

### Invited Sessions

**Title of Session:**

Low-temperature heat emission in buildings

**Name of Chair:**

Prof. Sture Holmberg

**Description:**

Within the European Union (EU) there is a demand for a 20 % reduction in the total annual energy consumption before year 2020. The building sector plays a key role. Heating, ventilation and cooling of buildings are responsible for 40 % of total energy consumption and a significant amount of CO<sub>2</sub> emission. To meet the EU ambition we need to reduce the overall energy demand in our buildings. This includes increased energy efficiency and better use of renewable energy. The demand for efficient and environmental friendly heating systems has contributed to the development of water-based heat emitters specially adapted to heat pumps and district heating systems. With equal heat output such heat emitters allow lower supply-water temperature than traditional systems, which gives energy savings in heat production and distribution.

Technical arrangements with low-temperature heat emission systems normally include large heat transferring surfaces, technology that improves the radiation heat transfer or various shapes such as convection fins to improve heat transfer by convection. It is also well-known that forced air movements on heater surfaces improve heat transfer. Floor heating is by far the most common low-temperature system in Sweden. The function of floor systems is normally good but in certain room types or buildings there are reasons to choose other solutions. In exhaust ventilated rooms for example, where ventilation air is supplied directly from outdoors, a better option could be to have wall-mounted supply air convectors or ventilation-radiators. With such solutions the risk of cold draught is reduced and a high ventilation rate is maintained even in the time. High ventilation rates are the single most important factor to reduce health problems such as Sick Building Syndrome (SBS), allergies and asthma.

An example of low-temperature heat emitters with fast thermal response is skirting board panels. Skirting heaters, where an integrated water pipe is the heat carrier, are long and low units installed to replace traditional wooden skirting boards. Such thermal units are placed at floor level along inner periphery of the room. Heat from the panels surrounds the occupants in the room providing a “heat enclosure”. Skirting heating distributes radiant heat uniformly throughout the room with minimum of air movements. This means less spread of contaminants in the room air, which may result in a healthier indoor environment. Ledge type low-energy emitters are possible to use in natural and mechanically ventilated rooms. Above mentioned projects are sponsored by the Swedish Energy Agency (STEM). The intention is to analyse energy consumption, thermal comfort requirements and hygienic aspects with alternative heat emission and ventilation systems in buildings. Achieved results give guidelines in the design, as well as contributions to further development of the systems.

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[http://www.kth.se/sth/forskning/stromning\\_klimat?l=en\\_UK](http://www.kth.se/sth/forskning/stromning_klimat?l=en_UK)

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