

## WELCOME

Society and governments require a more efficient and sustainable built environment. An emerging trend is the Circular Economy, which aims at decoupling economic growth from resource consumption. Construction has been identified as a field of action by the European Commission's Circular Economy Action Plan.

The 4<sup>th</sup> International Conference on the *Coordinating Engineering for Sustainability and Resilience* & Midterm Conference of CircularB *Implementation of Circular Economy in the Built Environment* is co-organized by the Steel Structures and Structural Mechanics Department of the Politehnica University Timișoara, in co-operation with the Romanian Academy, the School of Engineering of the University of Birmingham, the Faculty of Engineering of the Jordan University of Science and Technology, the COST ACTION CA21103 "Implementation of Circular Economy in the Built Environment" and the Technical Sciences Academy of Romania.

169 authors from 31 countries on 5 continents are contributing with 63 scientific papers and 3 Keynote Lectures, covering 10 topics, i.e.

1. *Sustainable Infrastructures;*
2. *Structural Engineering;*
3. *Energy Systems and Structures;*
4. *Innovation in Materials, Products, and Systems;*
5. *Circular Value Chains and Stakeholders Engagement;*
6. *Circularity KPIs and Criteria for Material, Flow and Design Assessment;*
7. *Circular Business Models and Economic Viability of Circularity Solutions;*
8. *Environmental Impact of Circularity Strategies and Solutions;*
9. *Standards and Regulations;*
10. *Digitalisation and BIM for Circular Design and Evaluation in Construction.*

The CESARE 2024 & CirculaB Conference is devoted to the presentation of the most recent results and to the discussion of key issues concerning the contribution of Coordinating Engineering to Sustainability and Resilience in modern and future built environment, constructions, and infrastructure.

One of the main goals of CESARE 2024 & CirculaB is to promote an exchange of ideas that inspires innovative research paths and fosters new collaborative endeavours. We expect CESARE 2024 to have an impact on the future research and development activity in all topics included in the programme. You are warmly invited to actively participate in the Conference.

The Organizers of the CESARE 2024 and CircularB Midterm Conference,

Viorel Ungureanu, Luís Bragança, Charalampos Baniotopoulos, Khairidin Abdalla

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## General Programme

### Tuesday, 28.05.2024

Arrival of participants 17 <sup>00</sup> – 19 <sup>00</sup>	Registration (Central Library main hall)
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### Wednesday, 29.05.2024

08 <sup>00</sup> – 09 <sup>00</sup>	Registration (Central Library main hall)
09 <sup>00</sup> – 09 <sup>30</sup>	Opening Session (Auditorium)
09 <sup>30</sup> – 10 <sup>00</sup>	<i>Keynote Session 1</i> (Auditorium)
10 <sup>00</sup> – 11 <sup>00</sup>	<i>Session 1.1: Innovation in materials, products and systems. Part 1</i> (Auditorium)
11 <sup>00</sup> – 11 <sup>30</sup>	Coffee Break
11 <sup>30</sup> – 13 <sup>00</sup>	<i>Session 2: Environmental Impact of Circularity Strategies and Solutions. Part 1</i> (Auditorium)
13 <sup>00</sup> – 14 <sup>30</sup>	Lunch
14 <sup>30</sup> – 15 <sup>00</sup>	<i>Keynote Session 2</i> (Auditorium)
15 <sup>00</sup> – 16 <sup>00</sup>	<i>Session 3: Sustainable infrastructures</i> (Auditorium)
16 <sup>00</sup> – 16 <sup>30</sup>	Coffee Break
16 <sup>30</sup> – 18 <sup>10</sup>	<i>Session 4: Structural engineering</i> (Auditorium)
20 <sup>00</sup> – 22 <sup>30</sup>	Welcome Reception (The Charlatan's Pub)

### Tuesday, 30.05.2024

08 <sup>00</sup> – 09 <sup>00</sup>	Registration (Central Library main hall)
09 <sup>00</sup> – 9 <sup>30</sup>	<i>Keynote Session 3</i> (Auditorium)
09 <sup>30</sup> – 10 <sup>30</sup>	<i>Session 5: Circular Value Chains and Stakeholders Engagement</i> (Auditorium)
10 <sup>30</sup> – 11 <sup>00</sup>	Coffee Break
11 <sup>00</sup> – 12 <sup>00</sup>	<i>Session 6: Digitalisation and BIM for Circular Design and Evaluation in Construction</i> (Auditorium)
12 <sup>00</sup> – 13 <sup>00</sup>	<i>Session 7: Circular Business Models and Economic Viability of Circularity Solutions</i> (Auditorium)
13 <sup>00</sup> – 14 <sup>30</sup>	Lunch
14 <sup>30</sup> – 16 <sup>00</sup>	<i>Session 8: Energy systems and structures</i> (Auditorium)
16 <sup>00</sup> – 16 <sup>30</sup>	Coffee Break
16 <sup>30</sup> – 16 <sup>45</sup>	Sponsor presentation
16 <sup>45</sup> – 17 <sup>45</sup>	<i>Session 1.2: Innovation in materials, products and systems. Part 2</i> (Auditorium)
20 <sup>00</sup> – 22 <sup>30</sup>	Conference Banquet (Restaurant Vineri 15)

### Friday, 31.05.2024

09 <sup>00</sup> – 10 <sup>00</sup>	<i>Session 9: Standards and Regulations</i> (K1 room)
10 <sup>00</sup> – 11 <sup>15</sup>	<i>Session 10: Circularity KPIs and Criteria for Material, Flow and Design Assessment</i> (K1 room)
11 <sup>15</sup> – 11 <sup>45</sup>	Coffee Break
11 <sup>45</sup> – 14 <sup>15</sup>	Presentations - Training School (K1 room)
14 <sup>15</sup> – 14 <sup>30</sup>	Closing session (K1 room)
14 <sup>30</sup> – 15 <sup>30</sup>	Lunch

## Detailed Programme of Sessions

### Wednesday, 29.05.2024

08<sup>00</sup> – 09<sup>00</sup> Registration (Central Library main hall)

09<sup>00</sup> – 09<sup>30</sup> Opening Session (Auditorium)

09<sup>30</sup> – 10<sup>00</sup> **Keynote Session 1** (Auditorium)

*Chairman:* Dan Dubina

*Dan M. Frangopol and Mitsuyoshi Akiyama:* Life-Cycle Risk, Resilience, and Sustainability of Individual and Spatially Distributed Structures

10<sup>00</sup> – 11<sup>00</sup> **Session 1.1: Innovation in materials, products and systems. Part 1** (Auditorium)

*Chairman:* Meri Cvetkosvka

1. *Rocío Pineda-Martos, Maria-Beatrice Andreucci, Cristina S.C. Calheiros, Camila Cervantes Puma, Adriana Salles, Rand Askar and Luís Bragança:* Nature-Based Solutions for Sustainable Urban System Transformation: Addressing Circularity in Building System Recovery
2. *Laura Dominici, Elena Comino, Luis Pérez-Urrestarazu and Rocío Pineda-Martos:* Alternative Growing Medium for Indoor Living Walls to Foster the Removal Efficiency of Volatile Organic Compounds
3. *Xia Qin and Sakdirat Kaewunruen:* Circular Economy in Construction: Harnessing Secondary Materials from End-of-life Tires for Sustainable Building
4. *Mariem Fakhfakh and Amin Hadj Taieb:* Regenerative Approach in Sustainable Composite Structure Design for Building
5. *Vlastimir Radonjanin, Mirjana Malešev, Ivan Lukić, Slobodan Šupić, Mirjana Laban and Olivera Bukvić:* Possible Utilization of Used Precast Building Elements through Consideration of Concrete Carbonation Degree

11<sup>00</sup> – 11<sup>30</sup> Coffee Break

11<sup>30</sup> – 13<sup>00</sup> **Session 2: Environmental Impact of Circularity Strategies and Solutions. Part 1** (Auditorium)

*Chairmen:* Florea Dinu

1. *Jorge Fernandes, Livia Cosentino and Ricardo Mateus:* Geo- and Bio-Based Materials as Circular Solutions Towards a Regenerative Built Environment
2. *Saud Alotaibi, Pedro Martinez-Vazquez and Charalampos Baniotopoulos:* Waste Generation Factors and Waste Minimisation in Construction
3. *Ioan Andrei Gîrbacea, José Humberto de Paula Filho and Viorel Ungureanu:* Environmental Impact of Cold-Formed Z-shaped Steel Purlins
4. *Raluca Buzatu, Viorel Ungureanu, Adrian Ciutina and Ioan Both:* Environmental Impact Assessment of Buildings with Steel-Intensive Façade Systems – A Case Study

5. Diana Bajare, Liga Puzule, Maris Sinka, Tatjana Tambovceva and Girts Bumanis: Life Cycle Assessment of the Lightweight Timber Structures with Bio-Based Aggregate Composites
6. Marilena De Simone, Daniel-Viorel Ungureanu and Daniele Campagna: Circular Economy of Wind Turbines Waste in Constructions and Cities
7. Janez Turk, Katja Malovrh Rebec, Tajda Potrč Obrecht, Maja Pristavec, Anja Lešek: Benchmarking circular versus linear end-of-life treatment approaches for construction and demolition waste, considering environmental Life Cycle Assessment

13<sup>00</sup> – 14<sup>30</sup> Lunch

14<sup>30</sup> – 15<sup>00</sup> **Keynote Session 2** (Auditorium)

*Chairman*: Luís Bragança

Mayara R Munaro: Circular Economy: Technologies, business models, and challenges for a sustainable built environment

15<sup>00</sup> – 16<sup>00</sup> **Session 3: Sustainable infrastructures** (Auditorium)

*Chairman*: Abdallah I. Husein Malkawi

1. Stergios A. Mitoulis, Dan V. Bompá and Sotirios Argyroudis: Integration of Carbon Emissions Estimates into Climate Resilience Frameworks for Transport Asset Recovery
2. Omar Albatayneh, Emhaidy Gharaibeh, Dima Husein Malkawi, Tareq Jaber and Yazeed AlOmaireyeen: A Study on Traffic Awareness at Jordanian Universities: A Case Study of the German Jordanian University
3. Adelin Stirb, Adrian Ciutina, Andrei Forton, Ciprian Costescu and Paul Marc: Analysis of the Pavement Response with Total/Partial Link Between Layers to the Action of Traffic Load
4. Abdallah I. Husein Malkawi, Dima A. Husein Malkawi and Khaldoon A. Ban-Hani: Thermal-Structural Modelling and Temperature Control of Roller-Compacted Concrete Gravity Dam: A Parametric Study
5. Ayah Alkhalwaldeh, Nour Betoush, Ansam Sawalha, Mohammad Alhassan and Khairidin Abdalla: Life Cycle Assessment and Sustainability Characteristics of Built Environment Systems

16<sup>00</sup> – 16<sup>30</sup> Coffee Break

16<sup>30</sup> – 18<sup>10</sup> **Session 4: Structural engineering** (Auditorium)

*Chairmen*: Dan V. Bompá

1. Andrea Rajić, Ivan Lukačević, Ivan Ćurković and Vlaho Žuvelek: Influence of Shear Connection and End Supports onto Self-Vibrations of Cold-Formed Steel Concrete Composite Floor
2. Vlaho Žuvelek, Ivan Ćurković, Ivan Lukačević and Andrea Rajić: Numerical Investigation of Double-Skin Cold-Formed Steel Shear Wall Filled with Concrete
3. George Taranu, Viorel Ungureanu, Zsolt Nagy, Septimiu-George Luca, Mihai-Sergiu Alexa-Stratulat and Ionut-Ovidiu Toma: Comparative Experimental Study on Improving Structural Performance of the Base Upright Profiles of Steel Storage Pallet Racks under Operational Conditions

4. Mohammad Shamim Miah and Werner Lienhart: Performance Comparison of Different Vibration Control Strategies
5. Popa Daniel, Iosim Dara-Dragana, Pintea Dan, Zaharia Raul and Franssen Jean-Marc: Exploratory Research on the Thermal Properties of Wood in Real Fire Conditions
6. Volodymyr Semko and Nataliia Mahas: Assessment of Existing Structures for Elongation of the Buildings Lifecycle Based on Ukrainian Experience and Codes
7. Viktor Szalaj, Aurel Stratan, Adrian Ciutina, Andreea Diana Clepe and Anna Ene: Procedure for Generation of Finite Element Models of Steel Members from 3D Scanned Data
8. Rajai Z. Al-Rousan, Khairidin M. Abdalla and Bara'a R. Alnemrawi: The behavior of Heat-Damaged RC Beams Reinforced Internally with CFRP Strips

20<sup>00</sup> – 23<sup>00</sup> Welcome Reception (The Charlatan's Pub)

**Thursday, 30.05.2024**

08<sup>00</sup> – 09<sup>00</sup> Registration

09<sup>00</sup> – 09<sup>30</sup> **Keynote Session 3** (Auditorium)

*Chairman*: Charalampos Baniotopoulos

Dan Dubina and Florea Dinu: Reliability and Durability of Built Environment under Impact of Climate Natural Hazards

09<sup>30</sup> – 10<sup>30</sup> **Session 5: Circular Value Chains and Stakeholders Engagement** (Auditorium)

*Chairman*: Mirjana Laban

1. Matthias Haase, Heinz Bernegger and Mihaela Meslec: Stakeholder Mapping for Value Creation of New Circular Business Models
2. Ferhat Karaca, Aidana Tleuken, Rocío Pineda-Martos, Sara Ros Cardoso, Rand Askar, Adriana Salles, Elena Goicolea Güemez, Akmaral Agibayeva, Huseyin Atakan Varol and Luis Bragança: Analysing Stakeholder Opinions within the COST Action CA21103 CircularB and Beyond: Circular Economy Implementation in Construction
3. Sakdirat Kaewunruen, Charalampos Baniotopoulos, Yunlong Guo, Pasakorn Sengsri, Patrick Teuffel and Diana Bajare: 6D-BIM Applications to Enrich Circular Value Chains and Stakeholder Engagement within Built Environments
4. Barbara Scozzi, Roberta Pellegrino, Alessia de Trizio and Monica Di Leonardo: Investigating Urban Resilience Through a Resource-Based View Framework: Evidence from an Empirical Survey
5. Xhesila Nano and Dorina Kripa: Stakeholders' Engagement in CE Approach on the Built Environment, Albania Case

10<sup>30</sup> – 11<sup>00</sup> Coffee Break

11<sup>00</sup> – 12<sup>00</sup> Session 6: **Digitalisation and BIM for Circular Design and Evaluation in Construction** (Auditorium)

Chairman: Katerina Tsikaloudaki

1. Rand Askar, Ferhat Karaca, Luís Bragança and Helena Gervásio: The Role of BIM in Supporting Circularity: A Conceptual Framework for Developing BIM-based Circularity Assessment Models in Buildings
2. Esam Alasmari, Pedro Martinez-Vazquez and Charalampos Baniotopoulos: Utilising BIM on LCC to Enhance the Sustainability of Saudi Residential Projects through Simulation. A Case Study at the Kingdom of Saudi Arabia
3. Aikaterina Karanafti, Nika Trubina, Christina Giarma, Katerina Tsikaloudaki and Theodoros Theodosiou: Integrating BIMs in Construction and Demolition Waste Management for Circularity Enhancement-A Review
4. Nika Trubina, Gerald Leindecker, Rand Askar, Aikaterina Karanafti, Marta Gómez-Gil, Teresa Blázquez, Bengü Güngör and Luís Bragança: Digital Technologies and Material Passports for Circularity in Buildings: An In-depth Analysis of Current Practices and Emerging Trends
5. Bengü Güngör and Gerald Leindecker: Digital Technologies for Inventory and Supply Chain Management in Circular Economy: A Review Study on Construction Industry

12<sup>00</sup> – 13<sup>00</sup> Session 7: **Circular Business Models and Economic Viability of Circularity Solutions** (Auditorium)

Chairman: Roberta Pellegrino

1. Matthias Haase, Marcel Janser, Heinz Bernegger and Mihaela Meslec: Models of Circular Economy Principles
2. Mihaela Meslec and Matthias Haase: Multi-Scalar Business Models for Advancing Circular Economy in Real Estate Development
3. Adriana Salles, Camila Cervantes and Luís Bragança: Assessing the Impacts of Urban Circular Economy Practices on Economic Growth, Environmental Sustainability, and Social Benefits: A Case Study Analysis
4. Genesis Camila Cervantes, Adriana Salles and Luís Bragança: Exploring the Potential of Circular Economy Strategies in Urban Planning: A Comparative Analysis of Successful Case Studies
5. Tiana Milović, Mirjana Laban, Vesna Bulatović, Anka Starčev-Čurčin, Suzana Draganić and Olivera Bukvić: Circular Economy as a New Concept for Sustainable Building Development in Serbia

13<sup>00</sup> – 14<sup>30</sup> Lunch

14<sup>30</sup> – 16<sup>00</sup> Session 8: **Energy systems and structures** (Auditorium)

Chairmen: Aurel Stratan

1. Junlin Heng, Jiaxin Zhang, You Dong, Sakdirat Kaewunruen and Charalampos Baniotopoulos: Influence of Adaptive Controlling Strategies of Floating Offshore Wind Turbine on Corrosion Fatigue Deterioration of Supporting Towers
2. Simeng Xie, Pedro Martinez-Vazquez and Charalampos Baniotopoulos: Wind Aerodynamics and Related Energy Potential of Urban High-rise Vertical Farms

3. Jean-Christophe Pelletier-De Koninck, Andreas Athienitis and Hervé Frank Nouanegue: Design of Photovoltaic/Thermal Collectors with Thermal Storage and Batteries to Enhance Building Performance and Resilience in Cold Climate
4. Mayara R Munaro and Vanderley M John: Energy Efficiency in the Higher Education Institutions: A Review of Actions and their Contribution to Sustainable Development
5. Eyüp Bekçi and Kemal Koca: Hybrid Renewable Energy to Greener and Smarter Cities: A Case Study of Kayseri Province
6. Vitor Sousa, Inês Meireles, Ana Falcão Flor, Cristina Matos Silva, Chiara Bertolin: Indirect carbon emission savings from rainwater retention in green roofs
7. Nadiia Kopyika, Stergios-Aristoteles Mitoulis and Jelena Ninic: Resilience Framework for Aged Bridges Subjected to Human-Induced Hazard - Case Study in Ukraine

16<sup>00</sup> – 16<sup>30</sup> Coffee Break

16<sup>30</sup> – 16<sup>45</sup> Sponsor presentation

16<sup>45</sup> – 17<sup>45</sup> Session 1.2: **Innovation in materials, products and systems. Part 2** (Auditorium)

Chairmen: Khairedin Abdalla

1. Dan V. Bompá, Viorel Ungureanu, Ahmed Y. Elghazouli and Ahamed Afsal: Disassembly and Structural Reuse Potential of Steel-Timber Shear Connections with Screws
2. Yaser Jemaa, David Yeboah and Michaela Gkantou: Experimental Study on the Behaviour of Glulam Timber Beams Bonded with Glued-in BFRP Rods
3. Ornella Iuorio and Shoma Kitayama: Experimental Study on the Feasibility of Disassembling and Reusing Lightweight Façade Wall System
4. Ornella Iuorio, Sam Wilcock and Emil Korkis: Design for Deconstruction through Digital Fabrication of Thin Spatial Systems
5. Rabeb Ayed, Emiliano Borri, Gabriel Zsembinszki, Salwa Bouadila, Luisa F. Cabeza and Mariem Lazaar: Use of Textile Fiber Waste to Improve the Thermal and Mechanical Performance of Cement-Based Mortar

20<sup>00</sup> – 23<sup>00</sup> Conference Banquet (Restaurant Vineri 15)

**Friday, 31.05.2024**

09<sup>00</sup> – 10<sup>00</sup> Session 9: **Standards and Regulations** (K1 room)

Chairman: Ricardo Mateus

1. Gerald Leindecker: The Effect of Standardization on the Future of Sustainable Refurbishment of Existing Buildings
2. Serena Giorgi and Monica Lavagna: Italian Regulations and Local Initiatives for Circular Economy in the Construction Sector

3. *Inês Burmester, Vanessa Tavares and João Poças Martins*: Framework for a Multi-level Approach for Testing the Construction Demolition Waste Hierarchy
4. *Pedro Frazão Pedroso, José Dinis Silvestre and António Aguiar Costa*: End-of-Life as a New Beginning: Pre-demolition Audits, Digital Platforms and Skilled Labour as Enablers of Circular Economy
5. *Andrei Crişan, Judith Fauth and Stefanie-Brigitte Deac-Kaiser*: Sustainability in the Context of BIM-enabled Digital Building Permits

10<sup>00</sup> – 11<sup>15</sup> Session 10: **Circularity KPIs and Criteria for Material, Flow and Design Assessment** (K1 room)

Chairmen: Matthias Haase

1. *Bengü Güngör, Rand Askar, Akmaral Agibayeva, Ferhat Karaca and Luís Bragança*: Development of Circularity Assessment Indices for Construction Sector: A Critical Review
2. *Bahar Feizollahbeigi and Ricardo Mateus*: An Analysis of the Circularity Indicators at the Building Design Level
3. *Marta Gómez-Gil, Rand Askar, Aikaterina Karanafti, Nika Trubina, Teresa Blázquez, Bengü Güngör, Luís Bragança and Gerald Leindecker*: Unlocking the Potential of Material and Building Passports in the Transition to a Circular Economy in Buildings: A Critical Review
4. *Abdulaziz AlJaber, Pedro Martinez-Vazquez and Charalampos Baniotopoulos*: Towards Circular Building Key Performance Indicators
5. *Marianna Marchesi*: Axiomatic Design and Design Structure Matrix for Circular Building Design
6. *Christina Giarma, Katerina Tsikaloudaki, Aikaterina Karanafti, Karolos J. Kontoleon and Theodoros Theodosiou*: Water Efficiency, Consumption and Management in Environmental Performance Assessment Methods for Existing Buildings In-Use

11<sup>15</sup> – 11<sup>45</sup> Coffee Break

11<sup>45</sup> – 14<sup>15</sup> Presentations - Training School

14<sup>15</sup> – 14<sup>30</sup> Closing session

14<sup>30</sup> – 15<sup>30</sup> Lunch

## SOCIAL PROGRAMS

### Welcome Reception

Date and time: *Wednesday, May 29* | 20:00 – 23:00

Venue: **The Charlatan's Pub** (address: Emanoil Ungureanu, no. 15, Timisoara)

Dress code: casual

*For registered participants and accompanying persons this program is included in the registration fee.*

### Conference Dinner

Date and time: *Thursday, May 30* | 20:00 – 23:00

Venue: **Vineri 15** (address: Bvd. Vasile Parvan, no. 9, Timisoara)

Dress code: casual

*For registered participants and accompanying persons this program is included in the registration fee.*

## INTERNET

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## CONFERENCE PROCEEDINGS



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