FRAUNHOFER INSTITUTE FOR SOLAR ENERGY SYSTEMS:
Technologies for Smart and Sustainable Buildings and Communities

Fraunhofer ISE: The Fraunhofer Institute for Solar Energy Systems ISE is a member of the Fraunhofer-Gesellschaft in Germany, a non-profit organisation, which occupies a mediating position between the fundamental research of universities and industrial practice. It conducts applications-oriented research to benefit the economy and society at large. With a staff of above 1200, Fraunhofer ISE is the largest solar energy research institute in Europe. The Fraunhofer ISE is committed to promote energy supply systems which are sustainable, economic, safe and socially just.

To this purpose, the institute develops materials, components, systems and processes for the following business areas: energy-efficient buildings, applied optics and functional surfaces, solar thermal technologies, silicon photovoltaics, photovoltaic modules and systems, alternative photovoltaic technologies, renewable power supply and hydrogen technology. With activities extending well beyond fundamental scientific research, the institute is engaged in the development of production technology and prototypes, the construction of demonstration systems and the operation of testing centers. The institute plans, advises, tests and provides know-how and technical facilities as services. (http://www.ise.fraunhofer.de/en)

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Doreen Kalz is the head of the group “Building Analysis and Energy Concepts” at the Fraunhofer Institute for Solar Energy Systems in Freiburg, Germany. She received her PhD from the University of Karlsruhe in 2009 (Germany) and her M. Sc. from the University of Nebraska-Lincoln (USA) in 2003. Doreen joined the Fraunhofer ISE in 2005 working with industrial partners and researchers on sustainable and efficient heating and cooling concepts for non-residential buildings. This includes the energy analysis of commercial buildings throughout Germany, the development of strategies to improve energy utilization and the continuous monitoring and evaluation of buildings over multiyear periods. Further, Doreen leads the business area of “Building Operation and Facility Management” at the Fraunhofer Innovation Center in Duisburg (Germany). The work focuses on the development of new technologies and systems that help to create a comfortable indoor environment and make it possible to operate a building in an energy-efficient and cost-effective way.

Presentation: Technologies for Smart and Sustainable Buildings and Communities

The building sector in Germany and Brazil is responsible for more than 42 % of the total energy consumption. Energy is used to heat, cool, ventilate, illuminate and provide many other services in buildings. For the year 2010, the Federal Ministry of Mines and Energy of Brazil confirmed a significant increase in energy consumption. In view of the global changes affecting energy use in buildings, it will continue to be a challenge to meet energy requirements and operate buildings in an optimized manner.

Building users today have higher expectations regarding the quality of the working environment and energy efficiency. To meet these expectations, and at the same time stand up to the increasing cost pressure from international competition, we need sustainable building and energy management concepts that are fit for the future. If we look at successful building concepts, it is immediately evident that they are all based on a combination of different energy-efficiency technologies. This combined approach is the only way forward if we want to improve thermal, visual and acoustic comfort, reduce energy consumption, and construct buildings that can be operated in a cost-optimized way.

In the future, buildings may become net energy suppliers, if renewable energy sources are used locally and excess energy is fed into the electricity grid. In buildings with a very high energy standard and correspondingly low consumption, a positive energy balance can be achieved for the annual average. Although buildings of this type are already in operation today in Europe, there are still only a few isolated pilot objects. Regardless of how the standard is achieved for specific cases, the use of solar energy will play a central role. Solar thermal systems help to reduce the remaining energy demand significantly for domestic hot water and space heating, and also for cooling if required, and photovoltaic systems can not only contribute to meeting the electricity demand but also feed excess solar energy in the form of electricity into the grid.

The speech will present new technologies and concepts for buildings regarding optimization of components and facades systems. Further, it will cover innovative concepts for cooling of non-residential buildings, such as the use of solar driven cooling systems. Finally, the presentation will point out the importance of the operation management for optimal functioning of complete systems, consisting of the building envelope, HVAC technologies and the users.