Inaugural Lecture

Adriano Sciacovelli – Professor in Dynamic Modelling of Thermo-Mechanical Storage Systems

Lecture Title: From Phase Change to Prolonged Storage of Energy: Engineering the Future of Heat

Abstract:
Thermal energy decarbonization is essential for climate neutrality, yet supply heating and cooling in industry, cities, and transport remains dominated by fossil systems and flexible storage of thermal energy is lacking. Long-duration storage of heat is a pressing challenge.

My vision is to develop next generation thermo-mechanical systems (TMES) that are compact, modular, and economically viable for prolonged storage and supply of zero carbon heating & cooling. By combining phase-change phenomena, thermo-fluid science, and optimization, we can overcome the limits conventional, unfit for purpose current energy storage concepts. This lecture will outline pathways to scalable TMES devices that accelerate integration of renewable energy for heating and cooling.

Advances in TMES, latent heat storage, and reactions-bases storage will be presented, along with future directions for research. Particular attention will be given to links between phase change thermal phenomena, engineered structures for performance enhancement, and novel thermodynamic cycles concepts improving thermo-economic feasibility.

Prof. Adriano Sciacovelli earned his MSc in Mechanical Engineering and PhD in Energy Engineering from Politecnico di Torino (Italy), where he also worked as Research Associate. He joined the University of Birmingham (UK) in 2015 as Postdoctoral Fellow, later becoming Assistant and Associate Professor. In 2025 he was appointed Full Professor at the Technical University of Denmark (DTU Construct).

His research focuses on thermo-fluids science and thermal energy engineering, with contributions spanning phase-change, liquid-air energy storage and Carnot batteries. He currently leads the Novo Nordisk Foundation project AI-LoDES, on advancing strategies for prolonged thermal energy storage with the aid of artificial intelligence.

Main Appointments and Degrees
2025 – Professor, DTU Construct, Technical University of DK
2025 – Honorary Professor, University of Birmingham, UK
2021-2024 – Associate Professor, University of Birmingham
2017–2021 – Assistant Professor, University of Birmingham

2019; Higher Education Academy Fellow, University of Birmingham, UK
2010; PhD, Energy Engineering, Politecnico di Torino, ITA
2007; MSc, Mechanical Engineering, Politecnico di Torino, ITA