PRESS RELEASE

Fraunhofer ISE at the ISH 2019 in Frankfurt, Germany

From March 11 to 15, 2019 the Fraunhofer Institute for Solar Energy Systems ISE will be presenting its expertise in the field of heat pump technologies, including sustainable coolants, quality assurance and product qualification. Other topics presented are the technical prerequisites, e.g. for tenant electricity models and the intelligent operation management of buildings. The ISH Energy section is the international meeting point for industry in the fields of heating and cooling technologies and innovative building solutions. The experts from Fraunhofer ISE are located in Hall 11, Booth D68 at the ISH 2019 in Frankfurt, Germany.

Sector coupling is the keyword for the second phase of the energy transformation which Germany is presently entering. At the turn of the year, the share of renewable energy surpassed the 40 percent mark in the net electricity production. Parallel to a continued increase in installation capacity, it is now time to focus on the intelligent coupling of the electricity, heating, cooling and mobility sectors. Fraunhofer ISE has been conducting research and development on systemic solutions for over 30 years. At the ISH 2019, the institute is presenting a selection of its services, with which it can assist industry in meeting the future challenges of the transformation.

For the modern heating market, the development focus is on the complex interaction between heat pumps, PVT collectors (i.e., hybrid collectors that generate both power and heat), solar thermal collectors and photovoltaic modules. Complementing the supply side, further research developments in thermal storage systems, heat distribution systems and the heat transport for space heating and hygienic hot water heating are also key.

The role of buildings is changing: They no longer exclusively consume, but also supply energy. This change necessitates both internal networking and coordination within the building as well as interaction in the next, larger entity of urban quarters and cities.

Heat Pumps of the Next Generation

Next-generation heat pumps are the focus in the field of product and component development for heating systems. Fraunhofer ISE carries out research along the entire value chain. The current developments in heat pumps feature reduced coolant demand, climate-friendly coolant as well as units with high efficiency and reliability.

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Since the F-Gases Regulation has come into force, the demand for climate-friendly coolants is on the rise worldwide. The limitation of coolants on the market and industry's interest in long term solutions require both new developments and the refurbishment of available devices and components. As development partner, Fraunhofer ISE offers the industry a broad spectrum of expertise and an excellent infrastructure. Research services include the development, characterization and analysis of components, measures to reduce the amount of coolant required and the development of heat pumps for higher temperature ranges. Additionally Fraunhofer ISE supports their clients in establishing suitable safety concepts.

Quality Assurance and Product Assessment in the Laboratory and the Field

The performance and reliability of the heating technologies used is decisive for the sustainable development of the heating market with low carbon emissions. Fraunhofer ISE supports its industrial partners in product qualification and characterization. The institute offers detailed analyses of the devices used in the building services, for example, PVT collectors, photovoltaic modules, solar thermal collectors, air-conditioning units, thermal storage and heat pumps. These services are performed both in the institute's accredited test labs as well as increasingly digitally in the field. Based on the test results, certificates and market authorization can then be obtained from the responsible certification bodies, and the energy label can be then put on the devices by the company itself. This provides transparency on the efficiency and quality of the tested device.
At the ISH, the results from the latest field test of heat pumps in the building stock are presented.

Fault Diagnosis for Technical Building Systems

In the field of building operations management, the next evolutionary steps are the Internet of Things (IoT), artificial intelligence as well as the digital building twin. With the data processing algorithms developed at Fraunhofer ISE, it is possible to carry out a digitalized and remote fault diagnosis of the building technology systems, like heating systems. This means energy savings, improved comfort and cost reductions due to optimal operating modes and a targeted maintenance effort. The industry can use this algorithm under license on their own products – in cloud-based platforms or as edge-computing solution direct in the device – and offer the advantages on the consumer market.

Technical Prerequisites for New Business Models, Such as Tenant Electricity Models

For the intelligent use of self-produced electricity, Fraunhofer ISE developed an agent-based energy management system. This comes into play when decentralized systems shall optimally interact during operation without any remote controls. In the new tenant electricity models offered by building cooperatives or real estate owners, tenants

can optimize their energy consumption through so-called "agents" and thus reduce their electricity bill. The agent gives the tenant the full control over his consumption. There is no danger that the user behavior is controlled remotely. Operation in city quarters can also be optimized locally in this way.

Sprinkler system used for acoustical measurements of a heat pump compressor at a Fraunhofer ISE test stand. ©Fraunhofer ISE/ Simon Braungardt