Figure 4.65 *Ernest Gimson: Stoneywell Cottage, Leics.*

to the site as possible. This both satisfied their ideological concerns and their regard for utility, but well pre-dated the widespread use of lightweight building materials sourced internationally. Therefore in the interests of sustainability, heavyweight materials such as masonry and aggregates for making concrete, should be sourced locally, but for most lightweight materials, the embodied energy in transporting them to the site is far outstripped by that consumed during manufacture, suggesting that local sourcing is less critical.

There are two categories of recycling; one reuses the salvaged building materials and components 'as found' in a new building, whilst the other manufactures new components from 'scrap' material. The embodied energy of the latter is much greater.

On a larger scale, some buildings offer an infinite capacity for re-use, whilst others, because of an inherent inflexibility in their organisation and method of construction, face demolition after the expiry of their 'first life'.

Energy conservation

Whilst buildings which are heavily insulated and air-tight will conserve energy, sensible design decisions at a strategic stage are nevertheless crucial in this pursuit. For example, north-facing fenestration should be minimal, or *in extremis*, avoided altogether. This simple case exposes the interactive nature of sustainable design, for high levels of insulation will not produce 'green' architecture should embodied energy, or working with a prevailing climate, be disregarded.

Nevertheless, high insulation represents an economic way of dramatically reducing a building's energy requirement and therefore its consumption of fossil-based fuels. A building's thermal performance can easily be measured, and this quantitative component of sustainable design has led to 'superinsulated' buildings, particularly in the domestic sector, where the benefits of 300 mm thick wall insulation and 500 mm thick roof insulation can be readily calculated (**Figure 4.66**). Locating such insu-

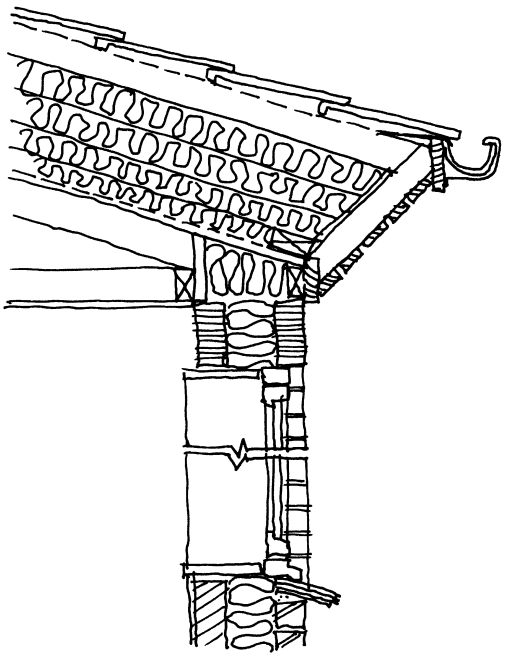

Figure 4.66 *Superinsulation: Robert and Brenda Vale, Woodhouse Medical Centre, Sheffield.*

lation on the 'cold' side of heavyweight walls, floors, and roofs will allow the thermal mass of these elements to moderate the internal environment by heat retention in winter and by passive cooling in summer. Vapour barriers should be located at the 'warm' side of insulation; openings in the building's fabric and junctions between constructional elements should be airtight.

So what effect has sustainability had upon architectural form? Certainly, architects have extended their range of architectural expression both at strategic and tactical levels. The response to climate is obvious in a new orthodoxy of heavily-glazed south elevations with shading devices (**Figure 4.67**) and attendant minimally-glazed north elevations on a narrow plan, with direct visual consequences. Moreover, devices such as atria and thermal chimneys (**Figure 4.68**) have been displayed by architects as expressive elements to describe their building's 'green' credentials.

In extreme cases, such as Hockerton housing in Nottinghamshire, UK, by Robert and Brenda Vale (**Figure 4.67**), traditional modes of architectural expression have been virtually subsumed by a need to satisfy the 'green' agenda. Even though a menu of traditional materials has been employed, they construct south-facing sunspaces, earth sheltering to north and east elevations, and turf-covered roofs, to establish a fresh and distinctive architectural expression for domestic buildings.

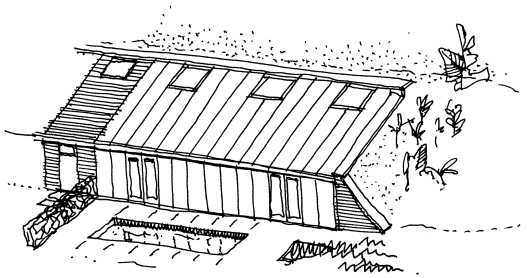

Figure 4.67 *Passive solar housing: Robert and Brenda Vale, Hockerton Housing, UK.*