ECCS Academy's

four-session webinar on

« Life-cycle driven design of steel structures for reduced embodied carbon »

By **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.

OBJECTIVE

This webinar provides a comprehensive overview of strategies, theoretical framework, and methods to reduce embodied carbon in steel construction. The webinar includes hands-on exercises, real-world examples, and interactive discussions to deepen the understanding of the topic. At the end of the webinar, participants will be able to calculate embodied carbon of a steel structure during the conceptual design stage, understand techniques and methods for reducing embodied carbon emissions, and analyze real-world case studies of mono and multi-storey steel structures.

Life-cycle driven design of steel structures for reduced embodied carbon

Webinar PROGRAMME

Date	Title	Content

Session 1
 	
23/01/2024
10:30-12:30
	Introduction, life-cycle driven steel structures	- Welcome, Introduction, contents, learning outcomes
		- Challenges and opportunities for the steel community during the climate crisis
		- Definition of life-cycle stages of a steel structure:
		  Product stage "raw materials" (A1)
		  Product stage "transport" (A2) and "manufacturing" (A3), construction stage "transport" (A4) and "installation" (A5)
		  End-of-life stages (C1, C2, C3, C4)
		- Q & A

Session 2 **25/01/2024** **10:30-12:30**	Conceptual design of life-cycle driven steel structures	- How to calculate the embodied carbon of a steel structure? - How to reduce the embodied and operational carbon by means of structural design? - Balancing the cost efficiency and embodied carbon reduction in steel structures. - Q & A
Session 3 **30/01/2024** **10:30-12:30**	Embodied carbon impact of different steel building design options	- Sensitivity studies (warehouse, 3-story residential, 9 storey office building) comparing the embodied carbon impact of steel buildings in terms of: span length, number of stories, slab types (e.g. composite), lateral resistant systems, material type (e.g. high strength steel, low carbon steel), different databases and EPDs. - Interactive exercise for attendees to compare different building structures and analyze their embodied carbon (an excel sheet or an open access LCA tool will be shared with attendees). - Q & A
Session 4 **01/02/2024** **10:30-12:30**	Circular economy of steel structures, case studies from practice, embodied carbon challenge	- Circular economy in steel structures (reuse, recovery and recycling potential) - Presentation of real-world examples of low-carbon steel structures. - An interactive exercise for attendees to practice the calculation of embodied carbon of a steel structure. - Q & A