



BACK TO THE FUTURE

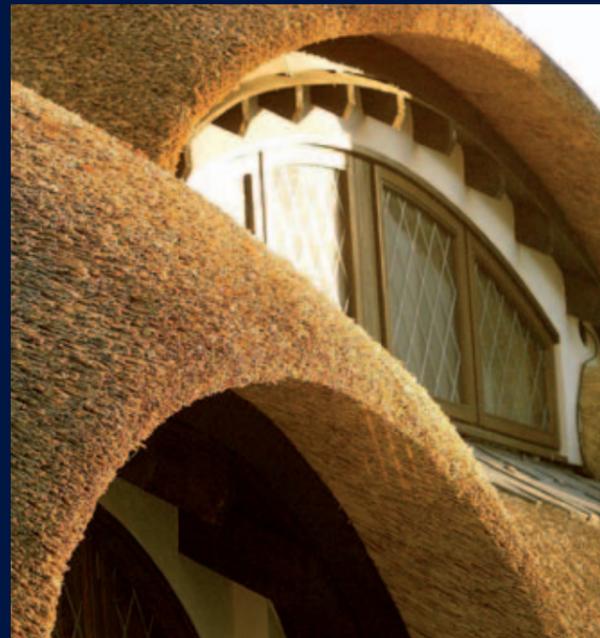
Ecological building techniques in modern architecture

In a time of economic difficulty with dwindling fuel resources and with more and more people becoming environmentally aware, the importance of localism as a way of thinking is growing in every sector. None more so than the domestic construction industry where home owners and designers are looking back to learn lessons from previous eras.

In a typical building designed to meet modern building standards, the embodied energy (i.e. the amount of energy used in manufacture and transportation) of the building materials represents between 10-25% of the total energy consumption of the building throughout its whole life. The operational energy (i.e. heating, lighting etc) represents the remaining 75-90%. For this reason the building industry has thus far focused on improving the overall thermal performance and air tightness of the building fabric in order to prevent heat loss and therefore reduce energy demand.

However, the embodied energy of the materials in what the industry terms a 'cradle to grave' analysis becomes more significant as the operational energy is reduced, as a result of using materials with high levels of insulation which often rely on large scale mechanisation and produce high quantities of harmful gases during manufacture.

It is for this reason that there has been a resurgence in 'low impact' building methods which utilise natural resources found in the local area. Most of these materials by their very nature require little energy for extraction or construction and are often based on techniques employed for hundreds of years and which have already shaped vernacular architecture all over the world.



Up until the Industrial Revolution and the increasing use of man-made building materials, construction relied on what was available in the local vicinity. This was particularly prevalent in island locations such as Guernsey, the most common materials available here being granite, clay, timber and thatch. The influence of these is still clearly visible in the historic architecture of the island. By contrast, in Guernsey today most building materials are imported from the UK or further afield, the consequence being a significant increase in embodied energy.

By utilising natural materials in a modern context, it is possible to reduce the reliance on imported products and reduce the carbon footprint of new buildings, whilst also creating architecture which exists in harmony with the surroundings.

Careful selection of materials is therefore required to ensure the meeting of current building standards as well as to create a comfortable living environment fit for modern life. Whether one opts to utilise modern or more traditional building technologies the basic aims are often the same; primarily to reduce the cost of providing a comfortable living environment.

Generally this is achieved in modern forms of construction through the use of insulated wall cavities, plastic membranes and impervious cladding which create a sealed building envelope to retain heat and keep out moisture.

This sealed envelope retains heat by restricting air movement in and out. The consequence of this strategy is that stagnant air becomes locked inside. Modern mechanical ventilation systems are often utilised to provide adequate air changes but this increases energy demand and fuel bills. Other forms of natural ventilation such as simply opening windows will provide adequate fresh air but this is intermittent, relies on the occupier and is also likely to be inadequate in winter when windows are not opened very often.

In contrast, traditional low impact building methods generally revolve around solid or homogeneous wall structures. Think of the thick granite and lime pointed walls of traditional Guernsey farmhouses for an example. Instead of trapping the air, the wall's key attribute is that they are able to 'breathe', allowing moisture to permeate through the structure. Much as this sounds counter-intuitive, this in fact has significant benefits. By allowing the movement of vapour in and out of the building, the internal environment is effectively filtered or purified on a continuous basis. This not only prevents mould growth inside the building but also removes harmful gases such as carbon dioxide and volatile organic compounds from the air, maintaining a healthy indoor environment.

The 'breathability' of traditionally constructed buildings need not be detrimental to their thermal performance however as this relates to the migration of moisture at a molecular level rather than through air gaps or cracks.

The thick walls also aid in reducing temperature fluctuations as excess heat is absorbed into the structure and released slowly back into the internal space as it cools, which, in turn reduces heating and cooling demands, saving energy and therefore reducing fuel bills.

Although not traditionally used on the island, there are a number of natural materials used in the construction of houses in similar climates which are now available. These include straw bales, cob (a mixture of local clay and straw), adobe (clay and straw blocks which can be made on-site), and rammed earth (heavily compacted soil between temporary plywood or permanent reused rubber tyre formers). Thatch, natural slate (depending on the source and processing methods) and turf can be used for roofing. Because the construction techniques used are based on traditional methods, they rely principally on manual labour (along with a few modern tools to speed things up) which again contrasts with more modern construction methods which utilise a lot of fuel-intensive machinery, transport and specialist labour. For example, the mixing of straw with clay, aggregate and water to form cob is usually done by trampling across it and tossing it in the air with a tarpaulin!

Although relatively labour intensive, the principles of low-impact construction are generally simple to grasp and would be suitable for self-builders alongside a suitably competent designer to provide construction information and advice during the course of the build.

The nature of the materials used often informs buildings which are organic in appearance and are particularly suited to rural sites as they can be designed to blend into their landscape, much as do the vernacular Guernsey farmhouses which are now so sought after. However, this need not by any means always be the case, there are many examples both on the island and across the globe of the successful combination of traditional building techniques and contemporary design. ■

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