The combined heat capacity is 5430 Kcal/sqm, disregarding the sensible heat capacity of the PCM, compared with 4980 for the PCM/concrete wall.

A water/PCM combination is easily applicable to passive, active or hybrid solar systems, while the application of concrete/PCM to an active system, although not impossible, would require complex detailing for the heat transfer in and out of the material.

In contrast with the thermal advantages and application flexibility of the PCM/water combination it should be pointed out that in passive solar buildings the construction and maintenance of a concrete wall seems to be much simpler than the water wall. These two aspects should be weighted by the designer.

## Combining heat and Cold Storage in One Element

It is possible to mix two types of PCM pellets, with two phase transition temperatures, e.g. 20 and 30 $^{o}$C., either with concrete or with water. The effective latent heat capacity of the material will be only one half of a mix with a single PCM type but the same element could serve to store solar heat in winter and night coolness in summer.

## Effect of PCM Carrier Matrix and Method of Application

The carrier matrix with which the PCM are mixed and the form of application in the building can have significant effects on its potential uses and performance. The following comments deal with the use of perlite (as well as other insulating materials) as carriers.

PCM impregnated perlite is a composite material which may combine high specific heat with low thermal conductivity. Although no experimental data was provided on the actual conductivity, it can be assumed that it is somewhere between the conductivities of the two individual components.

When filling an air space of a wall, the combination of high thermal resistance and high heat capacity provides a high Thermal Time Constant (TTC) for the wall. Such a wall, although a lightweight one, will perform as a high mass wall. It is very effective in suppressing the effect of the temperature swing of the external surface on the interior swing and in stabilizing the indoor temperature.

In fact, a building with lightweight stud walls filled with perlite/PCM mixture can perform in this case as a very high mass building. The indoor temperature in the building will be stabilized around the melting/freezing temperature range of the PCM, provided that the outdoor temperature swings well above and below the PCM range. A concrete/PCM wall of a given thickness will perform thermally in a similar climate as a much thicker concrete wall.

In such applications, as a filling of stud wall's cavity or forming a layer over the ceiling, the combination of high insulation value of the carrier medium and the storage capacity of PCM would act together in suppressing the indoor temperature