DOI: www.doi.org/10.23697/ghte-3d55

Summary Report from Workshops

Before the opening of the 14th IEA Heat Pump Conference in Chicago, nine different workshops were organized by the operating agents of the different international collaboration projects (Annexes) and by Heat Pump Centre. This section provides a concise yet comprehensive summary of all the workshops.

Advanced Cooling and Refrigeration Technology Development

Organizer: Reinhard Radermacher, USA, Operating Agent of HPT Annex 53

The workshop on Advanced Cooling and Refrigeration Technology Development, organized by Reinhard Radermacher, focused on the longer-term research, development, and demonstration needs in the field of cooling systems. HPT Annex 53, initiated in 2018, aimed to coordinate and share research on advanced cooling technologies. The technologies under investigation included vapor compression-based systems and non-traditional cooling approaches.

During the workshop, participants presented their ongoing research projects, which included concepts such as combined absorption/vapor compression/thermal storage, large chillers using water as a refrigerant, pressure exchange for work recovery, and improved matching of source and sink streams using zeotropic refrigerants. The workshop concluded with a discussion on the additional advances required or desirable for the future and the steps needed to facilitate the market introduction of these new concepts.

Decarbonizing Process Heating with High-Temperature Heat Pumps

Organizer: Benjamin Zühlsdorf, Danish Technological Institute, Operating Agent of HPT Annex 58

The workshop on Decarbonizing Process Heating with High-Temperature Heat Pumps, organized by Benjamin Zühlsdorf, aimed to explore the potential of high-temperature heat pumps in decarbonizing industrial process heating. The workshop highlighted the importance of collaboration among various stakeholders, including technology suppliers, end-users, policy makers, and research organizations, to exploit the massive potential of high-temperature heat pumps.

The keynote session provided an overview of the application potential of high-temperature heat pumps in industries and discussed the current technology status and perspectives. The group session delved into the potentials, challenges, and required actions for different stakeholders, including technology suppliers, end-users, policy makers, and research organizations. The workshop concluded with a summary of the results from the group session and a plenary discussion.

Heat Pumps in Positive Energy Districts

Organizers: Carsten Wemhöner, OST, Switzerland, Operating Agent of HPT Annex 61, along with representatives from EBC Annex 83 and SHC Task 66

The workshop on Heat Pumps in Positive Energy Districts, organized by Carsten Wemhöner, aimed to enhance collaboration and promote heat pump integration in positive energy districts for urban energy transition. The workshop brought together three IEA projects: HPT Annex 61, EBC Annex 83, and SHC Task 66, focusing on high-performance buildings and positive energy district concepts.

The workshop introduced the work of the three projects, discussing technical and economic opportunities and challenges associated with heat pump integration on the building and district levels. The workshop included presentations of research projects, a panel discussion involving the audience, and a summary, perspectives, and a Q&A session.

Flexibility in Energy Grids Provided by Heat Pumps

Organizer: Svend Pedersen, Danish Technological Institute, Operating Agent of HPT Annex 57, and Marion Bakker, RVO, ExCo delegate of the Netherlands

The workshop on Flexibility in Energy Grids Provided by Heat Pumps, organized by Svend Pedersen and Marion Bakker, focused on the possibilities of heat pumps to increase the flexibility in energy systems. The workshop highlighted the role of heat pumps in enabling the integration of different energy sources and empowering end-users to become prosumers.

The workshop consisted of presentation sessions where results from Annex 57-based cases were shared. The purpose was to provide attendees with insights into the flexibility created by heat pumps and the potential for both individual heat pumps and large-scale heat pumps. The workshop also provided an opportunity for attendees to engage in discussions and share their knowledge.

Acoustic Signatures and Placement Impact of Heat Pumps

Organizer: Christoph Reichl, Austrian Institute of Technology, Operating Agent of HPT Annex 51 and HPT Annex 63

The workshop on Acoustic Signatures and Placement Impact of Heat Pumps, organized by Christoph Reichl, addressed the placement impact of heat pumps on their surroundings and the importance of minimizing noise emissions. The workshop aimed to increase awareness among heat pump owners and their neighbors regarding optimal heat pump placement.

The workshop provided an immersive experience for participants through interactive sessions using augmented reality (AR) and virtual reality (VR) equipment. Participants had the opportunity to test innovative placement tools and rate different sound samples in a psychoacoustic awareness test. The results and feedback from the workshop would contribute to the ongoing IEA HPT Annex 63, focusing on the placement impact of heat pumps.

Comfort and Climate Box Solutions for Cooling and Dehumidification

Organizer: Kashif Nawaz, Oak Ridge National Laboratory, USA

The workshop on Comfort and Climate Box Solutions for Cooling and Dehumidification, organized by Kashif Nawaz, aimed to discuss and refine the proposal for an international collaboration project. The project aimed to develop efficient, affordable, applicable, and scalable solutions for comfort cooling and dehumidification, combining heat-pumping technologies with energy storage and integrated control.

The workshop started with an introduction to the objectives of the proposed project, followed by presentations on the importance of energy storage and the challenges and opportunities associated with process integration. The workshop provided a platform for discussion among participants.

Progress in Heat Pumps with Low GWP Refrigerants

Organizer: Yunho Hwang, University of Maryland, USA, Operating Agent of HPT Annex 54

The workshop on Progress in Heat Pumps with Low GWP Refrigerants, organized by Yunho Hwang, aimed to disseminate the latest progress in the IEA HPT Annex 54 activities. The workshop provided updates on the research and development of heat pumps using low-GWP refrigerants, including case studies, design guidelines, and real-world experiences.

The workshop included presentations on the final results of the LC150 project for R290 heat pump development, low-GWP heat pump activities in Austria, ecologic assessment of heat pump systems, and the influence of refrigerant choice and heat exchanger design on low-GWP refrigerants. The workshop aimed to share knowledge and facilitate the transition from high-GWP to low-GWP refrigerants in heat pump applications.

Concluding reflections from Annex Workshops

Overall, these workshops brought together experts, researchers, and stakeholders from various fields to share knowledge, discuss advancements, and identify future steps for the development and deployment of advanced cooling technologies, decarbonization of process heating, heat pump integration in positive energy districts, flexibility in energy grids, optimal placement of heat pumps, comfort cooling and dehumidification solutions, and progress in heat pumps with low GWP refrigerants.

Investors' Role in Different Parts of the Value Chain of Heat Pumps

Organizer: Heat Pump Centre

The Heat Pump Centre organized an impactful workshop titled "Investors' Role in Heat Pump Value Chain," focusing on leveraging private investment to accelerate the clean energy transition. The event convened experts, industry leaders, and investors to discuss opportunities, challenges, and potential in heat pump investments.

To achieve ambitious climate goals, clean energy investment must triple by 2030. The International Energy Agency (IEA) emphasizes a tenfold increase in heat pumps by 2050 for Net Zero emissions. Private investment complements public funding, expediting the transition. The workshop began with an overview by Heat Pump Centre's Monica Axell and Caroline Haglund Stignor. IEA's Rafael Martinez Gordon stressed private investment's significance in the clean energy transition. Julian Dieler of the European Commission highlighted policy support for heat pump value chain investments.

A unique remote contribution came from Nigel Jollands, emphasizing heat pump deployment for heating decarbonization from investors's perspective. Industry leaders Patrick Crombez (Daikin) and Barbara Priesching (Vaillant) discussed bottlenecks hindering market growth and targeted investment solutions. Interactive group discussions facilitated idea exchange, enriching perspectives. A panel discussion, "Investors' Role in Heat Pump Value Chain," included Martin Forsén (Nibe), Patrick Crombez, Barbara Priesching, Rafael Martinez Gordon, and Nigel Jollands. The panel explored investors' roles in different different parts of the heat pump value chain.

Workshop organizers Monica Axell and Caroline Haglund Stignor highlighted key takeaways: private investment's vital role, the potential for heat pump growth, and industry collaboration. The workshop united stakeholders, fostering knowledge exchange and collaborative solutions.

Workshops like these are crucial amid climate challenges. Discussions underscored private investors' potential in the clean energy transition and the importance of heat pump value chain investments. Investments in heat pumps can decarbonize heating and reduce emissions. The workshop promoted collaboration among industry, policymakers, and investors, informing future strategies.

Key takeaway: Overcoming bottlenecks requires targeted investments in research, innovation, and supportive infrastructure. Policymakers' role is vital in creating a conducive investment environment. The panel showcased diverse investor roles across stages, emphasizing innovation and cost-effective solutions. In conclusion, the workshop catalyzed collaboration and dialogue, advancing the clean energy transition. Private investment's impact is pivotal, aligning with climate goals. By uniting public and private efforts, a sustainable future with clean heating solutions is achievable. Workshops like these inspire further investment and collaboration, driving the heat pump adoption and global energy transition.

Rafael Martinez Gordon summarizing collective thoughts. (Photo: Heat Pump Centre)

Thomas Nowak summarizing collective thoughts. (Photo: Heat Pump Centre)

The Role of Public and Private Funded Projects to Tenfold the Number of Heat Pumps

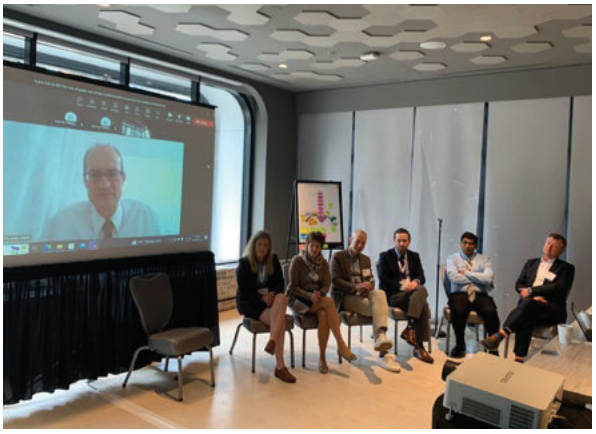
Organizer: Heat Pump Centre

The Heat Pump Centre hosted another transformative workshop titled " The Role of Public and Private Funded Projects to Tenfold the Number of Heat Pumps." Organized by Monica Axell, Caroline Stignor Haglund, and Metkel Yebiyo, the event aimed to inspire collaboration between the public sector and industry by showcasing success stories and strategies to optimize public investment in heat pump deployment. The International Energy Agency's (IEA) 2022 report, "The Future of Heat Pumps," underscored heat pumps' vital role in reducing natural gas usage, emissions, and energy costs. To align with Net Zero Emissions by 2050, 50% of building heating must come from heat pumps by 2045, necessitating a tenfold increase. Achieving this relies on significant clean energy investments and thoughtful public-private projects to overcome hurdles.

The workshop commenced with DMonica Axell and Caroline Haglund Stignor introducing the day's themes. Rafael Martinez Gordon from the IEA emphasized heat pumps' potential for global climate goals. Ramachandran Narayanamurthy (US Department of Energy) discussed the Inflation Reduction Act's role in fostering investment and scaling the heat pump sector.

Stefan Moser (European Commission, DG Energy) elaborated on the Net Zero Industry Act and Heat Pump Action Plan's impact in the European Union. Thomas Nowak (European Heat Pump Association) shared insights into the Heat Pump Accelerator's role in driving collaboration and innovation.

Ammi Amarnath (Electric Power Research Institute) discussed the role of utilities and government in US heat pump deployment. Marion Bakker and Tom van Aalten (RVO, Netherlands) shared transformative public funding experiences. Nicola Lazenby (BEIS, UK) highlighted the importance of public-funded demos in driving awareness.



Navigating ideas together: engaging in stimulating panel dialogue at the workshop. (Photo: Heat Pump Centre)

Emina Pasic (Swedish Energy Agency) discussed new funding opportunities for research and innovation. The panel discussion featured Rafael Martinez Gordon, Thomas Nowak, Stefan Moser, Ramachandran Narayanamurthy, Nicola Lazenby, Patrick Crombez (Daikin), and Barbara Priesching (Vaillant), delving into public-private project impacts.

Axell and Haglund Stignor summarized key insights, highlighting collaboration's importance for heat pump adoption. They emphasized optimized public investments and supportive policies for market growth. The workshop fostered knowledge exchange and collaboration, aligning with the Heat Pump Centre's commitment to heat pump technology development. Attendees gained insights into navigating challenges and seizing opportunities, contributing to global climate goals.

The workshop left participants invigorated and enlightened about public-private funding's role in advancing the heat pump sector. Connections formed during this event are expected to lead to collaborative initiatives, propelling clean energy transition and realizing IEA's ambitious targets.

All papers from the 14th IEA Heat Pump Conference can be downloaded for free from the HPT TCP database:
https://heatpumpingtechnologies.org/publications