



The INTEGRER Millenium House, Watford, UK



IEA – SCH Task 28 / ECBCS Annex 38:
Sustainable Solar Housing

Interior of INTEGER House



The project

The INTEGRER Millennium House went from design to construction to completion to occupation within a period of eighteen weeks. There were no contracts involved and no budget as suppliers donated materials, expertise and time free of charge. This was a real team effort with the task of building one of the most innovative houses in the world. The process was captured for posterity by the BBC in the six-part, prime-time 'DreamHouse' series.

Since it opened in 1998, the INTEGRER Millennium House has functioned as a demonstration house, showcasing the origins of the INTEGRER concept. To date, over 5,000 people have visited it, with glowing commendations such as "I love it! Where can I buy one?" It is a house which has reached iconic status in Britain and around the world.

Objectives

Following a seminar entitled "Intelligent & Green?" in May 1996, a design team was formed to evaluate available design and technical solutions to improve housing performance. This culminated in the production of a model house and specification which has toured the world, showcasing what is possible in introducing innovation to housing.

During 1998, the design team set out to turn this model into reality. The project involved a wide range of partners from all areas of the housing sector, including materials and product suppliers and building professionals. They all contributed expertise, time and materials to the construction of a real intelligent and green house.

The house aimed to incorporate innovation in design, intelligence, environmental performance and the construction process, turning a dream of what was possible into the reality of a three-bedroom house.



Building construction

Materials for the building fabric were selected for sustainability, low embodied energy, long life and low maintenance.

A low maintenance turf roof provides good insulation, is visually attractive and provides a natural alternative to conventional roof materials.

Off-site fabrication of components included pre-cast concrete floor slabs and timber panels for the superstructure insulated with 170mm of cellulose recycled paper.

Integrated design and procurement. CAD drawings were issued by e-mail from designers to manufacturers. Pre-fabricated components were designed and agreed in a matter of days.

Standard components from the commercial glasshouse industry were used to construct the conservatory.

Bathroom modules similar to those originally designed for the off-shore oil industry were craned into the site as fully completed timber-framed rooms.

A central service core was used to distribute all of the pipework and cabling services vertically through the house. Structured cabling hidden behind removable skirting, and service voids behind the internal plasterboard walls allow for easy access for maintenance and upgrade.

Technical systems

A heat pump extracts energy from water circulating in a 50m deep borehole. Although the heat pump runs on electricity, it is very efficient using only one unit of electricity for every three units of heat provided.

Heating is delivered through under-floor trench heaters. Water is pumped at 50°C to bring the temperature up to that set by the individual room thermostat.

Solar water heaters mounted on the roof can provide free hot water at up to 95°C which is then pumped to a highly insulated hot water tank at 77°C. This water is then supplied at mains pressure around the house as required.

A grey water system treats and recycles water used for washing and bathing and re-uses it for flushing the toilet, reducing water usage by around 30%

Rainwater is collected, treated and stored in an underground tank for garden irrigation and car washing.

Soil humidity is monitored to ensure that the automatic garden irrigation systems only waters plants which need it.

Energy performance

The sophisticated yet user-friendly building management system ensures that the performance of the heating system is optimised, only operating it when heat is required.

An intelligent security system not only picks up intruders but also interacts with the lighting, heating and door control systems to ensure that no energy is wasted while the house is unoccupied. On returning home, all of the systems within the house 'wake-up' automatically to provide safety and comfort as soon as you step in the front door.

Marketing strategy

Many of the 5,000 visitors to the house have wanted to know where they can buy an INTEGER house, and why housebuilders are not offering this kind of product to the public. In this way, the INTEGER Millennium House has succeeded in creating an example of what is possible and also permitted people to raise their expectations of what housing quality can be. Not merely three bedrooms under a roof, but a tool through which lives can be improved.

The INTEGER House has received widespread media coverage - the most obvious example being the "Dreamhouse" series on BBC1 prime time and in forthcoming repeats.

INTEGER is the UK's leading action-research network promoting innovation in buildings using intelligent and green technologies. Since 1996, over 100 organisations have joined INTEGER as partners to find ways of delivering better performance and value in buildings. These organisations include designers, contractors and suppliers as well as housing providers, government agencies and research groups.

Planning tools

The construction of the INTEGER Millennium House was monitored by the BRE Calibre programme and some valuable lessons were learnt. As the House was so unique, it is difficult to make comparisons with a conventional housebuilding programme, but high measures of productivity, good teamwork, a non-confrontational approach, joint ownership of problems and good levels of interdependence between team members were noted.

Costs and benefits

The project was carried out as a demonstration with no budget. With suppliers donating their materials, expertise and time free of charge, it is difficult to make realistic cost assessments on this project.

Project team

Architects : Cole Thompson Associates, Bree Day Partnership, Paul Hodgkins Associates

Intelligent Systems : i&i limited

Building Services : Oscar Faber

Structural Engineer : Anthony Ward Partnership

Cost Consultant : The Andrews Partnership

Performance Measurement : Centre for Performance Improvement in Construction, BRE

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