

High-Temperature Heat Pump Symposium 2024

23-24 January 2024 | DGI Byen



High-Temperature
Heat Pump Symposium
Copenhagen

Organizers



Partner



Gold Sponsors



Silver Sponsors

VAHTERUS



SRMTEC



ANEQ



SIEMENS
energy

Program of the 4th HTHP Symposium

Tuesday, 23rd of January, Overview



High-Temperature
Heat Pump Symposium

Copenhagen

Time	Room: Skt. Hans Torv (Ground floor)	Nørrebro Runddel (Ground floor)	Kødbyen (2 nd Floor)	Hovedbanegården (2 nd Floor)
08:30 – 09:30	Registration & Coffee			
09:30 – 11:00	Welcome Session & Keynote Presentations Session 1-1			
11:00 – 11:30	Coffee Break			
11:30 – 12:30	Market ramp-up ahead - Joint forces required! Session 1-2A		Carnot batteries and heat transformers Session 1-2B	Applications and evaluation Session 1-2C
12:30 – 13:45	Lunch			
13:45 – 14:45	Making it happen – Experiences from frontrunners working with HTHPs Session 1-3A	Technology Overview Session 1-3B	System configurations with large temperature glide Session 1-3C	System design and components Session 1-3D
14:45 – 15:15	Coffee Break			
15:15 – 16:35	Refrigerants - Which is the safer choice? Session 1-4A	Development and demonstration of large- scale systems Session 1-4B	Development and testing of medium-scale systems Session 1-4C	Business models and technology benchmarking Session 1-4D
16:35 – 18:00	Poster Session and Networking Session 1-5A		Poster Session and Networking Session 1-5B	
19:00	Dinner at DGI Byen, 3rd Floor			

Program of the 4th HTHP Symposium

Wednesday, 24th of January, Overview



High-Temperature
Heat Pump Symposium

Copenhagen

Time	Skt. Hans Torv (Ground floor)	Nørrebro Runddel (Ground floor)	Kødbyen (2 nd Floor)	Hovedbanegården (2 nd Floor)
08:00 – 09:00	Registration & Coffee			
09:00 – 10:20	Drying & MVR Session 2-1A	Development and demonstration of medium-scale systems Session 2-1B	Integration Concepts and Applications Session 2-1C	Development and testing of novel compressors & expanders Session 2-1D
10:20 – 10:50	Coffee Break			
10:50 – 12:10	The transition towards decarbonized process heating Session 2-2A	Development and demonstration of medium-scale systems Session 2-2B	Advanced system configurations Session 2-2C	Development and testing of turbo compressors Session 2-2D
12:10 – 13:15	Lunch			
13:15 – 14:00	Closing Session 2-3			
14:30	Departure to Site Visits			

Program of the 4th HTHP Symposium

Tuesday, 23rd of January, 09:30 – 13:45



High-Temperature
Heat Pump Symposium
Copenhagen

Time	Room: Skt. Hans Torv (Ground floor)	Nørrebro Runddel (Ground floor)	Kødbyen (2 nd Floor)	Hovedbanegården (2 nd Floor)
08:30 – 09:30	Registration & Coffee			
09:30 – 11:00	Welcome Session Session 1-1 Session Chair: B. Elmegaard (DTU)			
	Opening and welcome B. Elmegaard (DTU)			
	Making thermodynamics great again: high-temperature heat pumps Jan Rosenow (Regulatory Assistance Project)			
	High-Temperature Heat Pumps - Exploiting the potential B. Zühlsdorf (DTI)			
	A crucial time for energy efficiency N. Fuglsang, Member of the European Parliament			
11:00 – 11:30	Coffee Break			
11:30 – 12:30	Market ramp-up ahead - Joint forces required! Session 1-2A Session Chair: T. Nowak (EHPA)		Carnot batteries and heat transformers Session 1-2B Session Chair: A. Arabkoohsar (DTU)	Applications and evaluation Session 1-2C Session Chair: O. M. Moen (SINTEF)
	<p>HTHPs are a key technology for sustainable process heating and a massive scaling of the market is required to exploit the potentials. This rapid development does however also imply challenges for different parties. End-users need to put their strategy on unmaturing technologies. Technology suppliers need to develop technologies with a yet unclear application potential. Policies need to consider new technologies for an unknown market. This debate will highlight the challenges from different view points and elaborate on strategies to exploit the full potential by joining forces across various disciplines.</p> <p style="text-align: center;">Participants:</p> <ul style="list-style-type: none"> - Fabian Voswinkel, International Energy Agency - Frederik Lynge Halvorsen, Danish Energy Agency 		<p>A comparative techno-economic analysis of high-temperature and sub-ambient temperature pumped-thermal electricity storage integrated with external heat sources, <u>Q. Iqbal</u> (IRC), K. Wang (IRC), L. Qiu (IRC)</p>	<p>CO₂-neutral process steam for industry: Model-based analysis of technologies and strategies, N. Nolzen (ETH Zürich), L. Evering (ETH Zürich), C. Schmid (ETH Zürich), A. Bardow (ETH Zürich), D. Roskosch (ETH Zürich)</p>
			<p>Experimental validation of a HTHP integrated into a power-to-heat-to-power concept based on a PCM storage unit, F. Trebilcock (Technalia), J. L. Corrales-Ciganda (Technalia), M. Johnson (DLR), K. Theologou (DLR), J. Tombrink (DLR)</p>	<p>De-carbonization of European Dairy industry - quantifying commercial and environmental impact of the integration of a very high temperature heat pump, S. Vittor (Olvondo) et al.</p>
<p>Thermoeconomic analysis of waste heat upgraded steam production in the chemical industry using Type II absorption heat pumps, J. L. Corrales-Ciganda (Technalia), L. Alonso-Ojanguren (Technalia)</p>		<p>Techno-Economic Analysis of Large-Scale Heat Pump Integration to Assist Sustainable Water Desalination and District Cooling, N. H. Petersen (RWTH Aachen), M. Arras (Tsinghua University), M. Wirsum (RWTH Aachen), Ma Linwei (Tsinghua University)</p>		
12:30 – 13:45	Lunch			

Program of the 4th HTHP Symposium

Tuesday, 23rd of January, 12:30 – 16:35



High-Temperature
Heat Pump Symposium

Copenhagen

Time	Room: Skt. Hans Torv (Ground floor)	Nørrebro Runddel (Ground floor)	Kødbyen (2 nd Floor)	Hovedbanegården (2 nd Floor)
12:30 – 13:45	Lunch			
13:45 – 14:45	<p>Making it happen – Experiences from frontrunners working with HTHPs Session 1-3A Session Chair: B. Zühlsdorf (DTI)</p> <p>HTHPs are expected to be the preferred heating technology for a variety of end-users. But working with this emerging technology is related to a number of barriers and uncertainties, related to the technology development and the boundary conditions. In this session, early adopters are invited to share their experiences from working with the implementation of the technology. Various examples of role-model initiatives will be shared, serving as inspiration to other end-users on how to master the transition towards HP-based process heat supply.</p> <p>Participants: - Bart Aerts, (Tiense Suikerraffinaderij) - Arjun Arya (Philip Morris International) - Sander Geelen (Geelen Counterflow) - Tom Marren (Astatine)</p>	<p>Technology Overview Session 1-3B Session Chair: C. Arpagaus (OST)</p> <p>Annex 58 about HTHPs - Technology Review, <u>J. L. Poulsen</u> (DTI), B. Zühlsdorf (DTI), et al. (full author list in Annex 58 Task 1 Report)</p> <p>High Temperature Heat pump mapping for Industrial applications, <u>I. Rangelov</u> (Danfoss), T. Lund (Danfoss)</p> <p>Review of High Temperature Heat Pump Compressors and Calculations of their Working Range, <u>F. Sæther</u> (SINTEF), O. M. Moen (SINTEF), C. Schlemminger (SINTEF)</p>	<p>System configurations with large temperature glide Session 1-3C Session Chair: W. Meesenburg (DTU)</p> <p>High-glide refrigerant mixtures for HTHPs with different temperature changes on the heat sink and heat source, <u>L. Brendel</u> (OST), M. Wördemann (TU Dresden), S. Bernal (OST), C. Arpagaus (OST), S. Bertsch (OST)</p> <p>Design and off-design performance of a high temperature heat pump with ejector, <u>M. Lauermann</u> (AIT), M. Schieder (AIT), J. Unterluggauer (AIT), V. Sulzgruber (AIT), S. Kling (AIT), C. Reichl (AIT), T. Ciepiela (Ochsner)</p> <p>Rotation Heat Pump - Rotor design for 250°C output temperature, <u>G. Zotter</u> (ECOP), A. Längauer (ECOP), B. Adler (ECOP)</p>	<p>System design and components Session 1-3D Session Chair: M. H. Christensen (DTI)</p> <p>An Approach to increase flexibility of HTHP, <u>H. T. de Oliveira</u> (Fraunhofer ISE), S. Benkert (Fraunhofer ISE), U. Wittstadt (Fraunhofer ISE), S. Henninger (Fraunhofer ISE)</p> <p>Heat exchangers for efficient high-temperature heat pumps, <u>J. Müller-Ebhardt</u> (Kelvion), B. de Vries (Kelvion), A. Bani-Kananeh (Kelvion), M. Henningsen (Kelvion), S. Ziegler (Kelvion)</p> <p>Web-based Design Tools for Industrial Heat Pumps, <u>M. Gräber</u> (TLK), A. Marina (TNO), G. Rodriguez (TNO)</p>
	14:45 – 15:15	Coffee Break		
15:15 – 16:35	<p>Refrigerants - Which is the safer choice? Session 1-4A Session Chair: Petter Nekså (SINTEF)</p> <p>Natural refrigerants or synthetic refrigerants? This questions divides the heat pump industry, and the answer is dependent on a number of aspects, such as economics, safety concepts, environmental impact - and the interpretation and weighting of these factors. This debate will involve key representatives with different viewpoints and clarify the pros and cons for both options based on scientific facts.</p> <p>- Kenneth Hoffmann, GEA - Harald Nes Rislå, Heaten - Mohammed Youbi Idrissi, Honeywell - Mikkel Aaman Sørensen, Danish Environmental Protection Agency</p>	<p>Development and demonstration of large-scale systems Session 1-4B Session Chair: C. Schøn Poulsen (DTI)</p> <p>Towards energy-intensive industry decarbonization by generating steam through Large Scale Heat Pump systems, <u>D. Rizzi</u> (Turboden), E. Pingaro (Turboden)</p> <p>Heat Recovery in Chemical Processes – A Case Study on a very high temperature Heat Pump using MVR Technology in a EPDM stripping process, <u>O. Ruiz</u> (Piller), S. Kuberczyk (Piller), M. Gu (Sinteco)</p> <p>A High Temperature indirect MVR Heat Pump solution for energy recovery with high COP in a chemical industrial plant, <u>A. Norland</u> (EPCON), C. Gotaas (EPCON)</p> <p>MAN Heat Pump Solution for Industrial Steam Production using N-Butane, <u>D. Toebben</u> (MAN), J. Vennemann (MAN), L. Wallscheid (MAN), M. Winkel (MAN)</p>	<p>Development and testing of medium-scale systems Session 1-4C Session Chair: S. Henninger (Fraunhofer ISE)</p> <p>Development and testing of a 500 kW hydrocarbon cascade system for heat supply up to 150 °C, <u>J. L. Poulsen</u> (DTI), T. Pedersen (DTI), M. P. Andersen (DTU), B. Elmegaard (DTU), C. N. Gade (S&T), B. Zühlsdorf (DTI)</p> <p>Demonstration of a full-scale industrial heat pump producing steam above 140 °C, <u>W. de Vries</u> (TNO), S. Smeding (TNO), G. Otero (TNO), K. Verplancke (Mayekawa), S. Spoelstra (TNO)</p> <p>Testing and modelling of a steam-generating heat pump at up to 175 °C, <u>M. P. Andersen</u> (DTU), T. Kaida (CRIEPI), B. Zühlsdorf (DTI), J. K. Jensen (DTU), B. Elmegaard (DTU)</p> <p>Steam generating heat pump test bench using n-pentane as refrigerant, <u>S. Benkert</u> (Fraunhofer ISE), U. Wittstadt (Fraunhofer ISE), H. Oliveira (Fraunhofer ISE), et al.</p>	<p>Business models and technology benchmarking Session 1-4D Session Chair: E. Vendelbo Foged (DTI)</p> <p>Business Models for High-Temperature Heat Pumps, <u>C. Arpagaus</u> (OST), S. Paranjape (OST), S. Nertinger (OST), R. Tietz (OST), S. Bertsch (OST)</p> <p>Industrial Process Heating - Hydrogen vs. Heat Pumps, <u>W. B. Markussen</u> (DTI), B. Zühlsdorf (DTI), B. Elmegaard (DTU)</p> <p>Technoeconomic analysis of electrified boiler technologies to decarbonize industrial steam, A. Salvi (AtmosZero), <u>T. Bandhauer</u> ((AtmosZero, Colorado State University), et al.</p> <p>Unlocking Industrial High Temperature Heat Pumps Opportunities in the U.S.A: Business Models, Barriers, and Market Adoption, <u>Ammi Amarnath</u> (EPRI), Baskar Vairamohan (EPRI)</p>

Program of the 4th HTHP Symposium

Tuesday, 23rd of January, 16:35 – 19:00



High-Temperature
Heat Pump Symposium
Copenhagen

Time	Room: Skt. Hans Torv (Ground floor)	Nørrebros Runddel (Ground floor)	Kødbyen (2 nd Floor)	Hovedbanegården (2 nd Floor)
16:35 – 18:00	Poster Session and Networking Session 1-5A		Poster Session and Networking Session 1-5B	
	Full-Scale High-Temperature Heat Pump Test Facility , A. Jaatinen-Värri (LUT), A. Uusitalo (LUT), J. Honkatukia (LUT), T. Turunen-Saaresti (LUT)		High-Temperature Heat Pumps: Thermodynamic, Economic and Experimental Perspectives for Enhanced Integration , E. Vieren (UGent), W. Beyne (UGent), T. Demeester (UGent), K. Couvreur (UGent), S. Abbasi (KU leuven), A. Arteconi (KU leuven), M. De Paepe (UGent), S. Lecompte (UGent)	
	EU-Project Solindarity - Solar-driven industrial power and heat upgraded with high-temperature heat pumps for enhanced integrated process efficiency , E. Jende (DLR), P. Stathopoulos (DLR)		Design options of HTHP technology in comparison to existing industrial boiler systems , M. Wördemann (TU), C. Arpagaus (OST), S. Bertsch (OST), C. Thomas (TU)	
	Implementation of High Temperature Heat Pumps for heat upgrade and supply of process steam in the industry , R. Paitazoglou (Fraunhofer IEG), A. Hanßke (Fraunhofer IEG), J. Corrales (Tecnalia), L. Alonso (Tecnalia), T. Toppi (Politecnico), G. Abrami (Politecnico)		Integration of a steam-generating HTHP in a Swiss meat factory , C. Arpagaus (IES), S. Paranjape (IES), F. Bless (IES), S. Bertsch (IES), C. Jansen (Spiess)	
	Pump it Up: Tailored industrial high-temperature heat pumps simulation and optimization , H. Liu (DTU), E. Rattigan (DTU), K. Knobloch (DTU), M. Chen (DTU)		Enhancing high-temperature heat pump efficiency with zeotropic refrigerant mixtures: Potential and sensitivity towards process conditions , P. Widmaier (ETH Zurich), A. Bardow (ETH Zurich), D. Roskosch (ETH Zurich)	
	SPiRiT Demo Case 1 - Full-scale on-site demonstration of a cascade industrial heat pump producing steam at 145°C , G. O. Rodriguez (TNO), K. Verplancke (Mayekawa), J. Rauø (Stella Polaris), N. Kumari (TNO), S. Spoelstra (TNO)		Study on Industrial Steam Generation by Transcritical Heat Pumps , A. Zhao (TU Delft), R. Pecnik (TU Delft), J. Peeters (TU Delft)	
	SPiRiT Demonstration Case 2 - Integration of heat pump technology in a sugar production plant , V. Amato (DTI), J. L. Poulsen (DTI), E. N. Pedersen (DTI), B. Zühlsdorf (DTI), S. Schultze (GEA), O. Frederich (GEA), B. Aerts (Tiense Suikerraffinaderij), O. Knaepen (Tiense Suikerraffinaderij)		The application potential of reversible high-temperature heat pumps / ORCs within flexible geothermal energy systems , C. Schiffechner (TUM), F. Kaufmann (TUM), H. Spliethoff (TUM)	
	SPiRiT Demo Case 3 - Integration of a high temperature heat pump in a paper mill , M. Kriese (DLR), F. C. Yücel (DLR), N. Kabat (DLR)		Analysis of different high temperature heat pump cycles for industrial applications where district heat is used as heat source , G. Zotter (ECOP), A. Längauer (ECOP), B. Adler (ECOP)	
	Innovative Thermochemical Heat Transformer: A High-Temperature Heat Pump Technology for Efficient Waste Heat Recovery and Heat Upgrading , A. Arabkoohsar (DTU), H. R. Rahbari (DTU)		Analysis of a high temperature heat pump integration in an amine-based CO2 capture process , M. Bless (SINTEF), C. Schlemminger (SINTEF), A. S. Garcia (SINTEF), A. Chikukwa (SINTEF), T. Mejdell (SINTEF)	
	Development of an Ammonia/Water Absorption Heat Transformer to upgrade low-temperature industrial waste heat , R. Collignon (UGA), H. Demasles (UGA), H. T. Phan (UGA)		Selection for the use of an axial or centrifugal compressor in a hightemperature heat pump according to the Cordier diagram , B. Kajasa (DLR), M. Lockan (DLR), P. Stathopoulos (DLR)	
Compressor Test Bench Design to investigate the Compression Process for High-Temperature Heat Pumps , A. Halle (RWTH), T. Klebig (RWTH), C. Vering (RWTH) D. Müller (RWTH)		High temperature heat pump for process industries: potential of inverse Brayton cycle , A. Patti (UNIG), S. Barberis (UNIG), A. Sorce (UNIG), A. Traverso (UNIG)		
Identification of cost-effective electrification pathways for low-temperature industrial heat in Australia , A. Vecchi (UoM), M. Brear (MEI)		Improved COP Estimation Formula for High-Temperature Heat Pumps , J. K. Jensen (DTU), R. Padullés (DTU), M. P. Andersen (DTU)		
Integration of High-Temperature Heat Pump and Power Cycle Within Carnot Batteries , D. Jayakumar (DTU), M. P. Andersen (DTU), B. Elmegaard (DTU), P. Havil (TotalEnergies), K. S. El Nasser (TotalEnergies)				
19:00	Dinner at DGI Byen – 3rd Floor			

Program of the 4th HTHP Symposium

Wednesday, 24th of January, 09:00 – 14:30



High-Temperature
Heat Pump Symposium

Copenhagen

Time	Skt. Hans Torv (Ground floor)	Nørrebro Runddel (Ground floor)	Kødbyen (2 nd Floor)	Hovedbanegården (2 nd Floor)	
08:00 – 09:00	Registration & Coffee				
09:00 – 10:20	<p style="text-align: center;">Drying & MVR</p> <p>Session 2-1A Session Chair: J. Lundsted Poulsen (DTI)</p> <p>GreenSteam - Enhanced Drying Process with Heat Pump Driven Steam Generator, <u>T. W. Moesch</u> (Combitherm, TU Dresden), K. Klotsche (TU Dresden), C. Thomas (TU Dresden)</p> <p>Zero emission drying by High Temperature Heat Pumps & Superheated Steam Drying, <u>C. Nijssen</u> (CEE Engineering), P. Aerts (CEE Engineering)</p> <p>Elevating Efficiency: Lessons from the Integration of Mechanical Vapour Recompression Technology in Industrial Heat Recovery in the New Zealand Food Processing Sector, <u>M. Atkins</u> (AHUORA), T. Walmsley (AHUORA)</p> <p>Free2Heat - high-temperature steam generating heat pump with 2-phase compression, <u>N. Slettebø</u> (ToCircle)</p>	<p style="text-align: center;">Development and demonstration of medium-scale systems</p> <p>Session 2-1B Session Chair: V. Wilk (AIT)</p> <p>Integration of a 1.6 MW Steam Supplying Heat Pump into the Feed Production Process, <u>M. Bantle</u> (ANEO), C. Schlemminger (ANEO), V. Nilsen (Felleskjøpet Agri)</p> <p>Experiences of high-temperature heat pumps in industrial applications, <u>S. Östmann</u> (Oilon)</p> <p>Proven applications of High Temperature Heat Pumps (120°C) in Industry, <u>T. Marren</u> (Astatine)</p> <p>Optimizing Compressors for High-Temperature Applications: Paving the Way for Sustainable Industrial Heating, <u>K. Nourrice</u> (Frascold)</p>	<p style="text-align: center;">Integration Concepts and Applications</p> <p>Session 2-1C Session Chair: T. Kaida (CRIEPI)</p> <p>Annex 58 about HTHPs - Integration Concepts, <u>E. Schlosser</u> (University Paderborn), C. Arpagaus (OST), V. Armato (DTI), B. Zühlsdorf (DTI)</p> <p>Applications for high temperature heat pumps in Buildings: New York State's Empire Technology Prize, <u>H. Zirnheilt</u> (Whole Systems), B. Bridgeland (RMI)</p> <p>Thermal and economic performance assessment of different high temperature heat pump layouts for upgrading district heating to process heating of steam production at 160 °C, <u>M. Sadeghi</u> (AAU), T. Petersen (DTI), Z. Yang (AAU), B. Zühlsdorf (DTI), K. S. Madsen (DIN F.)</p> <p>Performance and Stability of a >30 MW Transcritical CO2 Heat Pump From Experiment and Simulation, <u>U. Woltsch</u> (MAN), R. Somanini (MAN), E. Jacquemoud (MAN)</p>	<p style="text-align: center;">Development and testing of novel compressors and expanders</p> <p>Session 2-1D Session Chair: J. K. Jensen (DTU)</p> <p>Novel Rotary Compressor-Expander for Expansion Work Recovery in High Temperature Trans-Critical CO2 Heat Pumps, <u>A. Thatte</u> (Energy Recovery), B. Fricke (ORNL), K. Nawaz (ORNL)</p> <p>Novel Rolling Piston Compressor for High Temperature Heat Pumps, <u>L. S. Akmandor</u> (Pars Makina), R. Christodoulaki (CRES), O. Bayer (METU), et al.</p> <p>Expansion Work Recovery in an Ejector Integrated High-Temperature Heat Pump (HTHP), <u>B. Jain</u> (UT), A. Singh (UT)</p> <p>Navigating the Challenges of High-Speed Centrifugal Compressors with Active Magnetic Bearings in High-Temperature Heat Pump Applications, <u>R. Lateb</u> (SKF), J. Da Silva (SKF)</p>	
	10:20 – 10:50	Coffee Break			
	10:50 – 12:10	<p style="text-align: center;">The transition towards decarbonized process heating</p> <p>Session 2-2A Session Chair: A. Arteconi (KU Leuven)</p> <p>Annex 58 about HTHPs - Applications and transition, <u>Sabrina Dusek</u> (AIT), B. Zühlsdorf (DTI), et al.</p> <p>Development of decarbonization strategies of industrial process heating applications - Experiences and case studies, <u>A. Kuijers Hostrup</u> (DTI), F. Dupond Holdt (DTI), T. Petersen (DTI), H. Madsbøll (DTI), B. Zühlsdorf (DTI)</p> <p>Digital twin modelling for thermal networks optimization through heat pumps and heat recovery systems: application to an integrated chemical site, <u>Chiara Magni</u> (McKinsey), Krzysztof Pajaczek (McKinsey), Cyril Verluise (McKinsey), Ken Somers (McKinsey)</p> <p>Annex 58 about HTHPs - Defining and testing of HTHP Specifications, J. Lundsted Poulsen (DTI), <u>E. Navntoft Pedersen</u>, et al. (full author list in upcoming Annex 58 Task 4 report)</p>	<p style="text-align: center;">Development and demonstration of medium-scale systems</p> <p>Session 2-2B Session Chair: W. Brix Markussen (DTI)</p> <p>PFAS free heat pumps above 100 °C, <u>K. Hoffmann</u> (GEA), R. Unsworth (GEA)</p> <p>Ammonia-water absorption compression Practical experiences and future perspectives, <u>P. Skov</u> (JCI), S. R. Nordtvedt (JCI), B. Horntvedt (JCI)</p> <p>Screw Compressors for High Temperature Heat Pump Duty, <u>M. Sundström</u> (SRM), T. Petersen (DTI)</p> <p>Steam production with piston compressor based heat pump, <u>T. Hamacher</u> (SPH), A. Mück (SPH)</p>	<p style="text-align: center;">Advanced system configurations</p> <p>Session 2-2C Session Chair: F. Trebilcock (Tecnalia)</p> <p>Thermoacoustic heat pumps for high temperature and industrial applications, <u>J.-A. Lycklama à Nijeholt</u> (TNO), H. Tijani (TNO), G. de Jong (TNO)</p> <p>Performance of a High-Temperature Industrial Heat Pump, using Helium as Refrigerant, <u>A. Høeg</u> (Enerin), K. Løver (Enerin), G. Vartdal (Enerin)</p> <p>Experimental investigations of water-cooled cylinder heads in a high temperature heat pump cycle, <u>J. Jeßberger</u> (LTTT), F. Heberle (LTTT), D. Brüggemann (LTTT)</p> <p>Experimental validation of lab-scale hydro-CO2 piston high-temperature heat pump with simultaneous heating and cooling production between +140°C and -40°C to cover all energy demand in dairy applications, <u>F. Faraldo</u> (PackGy, Rennes Univ.), P. Loiseau (PackGy), et al.</p>	<p style="text-align: center;">Development and testing of turbo compressors</p> <p>Session 2-2D Session Chair: P. Stathopoulos (DLR)</p> <p>Evaluation of turbo compressor performance for a water based HTHP to be utilized in solar assisted heat supply, <u>O. M. Moen</u> (SINTEF), M. Rotan (SINTEF), J. Dowdell (SINTEF), C. Schlemminger (SINTEF)</p> <p>Centrifugal compressor design and loss analysis for large-scale high-temperature heat pumps using natural refrigerants, <u>A. Uusitalo</u> (LUT), A. Jaatinen-Värrä (LUT), T. Turunen-Saaresti (LUT)</p> <p>Greensteam High-Temperature Heat Humps enabled by Turboclaw compressor technology, <u>T. Taylor</u> (Futeraheat)</p> <p>High Temperature heat pump test result and further development of high speed centrifugal compressors, <u>M. Weel</u> (W&S), J. Mikkelsen (W&S), J. Sandvig (W&S)</p>
		12:10 – 13:15	Lunch		
13:15 – 14:00		<p style="text-align: center;">Closing</p> <p>Session 2-3 Session Chair: Brian Elmegaard (DTU)</p>			
14:30		Departure to Site Visits			

High-Temperature Heat Pump Symposium 2024

23-24 January 2024 | DGI Byen



High-Temperature
Heat Pump Symposium

Copenhagen

STAY UPDATED ON FUTURE EVENTS



VISIT OUR WEBSITE:
HTHP-SYMPOSIUM.ORG



SIGN UP FOR OUR HTHP SYMPOSIUM NEWSLETTER



FOLLOW US ON LINKEDIN:
WWW.LINKEDIN.COM/COMPANY/98044174/
#HTHPSymposium

