

EFCE Spotlight Talks

17
March
2026

Working Party on Thermodynamics
and Transport Properties

10:00-12:00
CET



Thermodynamics for Zero-to-Low Emission Technologies Mini Series: Part 1. Heat Pumps

We are living in a decisive decade for climate action and energy transformation. Achieving zero-to-low emission technologies is no longer a distant ambition, but an immediate engineering and societal challenge. From how we heat and cool industrial processes to how we supply energy more broadly, solutions must deliver high performance while drastically reducing energy use and greenhouse-gas emissions.

Thermodynamics lies at the heart of this transformation. As the science governing the conversion, transfer, and utilization of energy, it provides the fundamental framework to assess efficiency limits, guide technology development, and enable informed design choices. Ultimately, thermodynamics determines how effectively emerging technologies can contribute to decarbonization.

In this context, we have initiated the “**Thermodynamics for Zero-to-Low Emission Technologies**” mini-series, aiming to highlight how applied thermodynamics underpins key solutions for the energy transition. **Part 1 focuses on heat pumps**, one of the most impactful and rapidly expanding technologies for sustainable heating, cooling, and industrial heat supply. Through this series of presentations, we will explore the thermodynamic principles, performance metrics, and real-world challenges that shape heat pump design and deployment, emphasizing their critical role in building a low-carbon energy system.

PROGRAM

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| 10:00 | Welcome and introduction
Prof. Maria-Grazia de Angelis, Chair WP-TTP, U. Edinburgh - UK
Prof. Christoph Held, TU Dortmund - Germany
Dr. Antoon ten Kate, Industrial Vice-Chair WP-TTP, ChemSpiration, Arnhem - NL
Boelo Schuur, EFCE Scientific Vice-President |
| 10:15 | High-temperature heat pumps: from mixture thermodynamics to net-zero heat supply systems
Prof. André Bardow, ETH Zürich, Energy and Process Systems Eng., Zürich - Switzerland |
| 10:45 | The Power of Reversible Chemistry in Heat Pumps
Dr. Aya Barakat, NEEXT Engineering, Univ. de Lorraine, CNRS, LRGP, Nancy - France |
| 11:15 | Heat Pumps – Technology & Research Directions
Prof. Arne Speerforck, Technische Universität Hamburg - Germany |
| 11:45 | Discussion and conclusion
Prof. Maria-Grazia de Angelis, Chair WP-TTP, U. Edinburgh - UK
Prof. Christoph Held, TU Dortmund - Germany
Dr. Antoon ten Kate, Industrial Vice-Chair WP-TTP, ChemSpiration, Arnhem - NL |
| 12:00 | Closure |

[REGISTRATION](#)

free of charge but mandatory

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