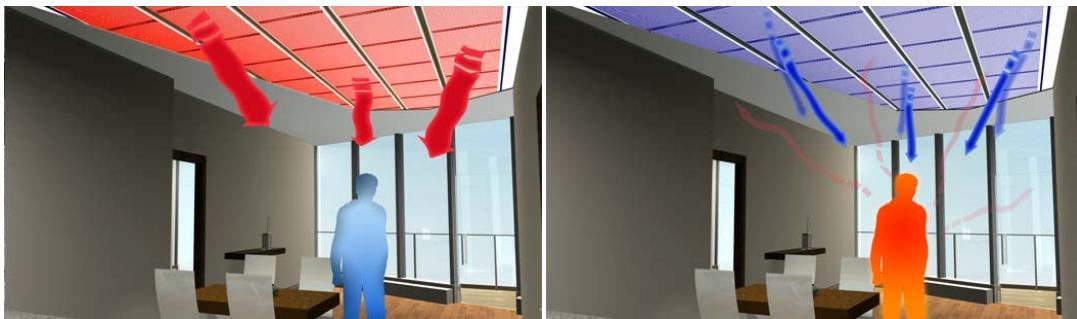


## ENERGY EFFICIENT BUILDINGS USING CONCRETE THERMAL MASS

To verify and prove the long standing experience of different civilizations to use massive buildings in providing temperature comfort from the elements, the Cement Association of Canada (CAC) recently completed several studies aimed at using the mass of concrete structures in energy efficient design of modern buildings.

When concrete in a building is coupled with radiant heating/cooling mechanical system it will, through its thermal storage capacity, moderate and substantially reduce energy consumption of the space. The technology of using thermo-active concrete elements, coupled with high performance building envelopes has been used successfully in Western Europe for the last 15 years, and has been shown to save up to 60% of energy when compared to conventionally designed and constructed buildings.



*Radiant energy stored in the floor concrete mass can heat up the space or cool it through an efficient temperature equalization process*

The CAC sponsored studies also confirmed energy savings possible using concrete buildings when compared with other types of construction lacking high thermal mass properties:

- Computer modeling studies concluded energy savings (over lighter construction material systems) in the order of 20- 25% across all the Canadian climates when heavy concrete construction is used combined with the radiant mode of heating/cooling of the space.
- Another study involved monitoring energy use of two buildings at the UBC campus, Vancouver, the older CICSR building and the new ICICS building. The data collected over a period of one year showed 59% savings achieved in the modern ICICS building designed with the latest heating and cooling technology utilizing the thermal mass properties of the concrete structure.

This new design concept is now being embraced by several mechanical engineering firms in Canada. In BC and elsewhere there is a growing number of a new generation of buildings designed to achieve very high energy efficiency using this concept. Perhaps the best example to date is the just completed Olympic Village project in Vancouver (see the photos below). This complex comprising some 15 low to mid-rise buildings use a variation of this technology on all of them, through an imaginative use of concrete construction.



*ICICS building shown in the middle & the CICSR building to the left of it.*



*View of a residential building in the Olympic Village*



*New hydronic radiant "capillary mat" system (pictured left) imported from Germany used on some of the buildings for radiant heating*