

IEA-SHC TASK59: FACT SHEET

Multidisciplinary planning process:

Enhancing the use of the European standard EN 16883:2017

LIFE CYCLE ANALYSIS – LCA/LCC

This is part of a series of fact sheets meant to facilitate and enhance the use of the European standard EN 16883:2017 Conservation of cultural heritage – Guidelines for improving the energy performance of historic buildings. This text presents tools and guidelines for life cycle analysis (LCA) and life cycle cost (LCC).

Life Cycle Assessment (LCA) is a quantitative method for assessing the environmental impacts of a building throughout its complete life-cycle. Life Cycle Costing (LCC) aims to determine the cost of a building, or a component, over its complete life cycle. In this context, LCA and LCC are used to predict and compare the consequences of different proposed measures for a building.

There are some common pitfalls in using LCA/LCC:

- Using simple assessment tools as a black box, without understanding how they really work, may be tempting. The general rule is that you need a qualified person to do the analysis.
- No life cycle analysis is better than its input data. The availability of relevant data on specific environmental impact and specific costs on a component level will always be a limiting factor.
- In LCA/LCC the life cycle is often limited to 30-50 years. This may be problematic in relation to historic buildings.

Contributors:

Tor Broström
Uppsala University
(Sweden)

TOOLS AND GUIDELINES

Name	Short description	Comment	Ref
EN 15978:2011	European standard: EN 15978:2011 Sustainability of construction works - Assessment of environmental performance of buildings - Calculation method	This standard describes a calculation method to assess the life cycle environmental performance of a building. It can be applied to new buildings as well as renovation projects.	1
oneClickLCA	One-click-LCA is an easy-to-use software for the compilation of information and analysis of results facilitating the integration of sustainability aspects in the decision making process.	Requires a licence Includes LCC Easy to use	2
Ascot	ASCOT – Assessment tool for additional construction cost in sustainable building renovation. Over the lifespan of the building, it takes into consideration: 1) all investment and operation costs 2) the savings from the investments with respect to sustainable issues 3) the reduced environmental impact from the energy savings.	Free Easy to use Includes an optimization It is available in English, French, Spanish and Italian	3
Gabi	GaBi models every element of a product or system from a life cycle perspective It provides an easily accessible and constantly refreshed content database that details the costs, energy and environmental impact of sourcing and refining every raw material or processed component of a manufactured item.	It includes both LCA and LCC. Requires a license.	4
SimaPro	SimaPro is a tool to collect, analyse and monitor the sustainability performance data of products and services. SimaPro can model and analyse complex life cycles in a systematic and transparent way and quantify the environmental impact of products and services across all life cycle stages.	SimaPro is a LCA software package that been in use for 25-years in more than 80 countries. There is a variety of licences.	5
Renobuild	Renobuild is a tool for evaluating the sustainability of renovations. It provides support for discussions and decision making by systematically comparing the effects of alternative renovation scenarios. It can be used to evaluate different alternatives.	Designed especially for renovation. Easy to use In Swedish only.	6

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OPERA/MILP	LCC optimisation software – OPTimal Energy Retrofit Advisory-Mixed Integer Linear Program (OPERA-MILP) obtains the cost-optimal energy renovation strategy corresponding to the lowest building LCC. Based on a pre-set period (50 years) it considers costs of building maintenance, investment cost for heating system, energy efficiency measures on the building envelope, and energy supply.	Not publicly available	7
LCAbyg	LCAbyg is a tool that calculates life cycle assessments for buildings. LCAbyg calculates a building's environmental profile and resource consumption. Based on information about the building parts the tool calculates the LCA and gathers the results in a report.	Easy to use In Danish	8
Danish national guidance	LCA guidance for renovation "Branchevejledning i LCA ved renovering"	In Danish	9
Swedish national guidance	LCA guidance for buildings "Vägledning i LCA för byggnader"	In Swedish	10
RIBuild	The EU project RIBuild has developed tools for probability based LCA and LCC for internal insulation of historic masonry constructions.		11, 12
The International EPD System	A global programme for environmental declarations based on ISO 14025 and EN 15804. The online database contains more than thousand EPDs for a wide range of product categories in 45 countries.	Based on international standards with national adaptations.	13
IEA EBC Annex 72 - Assessing Life Cycle Related Environmental Impacts Caused by Buildings.	This project aims to establish a common methodology with regionally differentiated guidelines and tools and to develop national or regional databases with regionally differentiated life cycle assessment data.	Work in progress. The project will be concluded in 2021.	14

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Project structure

The project consists of four work packages called “Subtasks”

Subtask B > Multidisciplinary planning process

led by Uppsala University, Sweden

Investigate how existing guidelines for improving the energy performance of historic buildings can be enhanced and complemented in order to better meet the needs of the end user by providing an integrated design platform

Organizational details

Full project title

Deep Renovation of Historic Buildings Towards Lowest Possible Energy Demand and CO₂ Emission (NZEB)

Project sponsor

International Energy Agency's
> Solar Heating & Cooling Programme (SHC) Task 59
> Energy in Buildings and Communities (ECB) Annex 76

Duration

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Operating Agent

Alexandra Troi
Institute for Renewable Energy
EURAC Research
Via Volta 13/A
I-39100 Bolzano / Bozen
Italy



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task59@eurac.edu



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