

Program of the 3rd HTHP Symposium



High-Temperature
Heat Pump Symposium
Copenhagen 29.-30.3.2022

Tuesday, 29.03.2022

Time	Track 1	Track 2
09:00 – 10:30	Welcome Session 1-1	
10:30 – 11:00	Coffee Break	
11:00 – 12:30	Technology Developments and Perspectives 1-2	
12:30 – 13:30	Lunch	
13:30 – 14:50	Regulatory Frameworks and Business Models 1-3A	HTHP Technologies 1-3B
14:50 – 15:20	Coffee Break	
15:20 – 16:40	HTHP Technologies 1-4A	Process Integration 1-4B
16:40 – 18:00	Poster Session and Networking 1-5	
19:00	Dinner at FoodClub København	

Wednesday, 30.03.2022

Time	Track 1	Track 2
09:00 – 10:20	Technology Developments 2-1A	System & Sector Integration 2-1B
10:20 – 10:50	Coffee Break	
10:50 – 12:10	Heat Pump-based Steam Systems 2-2A	Technology Development 2-2B
12:10 – 13:10	Lunch	
13:10 – 14:10	Plenary Discussion: Fulfilling the Potential - How many Industrial Heat Pumps are realistic and how do we get there?	
14:10	Site Visits	

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Time	Presentation	Speaker	Duration
Welcome Session 1-1			
09:00 – 10:30	Welcome and Introduction	Benjamin Zühlsdorf, (DTI)	15 min
	Opening speech	t.b.c.	15 min
	Towards energy transformation in chemical industry by large-scale energy recovery using heat pumps	<u>Julian Meyer-Kirschner</u> & Martin Dorn, (BASF)	30 min
	High-Temperature Heat Pumps – How large is the potential and how can we exploit it?	<u>Brian Elmegaard</u> , (DTU), Benjamin Zühlsdorf, (DTI), Michael Bantle, (SINTEF)	30 min
10:30 – 11:00	Coffee Break		
Technology Developments and Perspectives 1-2 – Chair: Michael Bantle (SINTEF)			
11:00 – 12:30	IEA HPT Annex 58 about High-Temperature Heat Pumps - State of the art review, demonstration cases and development perspectives	<u>Benjamin Zühlsdorf</u> , (DTI) <u>Jonas Lundsted Poulsen</u> , (DTI) <u>Florian Schlosser</u> , (University of Paderborn)	50 min
	DryFiciency closed loop heat pumps: Operation experience and outlook	<u>Veronika Wilk</u> , et al., (AIT)	20 min
	An industry response to more ambition in energy regulation	Annita Westenbroek, (Cepi - Confederation of European Paper Industries)	20 min
12:30 – 13:30	Lunch		

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	Regulatory Frameworks and Business Models 1-3A, Chair: Thomas Nowak (EHPA)			HTHP Technologies 1-3B – Chair: Wiebke Brix Markussen (DTU)		
13:30 – 14:50	EU Policy affecting the development and application of high-temperature heat pumps	<u>Thomas Nowak</u> , (EHPA)	5 min	HighLift – a very high temperature heat pump for industrial use – key results from a Horizon2020 Fast Track to Innovation Project	<u>Tor-Martin Tveit</u> & <u>Stefano Vittor</u> , (Olvondo Technology), <u>Ron Zevenhoven</u> , (Åbo Akademi University)	20 min
	Industrial heat pump opportunities in the Irish market	<u>David Connolly</u> , (Astatine)	15 min	Smart implementation of a Rotation Heat Pump	<u>Andreas Längauer</u> & <u>Bernhard Adler</u> , (ecop Technologies)	20 min
	Science Based Targets Initiative - An approach to accelerate the green transition	t.b.c.	15 min	Large Scale High Temperature Heat Pumps: Lessons learned and near future technologies	<u>Lars Reinholdt</u> & <u>Pernille Hartmund Jørgensen</u> , (Plan Energi)	20 min
	Panel discussion with presenters			30-45 min		
14:50 – 15:20	Coffee Break					
	HTHP Technologies 1-4A – Chair: Claus Schøn Poulsen (DTI)			Process Integration 1-4B – Chair: Veronika Wilk (AIT)		
15:20 – 16:40	Decarbonize the high-temperature heat demand with innovative large heat pumps	<u>Andrea Barbon</u> , Turboden	20 min	Supply temperature levels in Danish industry: a necessary discussion before High Temperature Heat Pump integration	<u>Martin Pihl Andersen</u> , <u>Jierong Liang</u> & <u>Roger Padullés Solé</u> , (DTU)	20 min
	Oilon ChillHeat high temperature heat pumps – up to 120 °C with full power	<u>Martti Kukkola</u> , Oilon	20 min	Feasibility of HTHPs – Experiences from selected case studies	<u>Fridolin Müller Holm</u> , (Viegand Maagøe)	20 min
	Challenges in the development of positive displacement compressors for high temperature heat pumps	<u>David Holder</u> , Bitzer	20 min	Optimal Temperature matching in high-temperature heat pumps	<u>Elias Vieren</u> , et al.	20 min
	Energy efficient integration of high temperature CO ₂ heat pumps and conventional heaters for spray dryers	<u>Lorenzo Bellemo</u> & <u>Riccardo Bergamini</u> , GEA	20 min	Large Scale Industrial Waste Heat Recovery: application in the food and pulp industry and heat storage using HTHPs	<u>Jose L. Corrales Ciganda</u> , <u>Maidor Epelde Agirre</u> & <u>Felipe Trebilcock Kelly</u> , Tecnalia	20 min

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Poster Session and Networking 1-5, Chair: Michael Bantle (SINTEF) All posters will be pitched in 1 min by the presenters in front of their posters, before all participants have the possibility to check out all posters and discuss with the presenters.			
	Welcome and Introduction	All poster presenters	20 min
16:40 – 18:00	Multi-Stage Water Vapor Reversed Rankine Cycle for Industrial High Temperature Heat Pump	<u>Seon Tae Kim</u> , Robert Hegner, Göksel Özüylasi, Panagiotis Stathopoulos, Eberhard Nicke, DLR	60 min
	Upgraded High-Temperature Heat Integration in Energy-Intensive Sectors	<u>Chiara Magni</u> , Hamed Abedini, Alessia Arteconi & Sylvain Quoilin (KU Leuven), Toon Demeester, Elias Vieren, Wim Beyne, Michel De Paepe & Steven Lecompte, (Ghent University)	
	The Applications of Ammonia-Water Absorption-Compression High-Temperature Heat Pumps in European Food Industry	<u>Shuai Ren</u> , Marcel Ulrich Ahrens, Armin Hafner, NTNU	
	Potential Impact of Industrial High-Temperature Heat Pumps on the European Market	<u>Cordin Arpagaus</u> & Stefan S. Bertsch, (OST), Jorge Payá, UPV, Abdelrahman H. Hassan, UPV & Zagazig University	
	Demonstrating high-temperature heat pumps at different integration levels	<u>Tage Petersen</u> , Benjamin Zühlsdorf, DTI	
	Annex 59 - Heat Pumps for Drying	<u>Michael Lauermann</u> , Veronika Wilk, Thomas Fleckl, AIT	
	Proofing the Replacement of Low GWP Synthetic Refrigerants in High-Temperature Heat Pump Applications	<u>Bassam Edmond Badran</u> , Ghanbarpourgeravi, M., Khodabandeh, R., KTH	
	19:00	Dinner at FoodClub København (Sortedam dossering 7C, 2200 København N)	

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	Technology Developments 2-1A, Chair: Claus Schøn Poulsen (DTI)			System and Sector Integration 2-1B – Chair: Brian Elmegaard (DTU)		
09:00 - 10:20	Development of a hydrocarbon cascade heat pump for high temperature applications	<u>Jonas Lundsted Poulsen</u> & B. Zühlsdorf (DTI), M. Fröschle (Bock), P. Laulund & C. Gade (S&T), L. Vigild & D. Ebert (Fuchs)	20 min	Steam from waste heat – costs of ways for steam generation	<u>Franz Helminger</u> , Johannes Riedl & Alexander Steurer (AIT)	20 min
	Industrial high temperature heat pump for simultaneous process cooling and heating	<u>Christian Schlemminger</u> & Michael Bantle (SINTEF), Sigmund Jenssen (Cadio)	20 min	A hybrid system of steam generating heat pump and solar parabolic trough collectors for process heating: Techno-economic analysis for a brewery	<u>Puneet Saini</u> & Andrew Hedstrom (Absolicon), Cordin Arpagaus, Frédéric Bless & S. Bertsch (OST)	20 min
	TransCrit: R600 high-temperature heat pump in sub- and trans-critical operation	<u>Manuel Verdnik</u> & René Rieberer, (Graz University of Technology)	20 min	Optimal operation of a conceptional industrial energy system including a high temperature heat pump, thermal energy storage and wind power	<u>Jasper Walden</u> , Anselm Glade, Jens Gollasch, Phong A. Tran, Martin Bähr & Tom Lorenz (DLR)	20 min
	Development and experimental analysis of two new types of steam compressors	<u>Hands Madsbøll</u> , Jonas Lundsted Poulsen & B. Zühlsdorf, (DTI), D. Rook (Hamburg Vacuum), C. Sørensen (CS TechCom)	20 min	Performance analysis of high temperature heat pumps and thermal energy storages for a dairy	<u>August Brækken</u> & Michael Bantle SINTEF, Marcel Ahrens, NTNU	20 min
10:20 - 10:50	Coffee Break					
	Heat Pump-based Steam Systems 2-2A – Chair: Wiebke Brix Markussen (DTU)			Technology Development 2-2B – Chair: Christian Schlemminger (SINTEF)		
10:50 - 12:10	Steam producing heat pumps for the electrification of the pulp and paper industry	<u>Michael Bantle</u> , Christian Schlemminger, Ole Marius Moen & Elisa Magnanelli, (SINTEF)	20 min	Development perspectives for HTHPs by Johnson Controls – Theoretical considerations, technical perspectives and project examples	<u>Alexander Cohr Pachai</u> , Per Skov (Johnson Controls)	20 min
	Efficient integration of steam generating heat pumps by adapting to industrial process needs	<u>Sabrina Dusek</u> , Franz Helminger & Veronika Wilk, (AIT), Alexander Arnitz, (Lenzig AG)	20 min	Reverse Brayton Cycle High Temperature Heat Pump for Heat Delivery Temperatures up to 350 °C	<u>Leander Schleuss</u> , Enrico Jende, Nancy Kabat, Nico Setzepfand & Panagiotis Stathopoulos, (DLR)	20 min
	Techno-Economic Analysis of Steam-Generating Heat Pumps in Distillation Processes	<u>Cordin Arpagaus</u> , Frédéric Bless & Stefan S. Bertsch, (OST)	20 min	Ongoing research for the utilization of NH ₃ -H ₂ O absorption-compression heat pumps at high temperature operation	<u>Marcel Ahrens</u> , Khalid Hamid, Ignat Tolstorebrov, Armin Hafner & Trygve Magne Eikevik, (NTNU)	20 min
	Heat Pump Development based on Mechanical Vapour Recompression Technology	Carl Ivar Gotaas, <u>Kjetil Evenmo</u> & Jan Haraldsen, (EPCON)	20 min	Thermoacoustic heat pumps for high temperature and industrial applications	<u>Jan-Aiso Lycklama a Nijeholt</u> , Hassan Tijani, Simon Spoelstra & Anshuman Pandey, (TNO)	20 min
12:10 - 13:10	Lunch					



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Plenary Discussion: Fulfilling the Potential - How many Industrial Heat Pumps are realistic and how do we get there? 2-3 – Moderator: Benjamin Zühlsdorf (DTI)			
13.10 - 14.10	Suggestions for discussion points: - What is missing for process industries for committing to heat pump-based process heat supply? - Assuming that we can reach optimal regulatory frameworks, how much heat pumps can the HP industry provide?	Participants to be confirmed	50 min
	Closing		10 min
Site Visits 2-4			
As part of the symposium, several site visits are organized to sites with various systems (not necessarily HTHP systems). We will organize the transport to the sites and after the tour, you will be dropped at a place with easy access to public transport and connection to the main train station and the airport. The site visits require registration, which will be opened shortly before the event (see homepage).			
14.10 - 16.10	<u>Steam Compressor Test Rig at Weel & Sandvig</u> This site visit will be organized by Weel & Sandvig (https://weel-sandvig.com/) to present their test rig for their two-stage steam compression system based on turbocompressors. The test rig is located at DTU in Kgs. Lyngby and there is space for two groups of 15 people.		30 min + transport
	<u>FlexHeat Heat Pump in Nordhavn</u> The Flexheat Heat Pump is operated by HOFOR and has been developed as a system with high flexibility to be able for fast regulation and provision of frequency reserves to the electricity grid. There is space for 25-30 persons.		45 min + transport
	+ 2 additional site visits requested		