

Training Course

MASTERING LIFE CYCLE ANALYSIS FOR BUILDING STRUCTURES

This course offers a detailed overview of Life Cycle Assessment (LCA), its theoretical framework, and strategies aimed at reducing embodied carbon in various building structural systems, including steel, reinforced concrete, and timber. It features practical exercises, case studies from the field, and engaging discussions to enhance knowledge to deepen the understanding of the subject. By the end of this course, participants will know how to calculate the embodied carbon of a structure during the conceptual design stage, apply strategies to lower GHG emissions, and critically assess the life cycle performance of the structures within their practice.

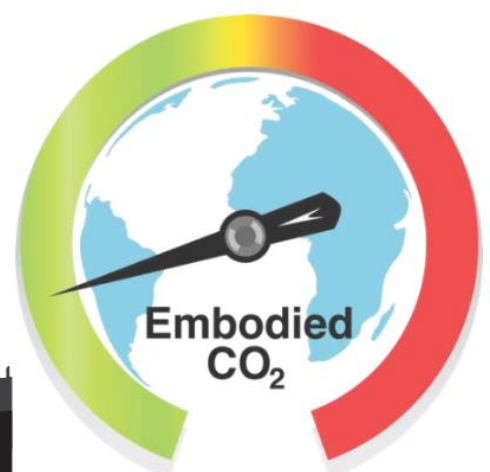
SPEAKER



Prof. Alper Kanyilmaz

Alper Kanyilmaz is an [assistant professor](#) in the Department of Architecture, Built Environment and Construction Engineering of Politecnico di Milano in Italy. He is an [Expert Advisor](#) for the European Commission Technical group “Steel Applications for New Markets” (Mandate 2023-2028, future low emission

industries). Some of his recent works include [“How does conceptual design impact the cost and carbon footprint of structures?”](#), [“Reuse of Steel in the Construction Industry: Challenges and Opportunities”](#) and [“A genetic algorithm tool for conceptual structural design with cost and embodied carbon optimization”](#). Dr. Kanyilmaz has been the principal investigator of 4 EU-projects with a €10 million total budget, and over 40 international partners. He transfers his research experience to the civil engineering and architecture students (300/year) in terms of [teaching](#), MSc and PhD thesis supervision.



COURSE OUTLINE

Lesson 1: Life Cycle Analysis, and its Stages for Building Structures (2h30)

- Introduction, overview of the course and learning outcomes.
- The power of the construction community to reduce the Greenhouse Gases (GHGs).
- Life Cycle Analysis and its stages related to a building's structural system:
 - Product stage "raw materials" (A1), "transport" (A2), "manufacturing" (A3), construction stage "transport" (A4) and "installation" (A5).
 - End-of-life stages (C1, C2, C3, C4).
 - Beyond Life (D), circular economy principles (reuse, recovery and recycling potential).
- Q & A

Lesson 2: Calculation of Embodied Carbon for a Building Structure (2h30)

- How to calculate the embodied carbon of a building structural system?
- What are Environmental Product Declarations (EPDs), and how are they used?
- What are the current regulations (worldwide, European and Portuguese) about low-carbon structural design and construction?
- Strategies to reduce the embodied carbon by means of structural design.
- Q & A

Lesson 3: Life Cycle Sensitivity Analysis, and hands-on exercise with participants (2h30)

- Sensitivity studies comparing the embodied carbon impact of buildings in terms of: span length, number of stories, slab types (e.g. composite), lateral resistant systems, material type (e.g. high strength steel, concrete with GGBS, timber options), different databases and EPDs.
- Balancing the cost efficiency and embodied carbon reduction in structures.
- Hands-on exercise together with attendees to compare different building structures and analyze their embodied carbon (an open access LCA tool will be shared with attendees).
- Q & A and round-table discussion.

INFORMATION



Duration: 7h30



16h30 – 19h00 (PT time)



Online



15, 16, and 19 April 2024



250€ + IVA 23% (307,5€)

CONTACTS

Fernanda Correia / Vanessa Silva
Tel. (+351) 218 418 042
E-mail: fundec@tecnico.ulisboa.pt
www.fundec.pt