Session title:

Pathways to Net-Zero: Innovating Industrial Decarbonization, Green Energy, and Carbon Management Solutions

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Session abstract (300 words maximum):

This session invites researchers, policymakers, and industry leaders to present advancements in driving net-zero transformations across industrial sectors. The focus will be on decarbonizing industrial processes, deploying low-CO_2 energy sources like green hydrogen, bioenergy, and renewable electricity, and leveraging carbon capture, utilization, and storage (CCUS) technologies.

Key topics include:

1. **Decarbonizing Industrial Processes:** Innovations in reducing CO_2 emissions in hard-to-abate industries (e.g., steel, cement, chemicals) through process optimization, electrification, and renewable energy integration.
2. **Low-Carbon Energy Sources:** Exploration of green hydrogen, bioenergy, and renewable energy as scalable solutions for CO_2-neutral energy production.
3. **Carbon Capture, Utilization, and Storage (CCUS):** Cutting-edge methods for capturing CO_2 emissions, its storage, and reuse in applications like synthetic fuels, chemicals, and building materials.
4. **Mineral (Re)Carbonation:** Advancements in natural and industrial mineral carbonation applications and techniques. Methodologies for reporting carbonation.
5. **Cross-Industry Circularity:** Case studies on the reuse of captured CO_2 in diverse industries to maximize circularity and contribute to a sustainable circular economy.

Multidisciplinary research from fields such as life cycle assessment (LCA), environmental and process engineering, energy systems, materials science, and policy is encouraged. Papers can address experimental breakthroughs, theoretical frameworks, policy analysis, and case studies that highlight innovative decarbonization pathways quantified through LCA.

Learning objectives for the session:

1. Understand the latest technologies for decarbonizing industrial processes, their scalability and life-cycle impacts.
2. Explore the potential and scalability of low-CO_2 energy sources like green hydrogen and bioenergy in reducing carbon footprint in different sectors.
3. Analyze advancements in CCUS and assess their long-term viability for net-zero transformations through LCA.
4. Evaluate industrial carbonation applications. Evaluate and learn how methodologies such as Life Cycle Assessment (LCA) can quantify the environmental benefits of mineral (re)carbonation processes.
5. Understand cross-industry opportunities for CO_2 capture, reuse and circularity using LCA as a key methodology for sustainability quantification.

Keywords: Net-zero industries, Life Cycle Assessment, decarbonization, green hydrogen, bioenergy, renewable energy, carbon capture, CCUS, circular economy, industrial processes, sustainability.

Session Format: Panel discussion, 12 minutes presentations