurance
- Support in data investigation with associations of the building material industry (1st choice) and individual companies in order to establish representative LCI data.
- Inclusion / consultation of LCI data stakeholders such as the building materials associations
- Information exchange between administration, research, building owners and associations of the building materials industry
- Deal with requests, questions and complaints regarding the LCA data either by answering directly or co-ordinating the answers.
- Organise agreements regarding data updates and data use.
- Clarify methodological issues regarding the LCA data in the building sector, taking into account that the methodological settings are valid for all product groups (eco-points, recycling rates, waste management processes, etc.)
- Development of a sustainable strategy from the viewpoint of the building sector regarding methodological settings of life cycle inventory and impact assessment of building products, including the consideration of new technologies in compliance with standards (such as the CEN standard 15804, the Swiss SIA recommendation 493 “declaration of environmental properties of building products”, the Swiss SIA 2032 “Grey energy of buildings” and others more).
- Ensure and facilitate to create and supply LCI datasets from publicly and privately commissioned projects, which are of use for the ecoinvent database.

METHODS

The list of LCA data in the building sector covers mineral materials (such as concrete, tiles, gypsum, mortar and plaster), windows and metal-glass façades, metals (steel, aluminium and copper sheets, metal beams), wood and derived timber products, adhesives, liner sheets, insulation materials, flooring materials, doors, pipes, paintings and coatings, plastics, building technology (boilers, heat distribution systems, ventilation systems, sanitary equipment,

electrical systems), energy supply (fuels, district heat, useful heat, electricity), and transports (persons and goods). The list uses the indicators cumulative energy demand (renewable, non renewable, Frischknecht et al. 2007a; Frischknecht et al. 2007b), greenhouse gas emissions (IPCC 2007) and the ecological scarcity method 2006 (Frischknecht et al. 2009).

The platform adopted the quality guidelines of ecoinvent data v2.0 and the ecoinvent data v2.2 as their current solid foundation. The quality guidelines are used whenever LCI data of a building material yet missing in the list are generated.

Up to now, an institutional support including updates and targeted extensions was missing. The new platform “life cycle assessment data in the building sector” takes care of these tasks and is at the same time facilitating the co-ordination between research, industry and the buildings industry.

RESULTS

The LCA data published by the platform is being used in several Swiss standards and concepts. In particular, the LCA data are used in the Swiss codes of practice about “Energy pass for buildings” (SIA 2031, SIA 2009), “Cumulative energy demand of buildings” (SIA 2032, SIA 2010), “Mobility, energy demand dependent on the building location” (SIA 2039, SIA 2011b), and “SIA-efficiency path energy”, (SIA 2040 and SIA D0236, SIA 2011a, c). The LCA data are also used in the accounting concept of the 2000-Watt-Society (EnergieSchweiz für Gemeinden et al. 2012).

Several planning tools used by architects and civil engineers exist which contain the LCA data in the building sector. Others are using tools such as Vitruvius that rely directly on the contents of the ecoinvent database.

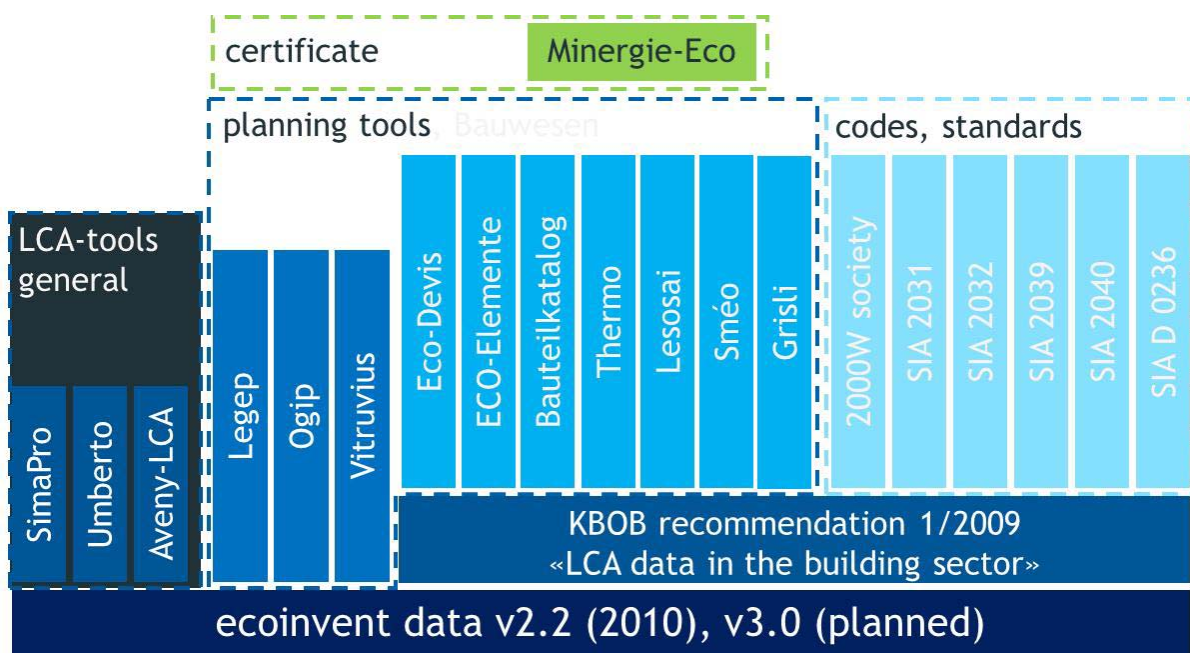


Figure 1. Planning tools, codes and standards in the building sector relying on ecoinvent data v2.2 and the KBOB recommendation 1/2009 (version July 2012, KBOB et al. 2012)

DISCUSSION

The KBOB recommendation 2009/1 with its “LCA data in the building sector” facilitates the use of environmental information when planning new buildings or retrofitting existing ones. It is a cost efficient, solid and harmonised foundation for planning tools, codes and standards. However, improvements are still needed and on the way. On one hand data of several construction materials are rather old and ask for updates. On the other hand the current list does not yet cover all environmentally relevant elements of buildings and thus projects are being launched or co-ordinated for targeted extensions of the LCA data list. The co-operation between representatives from building owners, scientists and the building industry is a unique opportunity to further increase the usefulness and acceptance of the LCA data.

CONCLUSIONS

The KBOB recommendation 2009/1 prepared, maintained, extended and issued by the platform “LCA data in the building sector“ is a cost efficient and powerful tool for architects and engineers. It helps them to include the environmental dimension into the planning process, be it within the preproject or competition phase or during the project realisation. Using the Swiss eco-factors of the ecological scarcity method 2006 (Frischknecht et al. 2009) the environmental assessment of buildings are in line with the Swiss environmental legislation.

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