University of Bayreuth Centre of International Excellency
"Alexander Von Humboldt"
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Contact:
Prof. Dr. Vedran Perić
+4916096612830 www.iem.uni-bayreuth.de vedran.peric@uni-bayreuth.de

Strategic Scientific Workshop 2026 funded by the University of Bayreuth Centre of International Excellence "Alexander von Humboldt"

Intelligent Planning and Control of District Heating and Cooling Systems

8–10 April 2026, Bayreuth, Germany

Background

District Heating and Cooling (DHC) systems are increasingly recognized as an effective pathway for reducing emissions while improving energy efficiency and energy security. By enabling the centralized production and distribution of thermal energy, DHC systems facilitate the integration of renewable energy sources, industrial waste heat, geothermal resources, large-scale heat pumps, and thermal storage technologies. As a result, they provide a flexible and scalable solution for supporting the decarbonization of urban and industrial energy systems. However, the planning, operation, and expansion of modern DHC systems are becoming increasingly complex. The growing penetration of variable renewable energy sources, changing consumption patterns and the need for higher operational flexibility require advanced planning methodologies and intelligent control strategies. Digitalization is therefore emerging as a key enabler of next-generation DHC networks, providing opportunities for enhanced monitoring, forecasting, optimization, automation and data-driven decision-making.

Workshop Participants

Participants (Fig. 1) represented a diverse range of organizations including universities, research institutes, industrial companies and professional associations:

Prof. Vedran Perić, University of Bayreuth, Germany (Host, Fig. 1)

Prof. Carlos Ugalde Loo, Cardiff University, UK (Collaborator, Fig. 1)

Dr. Meisam Sadi, TU of Denmark, Denmark (Collaborator, Fig. 1)

Dr. Thomas Lickklederer, Drees & Sommer SE, Munich, Germany (Collaborator, Fig. 1)

Prof. Pietruschka, Dirk, TH Aschaffenburg, Germany

Prof. Kai Strunz, TU Berlin, Germany

Dr. Florian Reißner, Siemens AG, Germany

Dr. David Bertermann, FAU, Germany

Dr. Ralf-Roman Schmidt, AIT Austrian Institute of Technology GmbH, Austria

Dr. Florian Heberle, University of Bayreuth, Germany

Dr. Godwin Okwuibe, University of Bayreuth, Germany

Dr. Anurag Mohapatra, CoSES, Germany

Mr. Ulrich Ganslmeier, CoSES, Germany

Mr. Jakob Worm, PlanEnergi, Denmark

Mr. Hemiko (Scott De Rijk), Hemiko, UK

Mr. Lloyd Corcoran, Cardiff University, UK

Ms. Wiebke Frenkel, German Aerospace Center (DLR), Germany

Mr. Daberechi Agwu, TU Berlin, Germany

Mr. Amedeo Ceruti, TU Munich, Germany

Mr. Jonas Groß, University of Bayreuth, Germany

Ms. Jiayin Fu, University of Bayreuth, Germany

Mr. Michael Altmann, BMW Group and University of Bayreuth, Germany

Mr. Jonas Pfeiffer, University of Applied Sciences Zittau/Görlitz, Germany

Mr. Markus Lorenz, SWKiel Netz GmbH, Germany

Fig. 1: Organizing team

Prof. Dr. Vedran Perić | Lehrstuhl für Intelligentes Energiemanagement, Universität Bayreuth, Weiherstr. 26, 95448 Bayreuth
Tel. +49 (0)160 966 12830, E-Mail: vedran.peric@uni-bayreuth.de, Internet: www.iem.uni-bayreuth.de

Fig. 2: Participants of the Strategic Scientific Workshop

Workshop Outcomes

Over the course of three days, the workshop provided a comprehensive platform for discussing the technological, economic and systemic challenges associated with the transformation of conventional district heating and cooling networks into intelligent, flexible and climate-neutral energy infrastructures. Through keynote presentations, technical sessions, panel discussions, brainstorming activities and the technical excursion to the Wunsiedel Future Energy Lab (Fig. 3), participants were able to exchange the latest research findings, share practical experiences and identify emerging opportunities for innovation and collaboration.

The workshop highlighted several key scientific themes, and identified important research gaps and implementation challenges that require continued investigation. These were grouped into four key thematic areas: 1) Regulatory Analysis, 2) Business Models and Financing, 3) Digital Twins and Control Strategies, and 4) Smart End-Users technologies.

As a result of the identified research gaps, a major and tangible outcome of the workshop was the initiation of a collaborative effort to develop a joint European research proposal, where individual work packages will address gaps identified in 4 research topics mentioned above. The foreseen project will establish a **MSCA Doctoral Network** that will involve **15 PhD candidates**, with the University of Bayreuth playing a leading supervisory and coordination role.

The workshop also contributed to the professional development of doctoral candidates and early-career researchers by providing direct access to leading experts in the field and exposing participants to a broad range of perspectives from both academia and industry. This aligns closely with the workshop's long-term vision of supporting the development of the next generation of researchers and industry leaders in sustainable energy systems.

Summary

The workshop established a strong foundation for future collaborative research and innovation in intelligent District Heating and Cooling systems and positioned the University of Bayreuth as a leading hub in the international research landscape. The discussions, partnerships and research directions emerging from the event are expected to generate lasting scientific and societal impact beyond the duration of the workshop itself. The organizers and participants remain committed to maintaining the network established through this initiative and to pursuing collaborative activities that contribute to the development of sustainable, resilient and climate-neutral heating and cooling infrastructures.

Fig. 3: Visiting the Wunsiedel Future Energy Lab

The organizers gratefully acknowledge the financial support provided by the **University of Bayreuth Centre of International Excellence "Alexander von Humboldt"**, which made the workshop possible and enabled the successful exchange of knowledge and expertise among an international community of researchers and practitioners.

Sincerely,

Vedran Perić

Professor and Chair of Intelligent Energy Management

University of Bayreuth, Germany

Prof. Dr. Vedran Perić | Lehrstuhl für Intelligentes Energiemanagement, Universität Bayreuth, Weiherstr. 26, 95448 Bayreuth
Tel. +49 (0)160 966 12830, E-Mail: vedran.peric@uni-bayreuth.de, Internet: www.iem.uni-bayreuth.de