

# Life Level(s)

Best practice guide to support incorporating Level(s) LCA, LCC and IAQ indicators into Public Procurement process



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# CONTEXT AND OBJECTIVES

The LIFE Level(s) project is directed towards **mainstreaming sustainable buildings in Europe** through greater awareness and use of the specified indicators within the framework of **Level(s)**, a set of common European Union indicators to address life cycle environmental performance of buildings.

**The key indicators within Level(s) are Life cycle assessment (LCA), Life cycle costing (LCC) and Indoor air quality (IAQ).**



The project has received funding from the LIFE Program of the European Union. The project will last for three years, from 2019 until 2022.

The partners engaged in the execution of the project and implementation of its outcomes are 8 European Green Building Councils, acknowledged for their contribution in spreading the awareness about green building principles and promotion of environment protection and energy efficiency values.

The project follows **5 steps**:

- 1** Alignment of Europe's leading green building certification schemes with Level(s) to ensure they are aligned in approach and generating more comparable data on life cycle performance.
- 2** Identify administrative and data requirements needed to support Level(s) across Europe.
- 3** Work with public authorities to align Green Public Procurement (GPP) criteria with Level(s).
- 4** Build the capacity of stakeholders across the whole sector value chain to apply the indicators.
- 5** Generate awareness across industry and government on the necessity of Level(s) and a lifecycle approach framework in addressing climate and environmental risk.

LCA LCC IAQ

This document is part of part 3 and part 5 of the Life Level(s) project.

This guide presents you **best practice examples all around Europe that incorporate LCA, LCC and/or IAQ indicators in their public procurement**. Its objective is to help public authority to implement it in their own project.

It is composed of 3 parts:

### First,

- A Level(s) framework presentation to explain you what is this methodology and how it works.
- An explanation of the 3 indicators: LCA, IAQ, LCC to have the same definition of this three terms.

### Second,

- A state of the art in GPP in each country with a focus on this three indicators
- Different best practice examples

### Finally,

- A conclusion drawn by this example
- Different resources produced by each GBCs on the subject.





# THE LEVEL(S) METHOD

# WHAT IS LEVEL(S)?

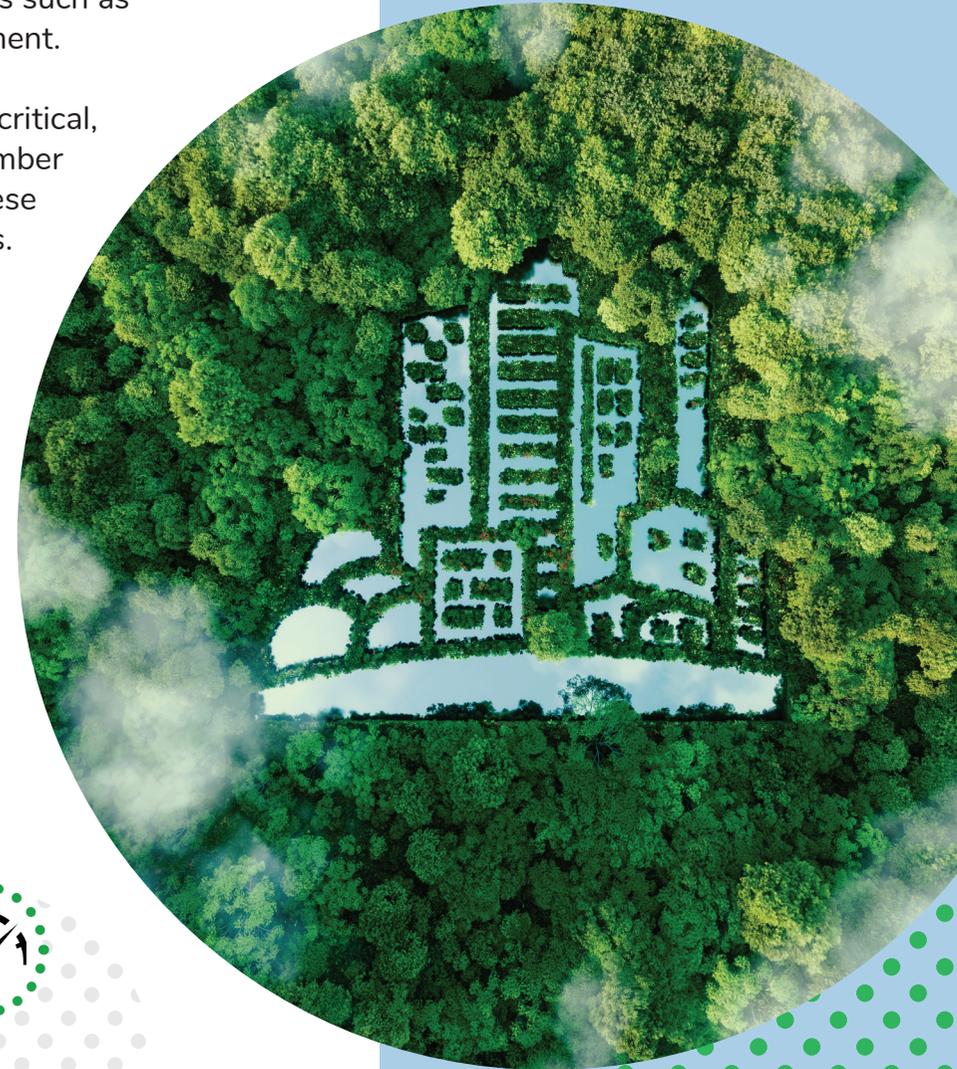
The commitment of global leaders to the United Nation's Sustainable Development Goals (SDGs) and the Paris Agreement have demonstrated their resolve to tackle issues such as climate change, resource scarcity, health and wellbeing and sustainable development.

The role of the building sector in addressing these complex issues is absolutely critical, and sustainable buildings have huge potential in helping us to achieve a large number of our global, regional and local goals. However, it will be very difficult to meet these goals unless we release this vast potential in the construction and real estate sectors.

This is why the European Commission has developed Level(s); a voluntary reporting framework to improve the sustainability of buildings. Level(s) is the common EU framework of core sustainability indicators. It is designed to enable professionals that play a role in the planning, design, financing and execution of building projects to make a clear contribution to broader environmental improvements at European level.

Level(s)'s aims are:

- To establish a common language of sustainability for buildings by defining core indicators for the sustainability of office and residential buildings and ensuring comparability
- To disseminate the use of Life Cycle Assessment (LCA) and Life Cycle Cost Assessment (LCC) methods at European scale.



Standardised reporting framework



Core sustainability indicators



Common metrics for life cycle performance measurement

# LEVEL(S) APPROACH

The common framework is organised into three levels. The levels provide a choice as to how advanced the reporting on sustainability for the project will be. You can choose to only work at one level or up to a specific level and use the guidelines accordingly.



## Level 1 (qualitative): CONCEPTUAL DESIGN

Accessible entry point for the use of each indicator, assessments are qualitative



## Level 2 (quantitative): DETAILED DESIGN AND CONSTRUCTION

Quantifying the performance of building designs, common units of measurements with reference calculation methods are provided



## Level 3 (monitoring): AS-BUILT AND IN-USE PERFORMANCE

Data collection on the real performance of the building project

For more information:  
Visit Level(s) website  
And publications: Level(s), A common language for building assessment  
Level(s), What's in it for public authorities, policy-makers and procurers?

# LEVEL(S) TARGET GROUP

Level(s) can be used by a variety of different groups at different stages of a building's lifecycle.



## Planning

Public authorities,  
policy-makers and  
procurers at national,  
regional, and local level



## Design

Architects, designers,  
engineers, and quantity  
surveyors



## Financing

Clients and investors,  
including property owners,  
and developers



## Execution

Construction companies  
and contractors,  
asset managers,  
facilities managers, and  
building occupants

# LEVEL(S) MACRO-OBJECTIVES

It is built on 6 macro-objectives for the sustainability of office and residential buildings with focus on the environmental performance, health and comfort, life cycle cost and value, and potential risks to future performance. It provides a set of indicators and common metrics for measuring the performance of buildings along their life cycle. It can be used to report on and improve the performance of new-build and major renovation projects.



1 Greenhouse gas emissions along the life cycle



2 Resource efficient and circular material life cycles



3 Efficient use of water resources



4 Healthy and comfortable spaces



5 Adaption and resilience to climate change



6 Optimised life cycle cost and value



# DEVELOPMENT OF LEVEL(S)



## Initiative of the European Commission\*

- Aim to reduce the environmental impact caused by buildings through improved resource efficiency
- Need for common EU reporting framework for assessing the environmental quality of buildings

2014

2015



## Publication of the Level(s) framework **Level(s)**

- Beta version
- Flexible indicator system
- Possible integration into existing evaluation systems

2017

2018



## Circular Economy Action Plan\*\*

- Promote design improvements to reduce environmental impacts
- Increasing the durability and recyclability of components



## Circular Economy Package

- Implementation of the Circular Economy Action Plan



\* Communication "Resource efficiency opportunities in the building sector" (2014)

\*\* Circular Economy Action Plan



## End of beta test version

- 2 years test phase (2017-2019)
- 136 Buildings including 74 residential and 62 office buildings were tested in all Europe



## Publications and website

- Communication and training materials published
- [https://ec.europa.eu/environment/levels\\_en](https://ec.europa.eu/environment/levels_en)

2019

2020

2021  
2022



## Level(s) methodology v2

- A new, more understandable methodology was published.
- Follow the life cycle of construction





# LCA, IAQ AND LCC INDICATORS

## LCA, LCC & IAQ

Level(s) framework support Green Public Procurement in Europe. Introducing 16 indicators, this framework is a comprehensive approach to sustainable building. With the intention to enable European public procurers to deal sustainable development (environmental, economic and social requirements) more easily, Life Level(s) promote a life cycle thinking approach and awareness on health. To do so, it simplifies the Level(s) framework to focus on three indicators: LCA, LCC and IAQ.



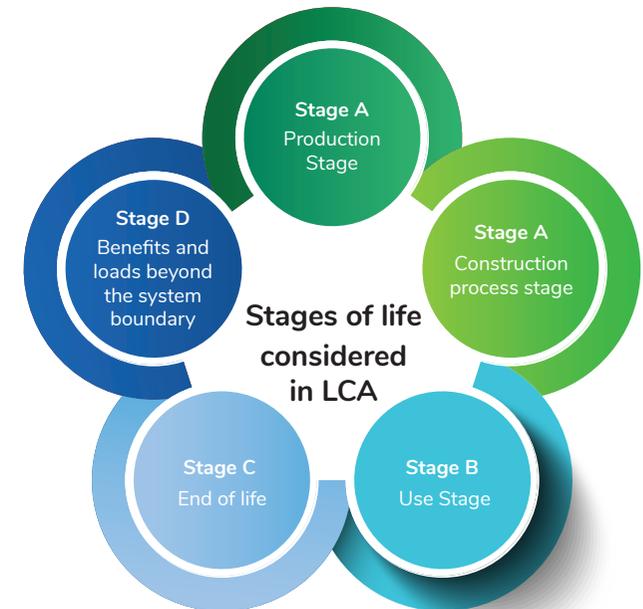
LCA LCC IAQ

# LCA (LIFE CYCLE ASSESSMENT)

**Life Cycle Assessment (LCA)** is a method to calculate the environmental impacts of a product all over its stages of life.

A **Life Cycle Assessment** of a building normally involves evaluating its whole life cycle. This means including all the stages in the assessment – raw material supply, manufacture of construction products, the construction process stage, use stage, demolition and recycling of materials.

The Paris Agreements emphasize the importance of assessing the environmental impacts and reducing the activities that most actively contribute to global warming. To calculate these impacts in the building sector, Life Cycle Assessment (LCA) is the most efficient because it is multicriteria and it considers all the environmental impacts throughout the entire life of a product.

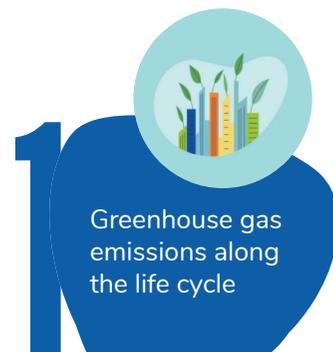


## General international standards for LCA:

-  ISO 14040 (Principles and framework)
- ISO 14044 (Requirement and guideline)
- ISO 14025 (type III declaration)

## European standards for LCA constructions:

-  EN 15804 (for products)
- EN 15978 (for buildings)



# IAQ (INDOOR AIR QUALITY)

Indoor Air Quality (IAQ) is the air quality within and around buildings and structures.

It has become a major public health issue. There are many potential sources of pollutants inside buildings: construction materials, decoration products, maintenance and furniture.

When measuring Indoor Air Quality, one must consider performance at different project stages, due to complex cause and effect relationships for indoor air parameters that require measurement.

## Why is Indoor Air Quality important?

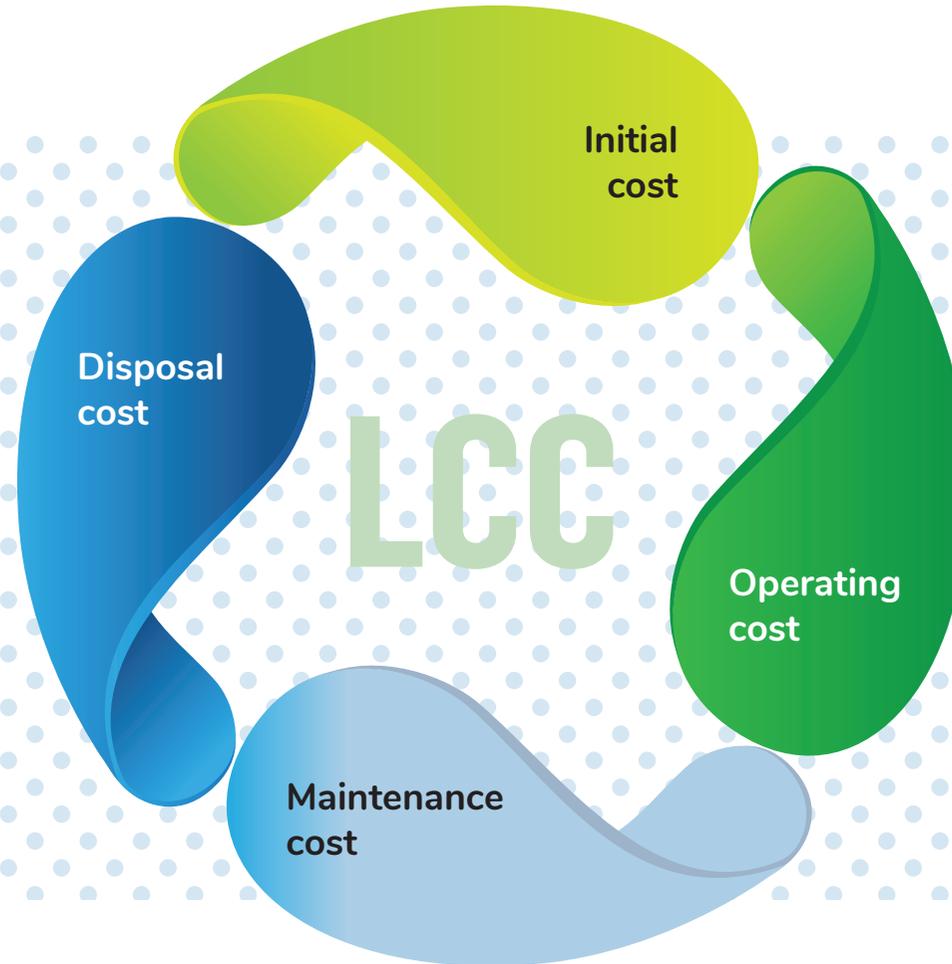
- ▶ In 2012, 1800 deaths in Europe due to poor IAQ (European Environmental Agency)
- ▶ People spend around 80% of their time indoors
- ▶ IAQ is about health and comfort
- ▶ The COVID crisis has highlighted the importance of IAQ

Formaldehyde  
**Insulation** CMR  
**Ventilation**  
 Radon **CO<sub>2</sub>** Particulate  
 VOC Benzene  
 Humidity



Aspect of a building that can affect IAQ

# LCC (LIFE CYCLE COST)



Life Cycle Cost (LCC) analysis is a methodology for comparing the total cost of a product, structure or system over its entire life cycle.

LCC gives a measurement of long-term economic performance of a building taking into account all its life stages. It includes various kinds of cost: the upfront capital costs, maintenance, repair and operation costs, renovation and adaptation costs, and finally demolition and disposal costs. It can also include environmental externalities.

LCC can be used to optimize the value and the cost of the entire life cycle of a building. It can help to make savings on resources consumption (energy, water, fuel) maintenance and replacement costs and disposal costs. LCC leads to a win-win situation whereby the building is less expensive and has better environmental performances.





# BUILDING SECTOR AND PUBLIC PROCUREMENT

# PUBLIC PROCUREMENT IN THE EUROPEAN UNION

Under EU procurement policy, tenders that exceed a specific set amount need to abide by a set of minimum requirements set by the EU. This policy has been transposed into national legislation by each member states. Member states have additional legislation for smaller tenders.

A quarter of a million public authorities spend around 14 % of the joint GDP of the EU on the purchase of services, work and supply annually. The European Commission believes strategic public procurement provides possibilities to boost the economy as well as innovation towards sustainability.

To ensure public procurers are able to take into account environmental aspects, the Commission has created a set of tools and criteria to lead the way. One of these tools is the Level(s) Framework.

In the following pages you will find a summary of how green public procurement principles are implemented in the eight states involved in the project.

For more information on public procurement in the EU visit the European Commission's website.



# PUBLIC PROCUREMENT FUNCTIONING

## WHO?

The key central institutions in the Republic of Croatia are the Directorate for the Public Procurement System within the Ministry of Economy, the Ministry of Economy and Sustainable Development, the Public-Private Partnership Agency for PPPs and the State Commission for the Supervision of Public Procurement Procedures for review procedures.

## HOW?

All notifications and related procurement documents are accessible online through a centralized electronic public procurement system operated by the National Gazette. The electronic submission of tenders has been mandatory in Croatia since 1 January 2016.

## GUIDING PRINCIPLES

### 2017: Law on Public Procurement

- Quality assurance standards and environmental management standards

### 2019: 4th national action plan on energy efficiency for the period 2017-2019

- Key objective: to engage GPP criteria in regular public procurement procedures on a national and local level

### 2021: Decision on green public procurement in central public procurement procedures

# INTEGRATION OF ENVIRONMENTAL INDICATORS IN PUBLIC PROCUREMENT

	<p>No legislative incentive through Green Public Procurement standards, but it is practiced by individuals mostly within the academic sector. The existing best practices could be used for education purposes.</p>
	<p>Although seen as a challenge, LCC is used in the country. Good practices exist and could be replicated.</p>
	<p>Not many actors are familiarized with IAQ in Croatia, and there is a lack of measuring technologies.</p>

CROATIA

# PUBLIC PROCUREMENT FUNCTIONING

## WHO?

The controlling actor in charge of the public procurements in Finland are ministry of Economic Affairs and Employment, and The Ministry of Finance and their connected bureaus. Governments Energy and Climate strategy sets the direction and principles for public procurement and municipalities and other actors that the public procurement procedures apply to use this strategy as a base to set their own sustainability and environmental goals for their procurement strategies.

## HOW?

According to the Finnish Governments Energy and Climate Strategy public procurement in Finland should fulfill economical, qualitative and strategist requirements, the procedure should be as open and transparent as possible and public procurement should enhance choices that improve environmental and social sustainability.

## GUIDING PRINCIPLES

### **The Act on Public Procurement and Concession Contracts (1397/2016, “Act on Public Contracts”)**

The government has set the goal for Legislation for procurement to optimize the use of public funds, enhance good quality, innovative and sustainable public procurement. Procurers are required to organize procurement in a way that procurements can be executed as economically as possible while still with the quality required. Strategic, environmental and social aspects have to also be taken into consideration. These principles and goals guide states strategy which so on guides the operation and strategies of the municipalities, bureaus and other public actors considered in the Act on Public Procurement.

Procurement Act enables the procurer to set different kinds of requirements or criteria to competitive tendering in public procurement process. The Act states that the procurer needs to choose most overall economical offer. This means that the decision can still be made based on the lowest price, but they can also choose option with the best value-quality ratio which enables procurer to make better choices also based on the projects, sustainability value and the life-cycle costs.

# INTEGRATION OF ENVIRONMENTAL INDICATORS IN PUBLIC PROCUREMENT

	<p>Legislation in process – to be verified for use in 2022 Voluntary use of this indicator is relatively popular and gaining more traction annually.</p>
	<p>Voluntary but very popular indicator in public procurement.</p>
	<p>Dictated by the Act on Public Procurement.</p>

FINLAND

# PUBLIC PROCUREMENT FUNCTIONING

## WHO?

The Ministry of Economy and Finance votes on the Code of Public Procurement, the legal code containing the provisions governing public procurement contracts.

## HOW?

The MOP law (law on public contracting) is a French law dealing with linking public contracting and private contracting. This law applies to public contracts in the event of construction.

## GUIDING PRINCIPLES

Since 2006, it is compulsory based on the Public Procurement Code to integrate environmental criteria in an offer.

Laws also set up rules on GPP:

Elan Law (2018): Goal to reform real estate and green buildings by favoring eco-materials and the development of low carbon solutions

Climate and Resiliency Law (2021): 20 articles on housing, favouring the development of LCA and LCC. It favors more generally a global approach of the building, taking many indicators into account.

RE2020: regulation that will come into force in January 2022.

# INTEGRATION OF ENVIRONMENTAL INDICATORS IN PUBLIC PROCUREMENT

	<p>With the RE2020 regulation, Life Cycle Assessment (LCA) is becoming a requirement to calculate the 'carbon weight' of new buildings first residential, then office and primary school and finally all new buildings. A database for LCA datasets on construction products and services (<a href="http://www.inies.fr">www.inies.fr</a>) need to be used.</p>
	<p>LCC is not compulsory but the public procurement code, since 2016, defines "life cycle costing" as a permissible criterion for the selection of tenders. Also, the RE2020 (to come in 2022), will value both technical and economical performance of buildings. Also, the Climate and Resilience Law (2021) indicates global cost as a goal to reach for green buildings.</p>
	<p>For "public establishments" (ERP), obligation to monitor indoor air quality and to label pollutants. Decree of 7 August 2015 set the deadline of 1 January 2023 for all public buildings to have the obligation to monitor IAQ.</p>

FRANCE

# PUBLIC PROCUREMENT FUNCTIONING

## WHO?

Relevant actors in public procurement are all public sector entities that purchase goods and services for public use. These entities can be federal, state or local institutions. The order volume for the procurement from the public sector is estimated in Germany at annually 500 billion €\*. The regulations for the award of public contracts are defined in various ordinances and laws and are subject to the EU Public Procurement Directives from 2014. Local and municipal ordinances and procurement guidelines can supplement these regulations.

## HOW?

Public Procurement Regulations generally require that environmental and social aspects are taken into account in addition to economic viability (§97 (3) GWB). Furthermore, the public sector is obliged to take aspects of circular economy into account (§45 (2) KrWG).

Threshold values are the most important determining factor for the question of which rules and regulations must be followed by contracting authorities when awarding public contracts and when organizing competitions. If the contract value exceeds the current threshold value (defined by the EU), public contracting authorities have to tender in accordance with the “GWB-Vergaberecht” (procurement law). For contracts below the threshold, budgetary law applies and different ordinances and regulations have to be followed.

## GUIDING PRINCIPLES

Act against Restraint of Competition - GWB (above threshold)

- Strategic procurement purposes, aspects of quality and innovation, and social and environmental aspects (§97)

Public Procurement Ordinance - VgV (above threshold)

- Performance specification (§31)
- Verification through labels and certification (§34)
- Award and award criteria (§58)
- Life cycle cost (§59)

Sub-Threshold Procurement Ordinance - UVgO (below threshold)

- Performance specification (§23)
- Verification through labels and certification (§24)
- Award and award criteria; Life cycle cost (§43)

Construction Tendering and Contract Regulations - VOB/A, VOB/B (below threshold)

- Binding for public works contracts

Waste Management Act - KrWG

- Durability, ease of repair and reusability or recyclability of products (§45)

Climate Protection Act - KSG

- Preference for products with reduced greenhouse gases (§ 13)

Sources and further information:

<https://www.kompass-nachhaltigkeit.de/grundlagenwissen/rechtliche-grundlagen>; <http://www.bescha.bund.de/DE/Rechtsgrundlagen/node.html>, <https://www.deutsches-ausschreibungsblatt.de/informationen/glossar/schwellenwerte/>; \*OECD (2019): Öffentliche Vergabe in Deutschland

# INTEGRATION OF ENVIRONMENTAL INDICATORS IN PUBLIC PROCUREMENT

GERMANY

	<p>There is no general legally binding obligation to use LCA. However, it is permissible and encouraged to integrate LCA into public procurement. For all federal buildings, the application of the Assessment System for Sustainable Building (BNB), is mandatory, including the assessment of LCA, LCC and IAQ. In addition, more and more state and local governments are demanding or promoting the use of these (and further) indicators in public buildings, adopting the BNB or other certification systems (e.g. DGNB) or providing funding programs (e.g. NBBW). A database for LCA datasets on construction products and services (<a href="http://www.ökobaudat.de">www.ökobaudat.de</a>) is providing additional support.</p>
	<p>In Germany, the contract is generally awarded to the most economical (not necessarily the cheapest) tender (§58 VgV, §43 UVgO). The integration of LCC in public procurement is not legally binding, but the contracting authority may specify that the award criterion “cost” is calculated on the basis of the life cycle costs (§59 (1) VgV, §43 (4) UVgO). For federal buildings, LCC assessment is mandatory (see above).</p>
	<p>Indicators for indoor air quality can be integrated into procurement processes. For federal buildings, IAQ assessment is mandatory (see above). An important tool for taking these aspects into account is environmental labeling, the criteria of which can serve as a basis for the performance description as well as the evaluation and selection of tenders.</p>

# PUBLIC PROCUREMENT FUNCTIONING

## WHO ?

The Office of Government Procurement (OGP) is responsible for setting the rules for PP in the State.

## HOW ?

### 2020: Programme for Government

The programme sets out the priorities for the government.

Within the Programme the Government has tasked the OGP with updating all procurement frameworks in line with green procurement practices.

## GUIDING PRINCIPLES

Develop and implement a sustainable procurement policy:

- Seek to minimise environmental impact
- Encourage suppliers to adopt practices that minimise their environmental impact.

The government also commits to:

- Ensuring that public procurement leads the transition to a Circular Economy
- Mandating the inclusion of green criteria in all procurements using public funds
- Creating a Circular Economy Unit in Government

Further information:

\* <https://www.gov.ie/en/publication/7e05d-programme-for-government-our-shared-future/>

\* <https://www.gov.ie/en/publication/4221c-waste-action-plan-for-a-circular-economy/>

\* <https://www.gov.ie/en/publication/984d2-climate-action-and-low-carbon-development-amendment-bill-2020/>

# INTEGRATION OF ENVIRONMENTAL INDICATORS IN PUBLIC PROCUREMENT

IRELAND

	<p>The latest guidance on procurement for office buildings has a significant focus on LCA, the Level(s) framework and standard EN15978. The national database and development program for EPDs are administered by the IGBC and the database is growing all the time (<a href="http://www.epdireland.org">www.epdireland.org</a>). LCA is beginning to be requested by Local Authorities.</p>
	<p>The concepts of life-cycle analysis and lifecycle costing are at the heart of Green Procurement and require buyers and suppliers to consider not just the up-front purchase costs of a given solution, but its total economic and environmental cost.*</p>
	<p>There is no specific national regulation on IAQ. In general, the key drivers to produce data on IAQ is to comply with certifications schemes. When filling in EPDs, usually manufacturers do not provide the information on IAQ.</p>

^ <https://www.epa.ie/publications/circular-economy/resources/Irish-GPP-Criteria-Office-Buildings.pdf>  
 \*[www.gov.ie/en/publication/c23f5-public-procurement-guidelines-for-goods-and-services/](http://www.gov.ie/en/publication/c23f5-public-procurement-guidelines-for-goods-and-services/)

# PUBLIC PROCUREMENT FUNCTIONING

## WHO ?

The former Ministry for the Environment (today Ministry of the Ecological Transition) published on the 11th of October 2017 a decree known as CAM (Minimum Environmental Criteria) providing a series of sustainability requirements for buildings.

## HOW ?

The effectiveness of the CAM is ensured thanks to art 18 of Law 221/2015 and art. 34 containing « Criteria for energy and environmental sustainability » of Legislative Decree 50/2016 which made it mandatory for all contracting authorities to apply it.

## GUIDING PRINCIPLES

CAM are the environmental requirements defined for the various phases of the purchasing process, aimed at identifying the best design solution, product or service from an environmental point of view along the life cycle, taking into account market availability.

The CAMs are defined within the scope of the Plan for the environmental sustainability of consumption in the public administration sector and are adopted by Decree of the Minister of the Environment for the Protection of the Territory and the Sea.

Their systematic and homogeneous application allows the diffusion of environmental technologies and environmentally preferable products and produces a leverage effect on the market, inducing less virtuous economic operators to adapt to the new demands of the public administration.

# INTEGRATION OF ENVIRONMENTAL INDICATORS IN PUBLIC PROCUREMENT

ITALY

	<p>The LCA analysis is not mandatory. A recent review of CAM included the proposal of a voluntary use of LCA in public tenders. The amended decree has not been published yet.</p>
	<p>CAM includes an economical criterion of the most favourable price following a method based on LCC (article 96 of the National code for public procurement). The criterion is often partially applied because reference, norms and methods are not clear.</p>
	<p>CAM provides a good analysis of IAQ through various criteria (natural ventilation and controlled mechanical ventilation, materials' emissions, radon). For each criteria, reference boundary values are given as foreseen by dedicated norms.</p>

# PUBLIC PROCUREMENT FUNCTIONING

## WHO ?

The Ministry of Treasury and Public Administration is in charge of the national public procurement policy through two main bodies: the General Directorate for State Assets (responsible for e-procurement) and the General sub-Directorate for Governance and Coordination of Public Procurement which harmonize public procurement at national and regional level. Key is its Observatory for Public Procurement.

## HOW ?

The Spanish public procurement system is composed of one single legal framework and a wide diversity of contracting, management and oversight institutions, due largely to the country's decentralised political system.

## GUIDING PRINCIPLES

Substantial efforts are underway to improve the centralization and harmonization of the system to reduce the costs of its current dispersed nature.

In order to standardize technical and economic requirements for public procurement procedures, Spain also makes use of a company classification system wherein enterprises can request certification as operating in one or more of 22 existing categories of business according to their field.

For larger value contracts contracting authorities can restrict eligibility to firms with the relevant classification, even under open procedures.

# INTEGRATION OF ENVIRONMENTAL INDICATORS IN PUBLIC PROCUREMENT

SPAIN

	<p>The potential of calculation LCA at buildings, creating benchmarks, recommending its use for sustainable design and possible inclusion at building regulations has got into the policy conversation. Very recently (Dec'21) LifeCycle terms have entered public procurement of building works. Nevertheless, volunteer pioneering practices are on the rise, though still few.</p>
	<p>Neither the indicator nor the methodology is widespread, even at a conceptual level. Other economic indicators as ROI are used. While sustainable financing is increasingly being debated, the focus on a lifecycle approach to it has not yet reached mandatory or voluntary initiatives.</p>
	<p>The building code (CTE-DB HS, specifically HS3 about IAQ) includes a solid approach to health in interiors, expanding beyond IAQ, including all Level's parameters.</p>

# PUBLIC PROCUREMENT FUNCTIONING

## WHO ?

Dutch government PIANOo - the Dutch Public Procurement Expertise Centre.

## HOW ?

Tenderned - Dutch government's online tendering system.

## GUIDING PRINCIPLES

All Dutch authorities are obliged to publish their national and European tenders on Tenderned's announcement platform

Professional procurement means linking procurement to your policy aims and budget and focusing on efficiency and quality

A will for sustainable procurement: taking into account environmental and social impacts as well as the prices

# INTEGRATION OF ENVIRONMENTAL INDICATORS IN PUBLIC PROCUREMENT

	<p>Bouwbesluit: According tot he Dutch Building Code LCA calculation is mandatory for new buildings.</p>
	<p>Value of LCC can have a major impact on sustainability in maintenance and operating phase, but there is a need for procurement on LCC build and maintenance and for a common calculation method.</p>
	<p>Bouwbesluit: regulation on formaldehyde concentration Mostly focused on ventilation and toxicity of building materials and the impact on the user's health But testing at delivery and during use phase is not always mandatory.</p>



# EXAMPLES OF BEST PRACTICES

## EXAMPLES OF IMPLEMENTATION OF LIFE LEVEL(S) INDICATORS

The European Commission has created resources to teach how to use the Level(s) framework. However, their use may still seem complicated to the untrained eye. A better understanding may come with the presentation of practical study cases.

In the following pages you will find examples of public construction projects that include at least one of the three Life Level(s) indicators. Those examples come with the description of the steps leading to the integration of the indicator, the methodology and tools that were used and feedbacks from the public procurers.

# LIFE CYCLE ANALYSIS – BEST PRACTICES

# LCA

# LCA: ASETELMAKATU, HELSINKI



## GENERAL INFO

Country: Finland  
 Developer: ATT (City of Helsinki)  
 Technical manager: Kimmo Antola  
 Case: Residential building worth 23 million euros  
 Date: 1.2.2021  
 Standard used: EN15987 and National method  
 Data sources: Database provided by One Click LCA

## Goal:

### Decreasing lifespan carbon through competition

The City of Helsinki has ambitious carbon neutrality targets. They have placed extensive environmental criteria as a part of procurement criteria to ensure the most sustainable building possible.

## Steps

Project manager, HVAC manager and developer architect scope out LCA criteria.

Internal experts, national governmental professionals and an external consultant assist.

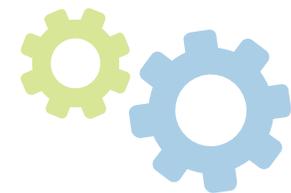
Contractors were provided with software and assistance to evaluate LCA

LCA calculations verified by external consultant

LCA calculations will be redone when construction is complete to ensure accordance

## Methodology and tools

LCA was performed using both the draft version of national legislative methodology and EN15978. At the time of the procurement, the national database was incomplete so general databases had to be used.



## CONCLUSION

The process was successful though the outcome would have benefitted from a higher level of competition.

In hindsight it would have been beneficial to discuss in length with the market in advance to ensure capability to produce according to requested criteria.

As the project was based on wooden construction to begin with, the amount of contractors available in the market was limited. This was exaggerated by additional criteria.

However, the two received proposals were of high quality and the procurement was completed according to procedure. Wooden construction seemed more expensive than concrete, but the requirement of LCA did not affect the pricing.

## WHY IS IT WORKING ?

The climate and environmental criteria used in the procurement are applicable as such

In other locations and projects as well. If a minimum level can be set for the carbon footprint in the future, it will be easier to implement criteria more appropriately.

In addition, when requesting carbon footprint information as part of a tender, it should be monitored during the construction process. The purpose of this competition was to check the carbon footprint twice: once at the design stage and a second time at the end of the construction phase. The result of the calculations is tied to the Bonus or Sanction scheme.



**Jonna Seppänen**, Environmental Expert, City of Helsinki



*In order for the selected criteria to have a real impact, the contractors must really feel it is meaningful to invest: the criteria must be given significant enough weight. Based on the experience in similar tenders, the weight should be at least 20%.*

# LCA: TECHNOLOGICAL UNIVERSITY DUBLIN, FOCAS RESEARCH INSTITUTE



## GENERAL INFO

Country: Ireland  
 Client: Grangegorman Development Agency (GDA) / TU Dublin  
 Architectural Lead: Carr Cotter Naessens Architects  
 Project: FOCAS Research Institute  
 Competition Date: 2020-2021  
 Standard used: EN-15978

## Goal:

### Introduction of LCA into Irish public procurement

In order to develop an enduring, adaptable and environmentally responsible building, the Grangegorman Development Agency (GDA) included the requirement that the winning design must demonstrate how the building would meet an embodied carbon target of 600kgCO<sub>2</sub>e/m<sup>2</sup> within the two-stage open Architectural Design Competition.

## Steps

Goals definition: develop an enduring, adaptable and environmentally responsible building

Choice of indicator: Whole life carbon as defined by BS-EN-15978

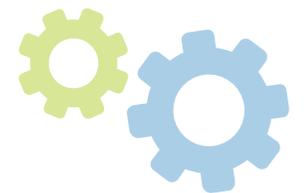
1st stage: selection of 5 teams which will provide a more detailed design

Submission of designs

2nd stage: selection of the best project by a jury

## Methodology and tools

The carbon requirement was formulated as described in BS-EN-15978. It includes a reduction of embodied carbon by 40% from a baseline of 1000kgCO<sub>2</sub>e/m<sup>2</sup>. To help make a decision, the jury was advised by technical experts in LCA, circularity and CLT construction.



<https://www.epa.ie/publications/circular-economy/resources/GPP-Guidance-for-the-Irish-Public-Sector.pdf>

## CONCLUSION

FOCAS Research Institute project is a leading project regarding the use of LCA in public competition in Ireland. It has introduced carbon indicators in its tender, with the goal of making an enduring, adaptable and environmentally responsible building.

## WHY IS IT WORKING?

The project uses the BS-EN-15978 standard to provide the framework of its LCA. The iterative approach to LCA means decisions can be guided by the latest knowledge on the carbon impact of the design as it evolves.



**Catherine Opdebeeck**, Project Coordinator - Grangegorman Development Agency



In order to meet strategic objectives of a net carbon zero horizon for both the Grangegorman site and nationally, performance targets are set for this project. Targets are set for both embodied and operational carbon as elements of whole life carbon. These are complementary to regulatory compliance and are fundamental to the project.

The carrying out of Life Cycle Assessments and integrating this into the design process forms part of the complete Design Teams' scope. A Life Cycle Assessor has been appointed as part of the Design Team.

The procurement of the LCA role was linked to the Life Cycle Cost and Quantity Surveying Role during procurement. Qualitative assessment around LCA formed a large portion of the award criteria for this linked role and as a result influenced the procurement process emphasizing a whole life approach.

The Design Team are currently reviewing a number of options around the structural frame which will be reviewed according to a matrix of risks and opportunities including embodied carbon. The Life Cycle Assessment is being considered as an iterative process used to influence early decision making.

# LCA: LILLE MÉTROPOLE HABITAT



## GENERAL INFO

Country: France  
 Contractor: Lille Métropole Habitat (LMH), public housing office of the Lille métropole.  
 Technical manager: LMH and the CD2E  
 Pilot projects: Brève Breughel and Wavrin (reference)  
 Date: 2019 – 2021  
 Standard used: E+C- experiment rules (based on EN 15978), and HQE Performance LCA in renovation method for the Wavrin project  
 Data sources: EPDs of Inies database

## Goal:

**To include multicriteria LCA clauses in tender assessment criteria**

In France, LCA will be mandatory for all new building in 2022. LMH wonders how it can integrate this criteria in its own tenders in new and renovated buildings, based on a reference project, Wavrin.

## Steps

LMH's willingness to implement LCA clauses in its tenders

Define which 9 indicators will be looked at

Establish ratios and scores in relation to the reference project, adapt to the reference

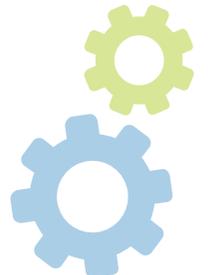
Testing of the method

Upgrade the method by shifting from a reference project to absolute indicators

## Methodology and tools

They based their method on the french E+C- experiment (based on EN standard 15978), and the HQE Performance test for renovation. The results for each indicator were compared with the Wavrin reference project.

The LCA is conducted in an energy-carbon framework, and considers 9 different indicators (GWP, Acidification Potential...). For each indicator, an impact value is attributed and is converted into a score. At the end of the process, each scenario has scores for the 9 indicators and receives a global score. These scores help creating eco-conception strategy and choosing between the scenarii.



## CONCLUSION

The Brève Breughel and Wavrin projects were pilots, that helped highlighting both the benefits of LCA and the difficulties encountered by actors during the process.

The choice of the framework, for example, impacts the results of the study, since the indicators will not have the same weight. It is therefore important to choose the most adapted framework from the beginning of the study. Here, it was especially important to properly frame the standard reference and to identify the importance of the different indicators.



**Romain Vermaut**, Carsat Hauts de France (previously at LMH, worked on the conduct of the project)



*The key is to get started and to begin by surrounding yourself with the skills that will allow you to avoid most barriers. When we look at the road ahead, it seems winding and unmarked. However, it is very rewarding because it allow us to better understand the impact of our design choices, to inform our boards, our leaders and our elected officials on the environmental impacts of our decisions. The financial arbitration remains a determining factor but it can be moderated by these criteria if they are integrated in the judgement of the offers. At LMH, my rôle as project manager was decisive in the integration of LCA in renovation project. We were thus able to understand how the life cycle analysis could become an help to the decision. For the second project, we integrated LCA as criterion for judging tenders. The most important parameter in this type of project is the owner's will. Because LCA is based on calculation and with standards, we can have a concrete idea of the environmental value of a project throughout its life cycle. My next project integrating LCA will be the rehabilitation of the headquarters of the CARSAT Haut-de-France.*

## WHY IS IT WORKING?

Brève Breughel and Wavrin projects were a success for several reasons. First, there was a will from LMH to conduct LCA. Moreover, in France, new regulation will soon apply, (RE2020), and there was already the E+C- experiment, and actors from the building sector have to adapt. Finally, LCA can not be conducted without data, which are available in France through the INIES database.



# INDOOR AIR QUALITY – BEST PRACTICES

# IAQ

# IAQ: NETHERLANDS - BIOSINTRUM



## GENERAL INFO

Country: Netherlands  
 Client: Municipality of Oostellingwerf  
 Architect: Paul de Ruiter  
 Construction: Natuurlijk Bouwen B.V.  
 Knowledge centre for biobased products for construction  
 WELL Building Standard  
 BREEAM-NL certified (jun 2020) 5 stars  
 BREEAM Health score: 92,86%

## Knowledge centre for biobased products for construction

In The Netherlands, the municipality of Oostellingwerf had the ambition to score 'Outstanding' on the BREEAM-NL certification. Goal is to become one of the most sustainable and innovative buildings in Europe.

## Steps

The municipality wanted to take a frontrunners position in biobased use of materials. The contractor was selected after winning a tender.

The architect and contractor defined together with government, education and business the design and construction.

During the project, a commissioning manager is appointed; this one has had a controlling role with regard to the work of the design and construction team for the building-related installations.

From design to delivery, a BREEAM\_NL Expert was involved in the project.

BREEAM-NL and critical BREEAM-credits led to a reference methodology that helped to shape the project and a high health score.

## Methodology and tools

The BREEAM-NL methodology has led to a very high health score of 92,86%. The guidance of the BREEAM credits gave structure to the process of the project, since it was used as a central sustainability management methodology.

All rooms are equipped with mechanical air supply and disposal. All rooms are also equipped with a control panel where the mechanical ventilation flow rate, temperature and lights can be regulated with. If the CO<sub>2</sub> content in a space reaches a certain limit, rooms will get more ventilation. All living areas have a CO<sub>2</sub> regulator in place. All living spaces have windows that users can open. Reception can control the first and second floor separately.



## CONCLUSION

The usage of BREEAM-NL helped the contractor and architect and other stakeholders with a central system. This has led to a great indoor climate, with ability to change temperature and air flow rates in each room.

Moreover, the usage of biobased materials (80%) also leads to a better indoor climate and a very high overall health score of the building. A healthy indoor climate leads to an healthy and productive environment, an improved image and the possibility to increase rent.

## WHY IS IT WORKING?

The method of BREEAM-NL helped the project with a central reference management system to incorporate all sustainability aspects;

- Low energy- and exploitation costs
- Optimal building management, through extensive metering and control
- Better process monitoring and control during construction
- Reinforcing the image of the user of the building
- Housing matching the set sustainability ambition
- Financial benefit using the MIA subsidy



**Ing. Tom Linneman**

Linneman – Bouw en Advies



*The project was a succes due to the high ambition setting and clear goals that were given by the municipality.*

*Moreover, the usage of a tender process for selecting the contractor led to a collaboration between frontrunners of contractors in sustainability in the area.*

*The architect decided to collaborate with other stakeholders as well (students, government, organisations) and the BREEAM-NL system helped to give structure to the project.*

For more information:

[https://www.breeam.nl/upload/files/Projecten/Casestudies/MAN%209.A%20-%20Casestudy%20Biosintrum%20Oosterwolde\(1\).pdf](https://www.breeam.nl/upload/files/Projecten/Casestudies/MAN%209.A%20-%20Casestudy%20Biosintrum%20Oosterwolde(1).pdf)



# LIFE CYCLE COSTS – BEST PRACTICES

# LCC

# LCC: LCC ANALYSIS OF VARAŽDIN PFI SPORTS HALL



## GENERAL INFO

Country: Croatia  
 Contractor: PPP Centre  
 Technical manager: prof.dr.sc. Saša Marenjak  
 Pilot project: life cycle cost analysis in construction of sports hall  
 Date: 2008.  
 Standard used: ISO 1568-5  
 Data sources: data provided by contractor

## Goal:

### LCC perspective on Varaždin Sports Hall

City of Varaždin procured PPP Centre to provide a perspective of which cost categories should be monitored based on LCC analysis. Construction of a sports hall in the City of Varaždin of 5000 seats.

## Steps

Assesment and justification of competitive options

Awareness on total costs

Precise way to foresee financial flows

Strategy development for future efficiency

Risk management

Best value for money solutions



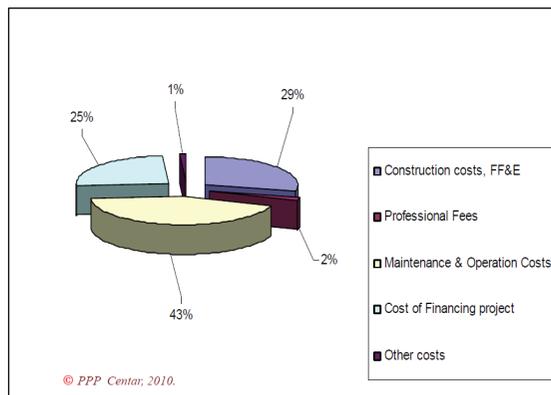
## Methodology and tools

- Norms and process based on ISO 15686-5 standard
- By analysing the total life cycle cost (LCC) and applying the Method of Approximate Quantities and the authors database developed on his previous research and based on the analysis of historical data of similar buildings, the total cost of living of the project was estimated

## CONCLUSION

- LCC analysis showed that the largest amount of costs covers the aspect of maintenance and operation costs
- Commercialisation income – tends to be underutilised – significant element in potential reduction of whole life costs

Whole Life Costs of Varazdin Sport Hall  
(25 years)



## WHY IS IT WORKING?

The analysis showed how significant the cost of maintenance and use of the Hall in the economic life of the building and why it is important in the design stages to analyse not only the cost of construction but also other significant costs in the stage of use of buildings. The LCC analysis proved that it is justified to reduce operating costs (maintenance and use) and increase energy efficiency with increasing the quality of selected materials and equipment.



**Prof. dr. sc. Saša Marenjak,**  
Faculty of Civil Engineering Osijek,  
PPP Centre

“ The process of calculating the total life cycle cost (LCC) of a building provides insight into the costs of planning, designing, building, using and removing the building. By using this method at an early design stage, it is possible to reduce operating costs, plan future project ownership costs, and prevent or reduce the impact of business interruptions due to maintenance needs and functional usability.

Key LCC analysis aspects to address:  
Service standards need to be contractually defined  
Public sector needs to provide continuous monitoring of performances and costs  
Monitoring of LCC enables a perspective on key cost characteristics which provide comparable data

# LCC: Guidelines for economically viable construction, FRANKFURT AM MAIN



## GENERAL INFO

Country: Germany  
 Publisher: City of Frankfurt am Main (Magistrat)  
 Editor: Mathias Linder  
 Date: 29.12.2020  
 Source: City Frankfurt am Main (2020):  
 Leitlinie zum wirtschaftlichen Bauen 2021.  
 Access: <https://energiemanagement.stadt-frankfurt.de/Investive-Massnahmen/Leitlinien-wirtschaftliches-Bauen/Leitlinien-wirtschaftliches-Bauen.pdf>

## Goal:

**Reducing the total annual costs over the entire life cycle for public buildings**

The city of Frankfurt am Main in Germany shifts the focus from cheap construction to economically viable construction, taking into account the entire life cycle.

## Steps

Needs Assessment  
 Setting out planning objectives in a coordinated and approved target agreement

Planning  
 Early assembly of planning team, integration of anticipated operating costs into performance specification

Acceptance  
 Preparation and handover of building operation folder and as-built documents

Operation  
 Regular monitoring:  
 User satisfaction, indoor air quality, actual operating costs

Reducing the total annual costs over the entire life cycle

## Methodology and tools

Compliance checks to be conducted on the basis of step-by-step checklists (Excel-Tools) to follow at the time of reaching the four milestones: 1. conclusion of preliminary planning, 2. at the construction and financing submission, 3. at acceptance, 4. after two years of operation. For all measures >500.000 EUR, an up-to-date total life cycle cost calculation (LCC) must also be submitted at all milestones. Along with the guidelines, the city of Frankfurt am Main provides excel-based step-by-step-checklists as well as practical templates in order to conduct the compliance checks at the relevant milestones.



## CONCLUSION

The guidelines for economically viable construction of the city of Frankfurt am Main aim at minimizing the total annual costs (sum of capital costs, operating costs and follow-up costs) over the entire life cycle (planning, construction, operation, refurbishment, demolition and disposal) for specified qualities. The guidelines define the quality of new construction and renovation projects of the City of Frankfurt am Main and describe the processes that are to be followed in order to achieve these qualities.



**Mathias Linder**, Head of Department Energy Management, Magistrate, Office for Construction and Real Estate



*With its guidelines for economically viable construction, the city of Frankfurt am Main pursues the objective of “Not cheap, but economically viable”. It is particularly noteworthy that the required calculation of the life cycle costs is not used as a mere quality check, but as a basis for planning in various phases of the project.*

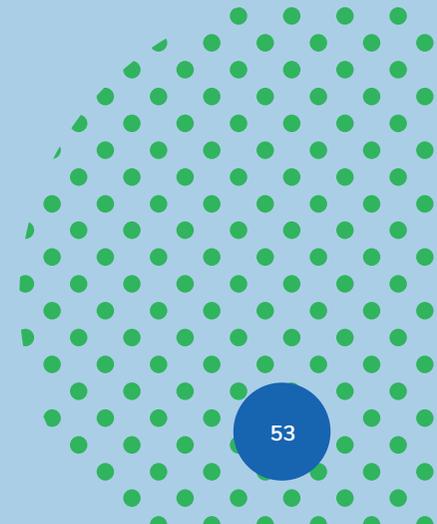
## WHY IS IT WORKING?

The guidelines for economically viable construction from Frankfurt serve as a model for how sustainability requirements, in particular the life cycle costing (LCC), an integral part of the Level(s) framework, can be anchored at regional and municipal level. They apply to all public new construction and renovation projects of the city of Frankfurt am Main, Germany (except temporary buildings with an operating life < 2 years). The guidelines are aimed in particular at architects and engineers who are commissioned with municipal construction projects, but also to all those involved in municipal construction tasks. The guidelines and tools are being updated annually.

For more information:  
[https://www.breeam.nl/upload/files/Projecten/Casestudies/MAN%209.A%20-%20Casestudy%20Biosintrum%20Oosterwolde\(1\).pdf](https://www.breeam.nl/upload/files/Projecten/Casestudies/MAN%209.A%20-%20Casestudy%20Biosintrum%20Oosterwolde(1).pdf)



# MIX – BEST PRACTICES



# LCC & LCA: METSOLA PRIMARY SCHOOL, HELSINKI



## GENERAL INFO

Country: Finland  
 Client: Facilities-service (City of Helsinki)  
 Developer: Hoivatilat  
 Toteutusmuoto: Vuokrahanke  
 Case: Educational building worth 10 million euros  
 Date: 1.2.2021  
 Standard used: EN15987 and National method  
 Data sources: Database provided by One Click LCA and Kustannustieto TAKU 2020

## Goal:

### Decreasing lifespan carbon through competition

The City of Helsinki has ambitious carbon neutrality targets. They have placed extensive environmental criteria as a part of procurement criteria to ensure the most sustainable building possible.

## Steps

Project managers and internal LCA expert scope out the LCA and LCC criteria and other minimum requirements.

An external LCA consultant describes the calculation methodologies and required input data.

Contractors were provided with input data forms and methodology descriptions.

LCA and LCC calculations were carried out by the external LCA consultant based on the information provided by the contractors.

LCA calculations will be redone when construction is complete to ensure accordance.



## Methodology and tools

- LCA calculation was divided into two parts both of which were evaluated individually: Materials (A1-A3, B4-B5) and Energy (B6).
- LCC was evaluated without investment costs as that information was part of the tender and provided by the constructor.
- The tender with the lowest LCA (divided into materials and energy) and LCC was granted with maximum points and the other tenders relative to that.
- LCA was performed using the draft version of national legislative methodology using OneClickLCA software and its database.
- LCC was carried out based on EN 16627 and using Kustannustieto Taku 2020 -software for calculation.



**Sara Tapiala**  
Team manager  
City of Helsinki

## CONCLUSION

- There were no significant differences between bidders (45p vs 48.9p when maximum 50p. Quality scores for the whole entity combined at 95p and price at 120p.
- More efficiently, a lower carbon footprint is controlled by setting a minimum level.
- Quality points for the proportion above that. The comparison was made for two offers: more would have been laborious and expensive.



The project showed that it is possible to include a quality score in the competition based on the carbon footprint. The approach used here is to reward the smallest LCA out of that group, but let's not take into account whether it's actually a little or a lot.

For more information: [Link about the project](#)

## WHY IS IT WORKING ?

The relative weight of the issue Calculations by a third party do not allow for comical gimmicks. On the other hand, the tenderer does not have the possibility to optimise his tender unless he makes his own calculation

# IAQ & LCA: NEW GYM FOR THE SCHOOL OLIVIERI IN PESARO, ITALY



GENERAL INFO

Country: Italy  
 Owner: Municipality of Pesaro  
 Contractor: the tender is closed (November 2021)  
 Technical manager: Office for Public Works  
 Pilot project: New gym for a school building  
 Date: tender published on the 4th of August 2021  
 Standard used: Sport facility  
 Data sources: local authority website

Goal:

**Design and construction of a certified nZEB school's gym in Italy, with requirements on IAQ and LCA**

In Italy, LCA is not mandatory. However the municipality of Pesario decided to include it in its tenders, as well as IAQ by using LEED v4 certification.

## Steps

Public tender will be 5 for economic aspects and 95 for technical offer

In the technical offer, 48 points for environmental aspects: environmental structure (25), building (19) and product (4) certifications

Choice to use the LEED V4 certification for the building: methodology, third verification

The municipality awards the best value for money offer



## The public tender

The tender awards the technical offer more than the economic one, as shown:

Type of offer	Score
Technical offer	up to 95 scores for sustainability and comfort parameters (of which 48 to life cycle related requirements)
Economic offer	Up to 5 scores
<b>Total</b>	<b>100 scores</b>

## Methodology and tools

The municipality has chosen various indicators for LCA and IAQ. Each indicator was then given a score and a weight to calculate the total score of the project. The relevant weights can be summarized as follow:

- Up to 25 to the use of timber frame instead of pre-cast concrete structures
- Up to 19 to the sustainability rating system certification LEED v4 with mandatory criteria: LCA analysis, building fabric commissioning, building systems commissioning
- Up to 4 to environmental certification of construction products



## For comfort and IAQ

### Energy parameters requirement

nearZEB: CPE-Pre  $\leq 0$   
 CPE  $\leq 25$  kWh/m<sup>2</sup>y  
 CHVAC  $\leq 20$  kWh/m<sup>2</sup>y  
 Clighting  $\leq 5$  kWh/m<sup>2</sup>y

### Indoor environmental quality parameters

CO<sub>2</sub> max: 1000 ppm (daily average)  
 CO<sub>2</sub> > 1000 ppm for 100 hours/year  
 VOC < 0,05 ppm  
 PM<sub>10</sub> < 50 µg/m<sup>3</sup> (24hours average)  
 T min (winter) 19-21°C  
 Tmax summer 25-27 °C  
 T air above 28 °C  $\leq 40$  hours/year

### Blower window test required

## For LCA

### Building sustainability certification:

LEED v4: gold or platinum  
 With mandatory credits about:

- LCA
- Envelope commissioning
- Building systems commissioning

### Building materials and product environmental certification:

- Building carbon footprint calculation (UNI ISO/TS 14067)
- Labelled products:
- EPD for reinforced concrete and steel bars, screeds and insulating products
  - ECOLABEL for paints and adhesives
  - FSC or PEFC for timber products

## Scorecard

Topic	Score
Environmental performance of the structure improvement: timber structure	25
Building envelope environmental performances improvements: solar shading devices	11
Energy performance improvements: heat/cold fluids production systems; mechanical ventilation, heat recovery	15
Improvement of water distribution system	2
Rain water collection system and green areas irrigation	2
Energy performance monitoring system	8
Acoustic performance improvement: building envelope	6
Acoustic performance improvement: building service	2
Site improvement: material and waste collection areas	1
Sustainability certification of the building	19
Building materials and products sustainability certification	4





## CONCLUSION

In Italy, there is not yet reference to the use of LCA and LCC on GPP rules (CAM edilizia), whereas there are specifications regarding IAQ. Italy doesn't have a national methodology and database to support LCA calculation either.

Nevertheless, the CAM edilizia have criteria referred to material circularity and low environmental impact, such as recycled content and the end-of-life plan for the full building.

Two main key learning for countries on a similar situation are:

- To include in tenders the request for building certification with rating systems such as LEED, HQE, DGNB and other that encompass the use of LCA. In tenders there should be a specific reference to the rating systems' credits that include LCA and LCC
- To pay attention to the distribution of the awarding points of the full tender to give enough weight to sustainability and life cycle principles and related requirements. In the Italian example almost 50% of the full score tender is given to life cycle-related strategies

## WHY IS IT WORKING?

The reference to rating systems that already encompass the use of LCA overcomes the barrier of the lack of a national law, methodology and database on life cycle impact assessment of buildings.

The weight given to life cycle principles and solutions in the tender score, about 50%, indirectly makes the requirement mandatory for a project to be awarded.



**Margherita Finamore**  
Public Works Department  
Pesaro Municipality



Nowadays in Italy, including energy-environmental certification in public tenders is necessary to achieve low environmental impact of buildings. To this requirement a highly rewarding value shall be attributed to encourage companies to offer such certification. It is essential to ensure that the economic offer only does not affect the result of the tender in order to reward the companies that offer the best offer.

The model is replicable because in the case of the school we have:

- Construction cost 1,300 € / sqm
- Less than 10 kg CO<sub>2</sub> m<sup>2</sup> / y against 550 kg CO<sub>2</sub> of a traditional corresponding building
- nZEB energy standard
- 98% recycled C&D waste

This GPP model built around a circular approach has already resulted in a budget that allows for great replicability showcasing to be a crucial contribution to a net zero carbon transition

For more information click [here](#)

# LCA & LCC: SUSTAINABLE MODEL DISTRICT NECKARBOGEN, HEILBRONN



## GENERAL INFO

Country: Germany  
 Contractor: City of Heilbronn  
 Management: Dr. Christoph Böhmer (Head of planning and building law office Heilbronn)  
 Date: 2009 - today  
 Standard used: DGNB Pre-certificate in Platinum (Urban Districts)  
 Data sources: Heilbronn (2017):  
 Documentation Model District Neckarbogen

## Objective: Development of a vibrant, diverse and innovative sustainable district

Within the model district Neckarbogen in Heilbronn, Germany, several instruments were used at municipal level in order to foster the integration of sustainability criteria into the planning and procurement process - the main instruments being certification, quality assurance, and through-out mixing.

## Steps

Inventory and demand analysis; urban planning competition

Acquisition of the development areas / plots

DGNB Pre-certification for sustainable districts

Transdisciplinary and integrated development and quality assurance

Investor selection and Concept tendering

## Methodology and tools

Aiming at a DGNB pre-certification of the district, where among other criteria, LCC and LCA play an important role, served as an important lever to anchor sustainability aspects in the planning process and to use the criteria for optimization. For instance, when an initial pre-check revealed that the economic standard was not met, the concept had to be adapted in the fields of density and the number of residents were doubled in order to achieve the economic goal.

In order to ensure the implementation of the sustainability aspects, an innovative integrated development and quality assurance process has been elaborated, involving internal and external experts, citizens and public authorities influencing the urban development framework. A matrix was used to establish standards and allocate tasks across five topics and at three different levels of aspiration. The matrix helped evaluate the best overall design for the site. With the procurement instrument of concept tendering, the properties were allocated based on the best design, not on the highest price. Furthermore, the quality assurance process of the council of Heilbronn involved the use of design guidelines (outlining the choice of material, and design of facades and free spaces) and a jury within a building committee.



## CONCLUSION

The successful development of the Neckarbogen district has shown how important an interdisciplinary and integrated approach is, especially for projects on the scale of a completely new urban district. The framework plan sets a clear vision for the qualities of the new district and provides essential goals for its development into a vibrant, diverse and innovative sustainable district. A strong focus was put on the topics of diversity and ‘through-out mixing’ (referring to a combination of purposes of a building, e.g. office, leisure, commercial, restaurants, etc.). This allows change in the use of buildings and the ‘multi-coding’ of free spaces, creating a level of resilience which supports long term sustainability and acceptance.

Accompanying the development with a holistic quality assurance process including a DGNB pre-certification ensured the implementation of sustainability aspects during the whole process.

## WHY IS IT WORKING

The key lever of success of the implemented quality assurance process in order to ensure the implementation of sustainability aspects within the project, has been the ownership of the plots within the district. This gave the city of Heilbronn the possibility to implement an innovative tendering procedure (concept tendering), allowing the allocation of the properties based on the best design concept, not on the highest price.

The quality- and concept-oriented approach has certainly proven its worth in the development of the Neckarbogen to date and created incentives to integrate sustainability and diversity in the district development. It has been shown that the ambitions of the city of Heilbronn have been well received by citizens and investors.



**BM Wilfried Hajek**, mayor responsible for the department of construction and urban development, City of Heilbronn

“ The development of a new city quarter with a size that almost reaches the historic core city is a special challenge for a city. Heilbronn was one of the first cities to have a plan for a new urban district certified by the German Sustainable Building Council (DGNB). In doing so, it saw the certification process as an important tool for quality assurance and as an important stimulus for further planning.



**Dr. Christoph Böhmer**, Head of planning and building law office, City of Heilbronn

“ Implementing a quality- and concept-oriented approach for the tendering process allowed the city of Heilbronn to find the best overall design for the site and allocate the properties accordingly. The implementation of sustainability aspects was ensured by the quality assurance process of the city of Heilbronn as well as by the DGNB pre-certification process.



# CONCLUSION AND PERSPECTIVE

## **Learning 1: Municipalities go beyond national regulations**

As national and European regulations do not go far enough in the environmental approach for buildings, some municipalities are trying to engage themselves toward this transition. By using what they have (Level(s) methodology, certification schemes, ...), they open the way to other municipalities and allow the States to question themselves on what could be a more ambitious regulation.

Thanks to their knowledges, GBCs can also be a help for this municipalities to go further.

## **Learning 2: A need to share knowledge**

When we asked before this best practice guide public procurer on the barriers for the use of LCA, LCC, IAQ indicators, one of the first barriers identified was the lack of information, in particular to show how to move from theory to practice. We need to create communities in each country, to show feedbacks on possible solutions, to get in touch.

In each GBC, group exist where it is possible to connect with others on specific topics and thus move forward together towards a more sustainable world.

## **Learning 3: “you can’t manage what you can’t measure”**

The feedback we have is that the evaluation of indicators is a key step. Whether we want to reduce the carbon footprint, improve comfort or reduce the overall cost of a project, it is necessary to be able to measure and have figures to guide decisions. It is the use of indicators that will allow the emergence of sustainable buildings.

Based on scientific grounds, some GBCs have developed or are using methods to address them.

## **Learning 4: Moving from carbon saving to a multi-criteria analysis**

LCA is a method that allows the environmental impacts of a building to be taken into account over its entire life cycle. Today, LCA is mainly used to calculate the carbon footprint of buildings. This first step is interesting, but LCA is a multi-criteria method, and in order to develop sustainable buildings, it must be used in a more complete way. It would be interesting, for example, to have requirements on other indicators, such as waste production, energy or water consumption, especially since the calculation of these indicators is done automatically at the same time as global warming potential indicator.

## Learning 5: Ventilation for a better air quality

IAQ is an important health issue. It varies according to pollutants that can be found in the building and their renewal. Ventilation is the parameter on which is most effective to act. The main difficulty with this indicator is that air quality cannot be predicted without measurement. The regulation must therefore be done after construction.

## Learning 6: Global costing for better value for money

LCC makes it possible to calculate the cost associated with product and maintenance throughout the lifecycle. This method allow to make choices on the quality of the products while remaining on affordable prices.

### PERSPECTIVE 1

#### Learning what to do

When we asked stakeholders about their knowledge of Level(s) indicators and in particular LCA, LCC or IAQ, most of them had not used them because they did not know how.

That's why, GBCs organize training session adapted to each one: manufacturers, public authority and companies.

**Go to action B4 of the project!**

### PERSPECTIVE 2

#### Having appropriate method and data

One of the gap for each of these indicators is the existence or access to appropriate data and tools.

The level(s) method provides a common language and proposes a methodology and tools to calculate each of these indicators.

The Life Level(s) project has created data for some countries to make more complete calculations.

**Go to action B2 of the project!**

### PERSPECTIVE 3

#### Getting involved

After reading and seeing these examples, it becomes time to act! In order to disseminate good practices and experiment, Life Level(s) project proposes you to sign a commitment to incorporate LCA, LCC, IAQ indicators in your public order.

**I want to sign it!**

# TO GO FURTHER

## General resources for public procurer

JRC – GPP good practice (EN)

JRC – Process for setting criteria (EN)

JRC – Buildings (EN)

JRC – Level(s), What's in it for public authorities, policy-makers and procurers? (EN)

JRC – Green Public Procurement Criteria for Office Building Design, Construction and Management (EN)

## Focus on LCC

ObCP – The necessary Big Bang in public contracting: towards a disruptive regulatory vision in public and private management that emphasizes quality (ES)

DGNB – Guideline for sustainability-oriented planning and procurement (DE)

# TO GO FURTHER – GBC RESOURCES

## Focus on LCA

Alliance HQE-GBC – New and renovated building regard to circular economy (FR)

Alliance HQE-GBC – The hidden treasure of renovation (EN & FR)

Alliance HQE-GBC – LCA guide in renovation (EN & FR)

DGNB – Life Cycle Assessments – A Guide on using the LCA (EN & DE)

DGNB – “Benchmarks for greenhouse gas emissions from building construction” (EN & DE)

FIGBC – Guide for life cycle assesment according to upcoming legislation (FI)

Bionova - Recommendations for Carbon Footprint Limits for Building Types (EN)

## Focus on IAQ

Alliance HQE-GBC – The place of continuous measurement sensors during the reception or operation of a building (FR)

Alliance HQE-GBC –IAQ measurement guide in exploitation (FR)

Alliance HQE-GBC – IAQ measurement guide for reception (FR)

DGNB - “Liveable & fit for the future – People as the center of sustainable construction” (EN & DE)