

Keynote Speech

State of the Art of HVAC Technology in Europe and North-America

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Heating, cooling and ventilation systems play a significant role in the energy use and for the indoor environment quality in a building. The main purpose of these systems is to provide a comfortable, healthy and productive indoor environment for the occupants. These goals should however be achieved with the lowest possible energy consumption. Today the heating, cooling and ventilation of buildings consume about 40% of the world energy use. As the resources of fossil fuels are limited and the use of nuclear power is associated with several safety issues there is a worldwide need for reducing the energy need of buildings.

This can easily be done by sacrificing the requirement to the indoor environment i.e. accepting higher room temperatures in summer and lower room temperatures in winter or decrease ventilation rate. This may however result in more uncomfortable places of work, increased health risk and lost productivity of the people working in the space. Besides decreasing the energy demand by building design and energy efficiency another priority is to use as much as possible renewable energy sources like wind, solar and geothermal.

This paper will present state-of the art-off energy efficient systems that will provide a good indoor environmental quality at a decreased energy use. Low Temperature Heating (LTH) and High Temperature Cooling (HTC) systems are an important requirement for increasing the energy efficiency of HVAC (heating, ventilation and air-conditioning) systems and for increasing the amount of renewable energy used. Especially these types of systems are getting increasing attention in Europe and North-America.

Dr. Bjarne W. Olesen is a full professor in the Department of Civil Engineering, Technical University of Denmark, where he also is head of the International Center for Indoor Environment and Energy. He is ASHRAE President Elect. He has been working on indoor thermal comfort, ventilation and sustainable heating and cooling of buildings since 70's. He is active in several ASHRAE-CEN-ISO standard committees regarding indoor environment and energy performance of buildings and HVAC systems, and has published more than 370 papers including more than 80 in peer reviewed journals. He was awarded the Ralph Nevins Award (1982), Distinguish Service Award (1997), Fellow Award (2001) and Exceptional Service Award (2006) from ASHRAE. Honorary member of AICARR (Italy), SHASE (Japan) and VDI-TGA (Germany)