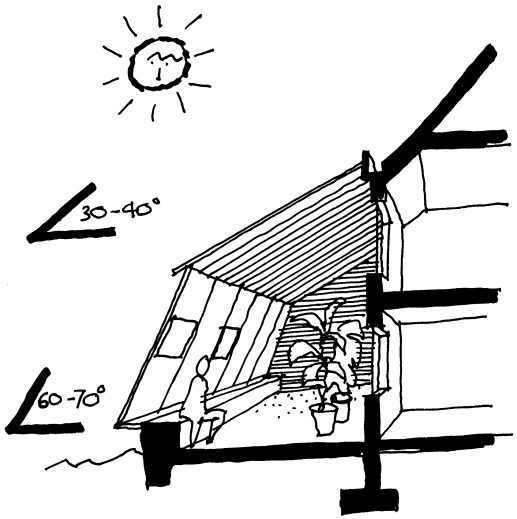

Figure 4.61 *Direct solar gain.*

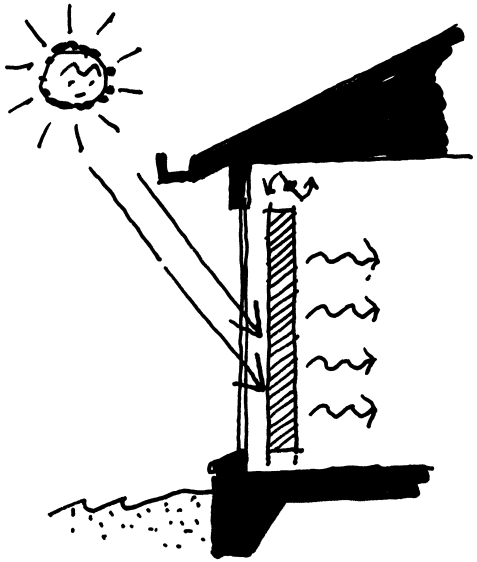

Figure 4.62 *Trombe wall.*

not exceed 20 per cent of the area which it heats. Just as the floor slab in direct gain systems releases its stored heat slowly, so the Trombe wall allows its stored heat to be transmitted to the interior at a rate depending upon its thickness. The outer skin of glazing provides a rain screen but also contributes to heat retention through an inherent 'greenhouse' effect. The Trombe's efficiency is enhanced by incorporating vents at its base and head, which connect the glazed void to the habitable space; by convection, air from the room is tempered and re-circulated (**Figure 4.62**).

The familiar conservatory or 'sunspace' embraces both direct and indirect solar gain and provides, economically, a flexible extension to habitable space. Thermal isolation will reduce heat loss from an adjacent room in winter and will control heat gain in summer. Vents will allow for a moderating air flow between the conservatory and its adjoining space (**Figure 4.63**).

Active solar energy

There are two types of active solar systems; those which directly use the sun's rays (as in a flat plate collector) and those which convert solar energy into another power source (as in photovoltaic cells). Both collectors are mounted on south-facing roofs at optimum pitch (30° to 40°).

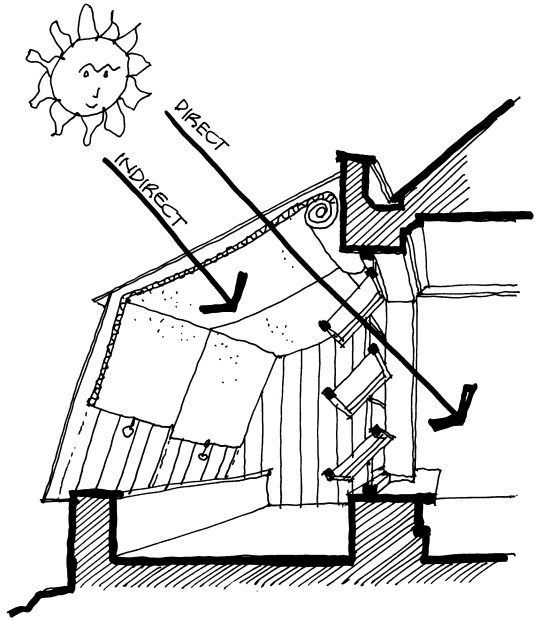

Figure 4.63 *Attached 'sunspace'.*

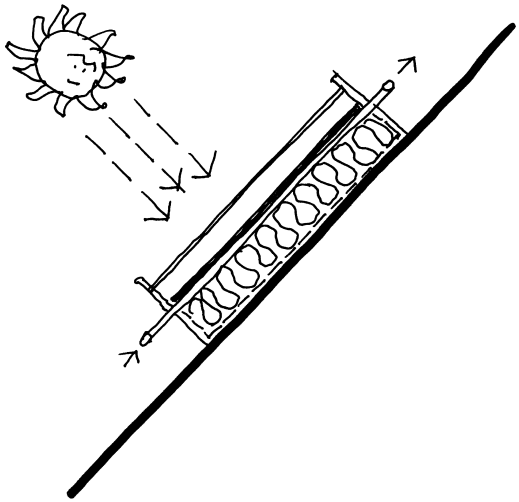

Figure 4.64 *Flat plate solar collector.*

The flat plate collector is essentially a water-filled calorifier behind an absorber plate, which transfers solar heat to another medium. In the UK, it is generally used for domestic hot water systems, where roof-mounted collectors heat water storage tanks within the roofspace (**Figure 4.64**).

Photovoltaic (PV) cells convert solar energy into electrical power which is then harnessed within the building for space heating, cooling, mechanical ventilation, or lighting. They embody two layers of semi-conducting material which, when exposed to sunlight, generate electrical power. They are normally incorporated within roof or wall cladding systems, and in some installations offer sun shading.

Embodied energy and recycling

The 'embodied' energy of materials within a building is complex, and relates to how such materials can be recycled after the building's 'first use', as well as to the energy used in their manufacture and transport to the site. Moreover, embodied energy is small (approximately 10 per cent) when compared with that consumed during a building's useful life.

The English Arts and Crafts architects, notably Ernest Gimson (**Figure 4.65**) and Edward Prior, sourced their building materials as near