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Chillventa 2018: Fraunhofer ISE Puts Focus on Heat Pumps

Heat pumps are a key technology for the energy transformation, since they cover the heating demand efficiently and sustainably. While the market for heat pumps in detached and semi-detached homes is growing continuously, there is still potential for heat pump use in multi-family homes and for commercial and industrial applications. At the Chillventa, the international trade fair for cooling, air-conditioning, ventilation and heat pumps, the Fraunhofer Institute for Solar Energy Systems ISE focuses on the potential and the current challenges facing heat pumps in a special presentation. The Chillventa trade fair takes place from 16-18 October 2018 in the City of Nuremberg.

“In addition to process optimization, the sustainable supply of heating and cooling in multi-family homes as well as in businesses and industry is important for the success of the energy transformation. Looking forward, further research and development work on heat pumps is necessary in order to meet the market requirements of these branches in the future. We invite participants of the Chillventa to the specialist forums, where they have the possibility to speak with experts in the field,” explains Dr. Peter Schossig, Director of Business Division “Thermal Systems and Building Technology” at Fraunhofer ISE.

The following topics will be presented at **specialist forum on heat pump technology** located in Hall 4A, Stand 4A-405 at the Chillventa:

Tuesday, October 16

11:40 - 12:00 “Reduction of energy costs and integration of renewables by using vacuum ice slurry in heat pump and cooling systems,” Mathias Safarik - ILK Dresden gGmbH Institut für Luft- und Kältetechnik gemeinnützige Gesellschaft mbH

14:40 - 15:00 “Neue Komponenten für natürliche Kältemittel: Welche werden notwendig werden?“, Dr.-Ing. Peter Schossig – Fraunhofer Institute for Solare Energy Systems ISE

Wednesday, October 17

11:40 - 12:00 “Sollten die Hersteller die Verantwortung für die Effizienz des Gesamtsystems übernehmen? Wenn ja, wie am besten?“, Egbert Tippelt - Viessmann Deutschland GmbH

14:40 - 15:00 „Die Zukunft der WP Vermessung/Zertifizierung. Brauchen wir dynamische Bewertungs-Methoden?“, Carsten Palkowski - BAM Bundesanstalt für Materialforschung und -prüfung // Andreas Zottl - AIT Austrian Institute of Technology

Thursday, October 18

11:40 - 12:00 „Fehlerfreie Installation: Was macht ein Hersteller um den Installateuren zu helfen die Fehler zu vermeiden?“, Tony Krönert - Bundesverband Wärmepumpe e.V.

14:40 - 15:00 „Integration der Wärmepumpen in das Energiesystem der Zukunft. Was ist notwendig um diesen Prozess zu beschleunigen?“, Dr. Marek Miara – Fraunhofer Institute for Solar Energy Systems ISE

On October 15, 2018, the day before the trade fair, the Chillventa CONGRESS offers four specialist forums which provide a detailed summary on current topics in the branch. In the forum “Conditioning Computer Centers” Gerrit Fülde from Fraunhofer ISE gives a talk on “Adsorption Cooling from Exhaust Heat of Liquid Cooled CPUs in the HPC Computer Center – Material and Component Development.” The growth rate of big computers installed has risen rapidly over the last years and will continue to do so in the future. Besides the electricity needed to operate the components, heat is emitted on about the same dimension. Therefore, efficient solutions for cooling computer rooms come into focus.

Innovations in Heat Pumps

Fraunhofer ISE has many years of experience in heat pump technology. Its know-how covers the entire value chain, starting with material and component development together with partners and clients from industry and research, through field tests and indoor tests up to analyzing the performance as part of the total energy system.” A current research focus is the use of climate-friendly refrigerants in heat pumps. These will be replacing conventional refrigerants due to the new regulatory restrictions in place. At the Chillventa we will be presenting several new approaches and options,” says Dr. Marek Miara, Coordinator of Heat Pumps at Fraunhofer ISE.

You can visit us at the Fraunhofer ISE stand (4A-407) to speak with experts and view our exhibits:

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- Efficient refrigerant distributor for microchannel evaporator: Heat exchangers like the evaporator play a key role in decreasing the refrigerant charge in air-water heat pumps. This is also relevant for the costs and safety. Fraunhofer ISE has optimized concepts to reduce inner volumes. Aluminum sheets with channels allow for a homogeneous distribution of the refrigerant (e.g. propane) compared to a ribbed circular tube heat exchanger.

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The new fluid distributor has a homogeneous distribution and reduces the refrigerant required.
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- Adsorption Heat Exchanger: As a main component of the adsorption chiller and heat pump, the heat exchanger has a patented adsorptive coating. Metal-organic frameworks (MOFs) can be used as sorbent, for example. The coating allows for a high power density and high heat transformation efficiency at the same time.



With the new class of material, metal-organic frameworks, sorbents can be optimized to target the needs of the different applications. ©Fraunhofer ISE

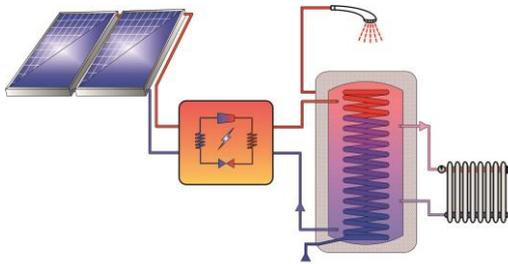
- Photovoltaic-Thermal Hybrid Collector (PVT) and Heat Pump: The symbiosis of both technologies has many advantages: The PVT collector supplies low temperature
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heat to the evaporator and also electricity for the compressor. This can replace a ground probe or an outdoor unit, eliminating noise. Solar cells are laminated directly on the absorber in order to optimize the heat transfer from the cells to the fluid. The initiative integraTE² from Fraunhofer ISE and partners, within the framework eneff.gebäude.2050, aims to establish the technical integration of thermal-electric energy supply combining PVT and heat pumps on the market.

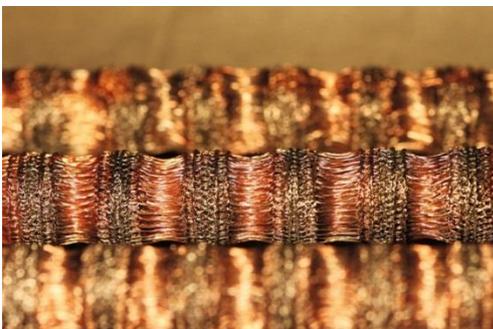
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Schematic of a combined heat pump and PVT collector system for supply space heating and hot water heating. ©Fraunhofer ISE

- **Wire-based Heat Exchanger:** The innovative design with a soldered copper-wire structure is optimized for use in adsorption heat pumps and improves the sub-atmospheric evaporation of water. The manufacturing technology for metal textile structures enlarges the surface area and thus the capacity for the capillary adsorption of the refrigerant. Compared to the current state of the art, this heat exchanger evidences improved volumetric evaporation.



For efficient evaporation of the natural refrigerant water, it is necessary that the heat exchanger has a large specific surface area, as shown by this sheath structure of woven and knitted copper wire soldered to the round copper pipe. ©Fraunhofer ISE

<https://www.chillventa.de/>