

What do a Cork-based house builder, the managing director of an architectural and engineering design firm and a former GAA county footballer have in common? They're all determined to push Irish building standards to new heights. Maev Martin reports.

# Making 'A' Grade the

**T**he Irish Concrete Federation launched its new publication, 'The A-Rated Energy Efficient Concrete Home' on 22 May in the Stand House Hotel in the Curragh in Co Kildare. The guide is aimed at architects, developers, home builders, engineers and those wishing to build their own concrete home and provides practical measures to help them achieve an A-rated energy efficient home.

According to the publication, moving from a house that is rated in the B or C band of the Building Energy Rating system (in other words a Building Regulations compliant house) to an A3 rated house could cost between €15,000 and €20,000 because of the increased insulation requirement, the requirement for better airtightness standards and the need to install higher specification windows. However, an A3 house should lower the fuel bills by 50%. According to the ICF, improving a Building Regulations compliant dwelling to an A-rating will typically reduce primary energy consumption from around 160 kWh to less than 75 kWh per square metre of building space per year.

'The A3 house is the only commercially viable house now under the new BER system,' says **Pat O'Rourke** of the **Irish Concrete Federation**.

'Getting to an A1 or A2 is not commercially viable at the moment for multi unit developments. That standard would really only be commercially viable for a one off house.' According to Pat, the A3 rated house is 60% more energy efficient than a standard, Part-L compliant house and 20% more energy efficient than a House of Tomorrow house which, he says, would achieve a B1 rating.

So how does a builder go about constructing a house to this standard? 'No single change will turn a current building regulation compliant home into an A-rated one,' says **John Maguire**, chief executive officer of the ICF. 'It is a series of steps that need to be taken and that is true of all construc-



(l-r): Kevin O'Rourke, Sustainable Energy Ireland, Alan Haugh, president, Irish Concrete Federation, John Maguire, chief executive officer, ICF and Bill Gleeson of Gleeson Concrete Ltd at the launch of 'The A-Rated Energy Efficient Concrete Home' on 22 May.

tion methods, whether concrete, timber or even steel. For those designing and building their home, the guide provides a series of measures to take at the construction stage. Importantly it also provides guideline prices on the cost of these measures and information on the efficiencies achieved. For example, increasing the insulation in the external fabric of the house will cost in the region of €500 and will lead to an improvement in energy efficiencies of four per cent. Improved window orientation to southwest facing is normally possible and will typically achieve energy efficiencies of four per cent. There are also practical measures that every homeowner can take which will reduce their energy consumption, including changing to energy efficient light bulbs and increasing the insulation levels in the attic and on the hot tank. Other changes include replacing the open fireplace with a balanced flue enclosed stove leading to an 11% improvement in energy efficiency and installing a condenser boiler rather than a standard one which typically would give a 10% improvement in overall building efficiency.

One construction company that is aiming to be a market leader in the provision of low energy housing solutions is Cork-based **Magner Development Ltd**. They are building A3 rated houses and standard, Part L-compliant houses in their 70-unit Churchfield residential scheme, which is located in



Airtight sealing and insulation of attic bedroom at **Magner's** 70-unit 'Churchfield' residential scheme.

Castlemagner (between Mallow and Kanturk). The development comprises 52 semi-detached units, 10 detached units and eight townhouses in two blocks of four.

'We have House of Tomorrow approval for 50 of the 70 units that we are building at Castlemagner,' says **Ed O'Donoghue**, director, **Magner Development**. 'That's €8,000 per hour so we are receiving a total grant of €400,000 towards the cost of the development. The houses at Castlemagner are aimed at first time buyers and the HOT specification is being offered as an optional extra to buyers. We feel that the first time buyer is badly informed by the construction industry when it comes to the technical aspects of a house when they go to buy it. We decided that



First floor joist made airtight at the **Magner Development Ltd** scheme in **Castlemagner, Co Cork**.



Airtight sealing of window on the Castlemagner site.

rather than provide energy efficiency as standard we would provide it as an optional extra. This development also demonstrates that making houses energy efficient doesn't have to be very expensive. On our north south facing houses it costs as little as €8,500 extra to build them energy efficient.'

Ed points out that the houses were designed before Magner Development considered incorporating the energy efficient features. 'We had to build in the energy efficient features during the construction phase, with the advice and assistance of energy consultants, Energy Matters,' he says. 'Galway-based Polypearl Ltd told us about Sustainable Energy Ireland's House of Tomorrow programme. We knew then that this was where

the market was going. **Brian McHugh** of **Polypearl** is friendly with **Ronan Rodgers** of **Energy Matters** who has carried out a lot of work in relation to the Building Energy Rating and DEAP. He made a presentation to us about the HOT programme last autumn when we had received planning permission for this development so the timing was perfect.'

So what features are Magner Development incorporating into their units that will allow them to score an A3 on the BER scale? 'We are installing 100mm (four inches) of low U value **Kingspan** insulation (Platinum Aerofloor) below a 75mm screed floor and the cavity in the external walls is increased in size from 100mm to 150mm (from four to six inches), a 50% increase, and pumped with **Ecobead insulation** supplied by Polypearl Ltd,' says Ed O'Donoghue. 'Instead of having partial insulation in the cavity we have the Ecobead insulation, which is filling the entire cavity. With a rigid board you have big gaps around windows and doors but with beads you can pump the bead right around the doors and windows. Many people in the industry are reluctant to use beads. There is a mindset in Ireland that you have to keep the cavity open because we have a damp climate but these bonded beads have certification from the Irish Agreement Board and they have proven their effectiveness as a means of providing continuous insulation and guarding against gaps.' The house attic space is insulated with a 300mm (12 inch) layer of Warmcell, natural cellulose fibre insulation for lofts, made from recycled newspaper, which has a U value of 0.035 (similar to sheep's wool and glass fibre/mineral wool). The houses at Castlemagner also include a solar domestic hot water system, whole house mechanical ventilation with heat recovery and a condensing boiler. 'There are 4.6 square metres of solar panels integrated into the roof,' says Ed.

'**Carey Glass**, trading under Sampson Solar, are providing the solar panels. Carey Glass is a Velux window supplier and they have moved into the solar panels business. We have the option to convert the attics of the houses into a fourth bedroom and they will have Velux windows, also supplied by Carey Glass. We are using low E, argon-filled windows with a U value of 1.9 so these are the least energy efficient aspect of the development.'

However, we are looking at pushing down to a U value of 1.4 or 1.3 for the windows and doors and we are investigating a number of different suppliers at the moment.'

The mechanical heat recovery ventilation system means that every room in the house will be ventilated and the fresh air will be filtered and pre-heated so there is no requirement for trickle vents. Each unit will have a tall, highly insulated hot water storage tank with two sets of coils - one set will be connected to the condensing boiler and the other to the solar panels. 'The primary heating is through an LPG gas/condensing boiler that has a SEDBUK-certified specification,' says Ed. 'Indeed, the technical performance of all of the components in the houses is certified.'

Twenty-six houses are currently under construction and seven of them are being built to a standard where they will receive an A3 rating under the Building Energy Rating system. Two of those A3 houses are the show houses for the development. 'We may decide to offer A3 as standard,' says Ed O'Donoghue.

Magner Development has carried out one airtightness test on one of the houses that is under construction. 'It came out at 3.8 air changes per hour @ 50 Pascals,' he says. 'This is a provisional result because the building fabric was incomplete. We will be testing the unit again and we are hoping to improve on that result. The aim in the UK is to hit 10 air changes per hour so we are well within best practice but it would be really good if we could hit below 3 air changes per hour on all of the units that we are building. Our energy consultant



Polypearl infill of 150mm cavity in one of the houses at Castlemagner.

Ronan Rodgers of Energy Matters told us that our result was one of the best that he had seen to date. We were worried that we wouldn't get into the A band but the airtightness performance has pulled us up into that band.'

Every unit at Castlemagner will be subjected to an airtightness test. Magner Development bought a Wincon machine, which fits into a window or door, measures pressure only and checks the quality of the vapour/air barrier. 'We are using that to carry out an airtightness test on the houses once they have reached a certain level of completion in advance of the Blower Door test,' says Ed.

The architects for the Castlemagner scheme are **Kevin O'Keefe Architects**, who are based in



The Wincon test in progress on one of the units at Castlemagner.



Polypearl infill of door reveal.

Annabella, Mallow, Co Cork and the consulting engineers are **Tim Lenihan Civil Engineers**, who are based in Kanturk, Co Cork.

Ex GAA footballer for Co Offaly, **Vincent Claffey** is building a 4,800 square foot, five-bedroom house close to Ferbane in Co Offaly to the House of Tomorrow specification. The house is built to roof level and he is hoping to have moved in by Christmas 2007. 'If it takes longer, so be it, we want to do it right,' he says. For Vincent, doing it right involves installing a very high level of insulation in the house. 'We have a four inch cavity in the external wall and that is being filled with Ecobead bonded bead and we are inserting 50mm of Kingspan insulation board on the inside of the house,' he says. 'My aim is to have a house that is as well insulated as possible. Installing Kingspan insulation on the inside of the house is the way to go.' Airtightness is another aspect of the house that will be constructed to a very high standard. 'I am installing two Heat Recovery Ventilation (HRV) systems and if they are to work properly, the structure must be extremely airtight,' says Vincent.

The two UTEK-AIR 300 EC (HRV) units are being supplied and installed by a company called **Quality HRV**, based in Kilbeggan in Co Westmeath. 'The units offer in excess of 90% heat recovery and are controlled fully automatically by indoor air quality sensors on the extracted air,' says Quality HRV managing director **Shane Miller**. 'The fresh air delivery from the HRV system is connected to a manifold which in turn is connected to an individual duct for each supply ceiling terminal. Each duct is cut to length on site and there are no joints. This system ensures that there is no possibility of cross-talk between rooms, a feature of traditional ducting systems. A similar principle is applied for the extract duct network.'

Shane Miller is also advising Vincent on achieving a high level of structural airtightness and insulation in his home. 'From the start Vincent and myself designed the house to be structurally airtight,' says Shane. Shane has a degree in manufacturing technology, specialising in HRV, and was formerly a sales manager with HRV manufacturing firm ProAir in Galway. 'Vincent has gone beyond A3 with his house because he is using very little electrical energy and his CO2 emissions are very low,' he says. 'He has sorted out all of his heat loss areas - any thermal, air infiltration and ventilation heat losses have been reduced to the very minimum. The house should achieve an A2 rating when it is finished. It will be perfectly, structurally airtight - it will have 1.5 air changes per hour @ 50 Pascals.'

The house is brick and block construction but Shane points out that as it is a dormer construction there is a possibility of leaks in the converted



Ventilation ducting in suspended ceiling.

attic space. 'That unheated area at the front and back of the house is a major source of leakage,' he says. 'To counteract this, we have installed a **Moy Isover** membrane around the perimeter of the structure and around the hollow core blocks and the windows and doors because where the window meets masonry can be a major source of leaks.'

The house will include a wood chip boiler and 'Solar Focus' panels (a flat plate solar panel from Austria) for domestic hot water.



Window thermal bridging detail, including Polypearl infill.

**Liam Loughrey** is managing director of an architectural and engineering design firm called **A&L Consultants Ltd**. A chartered engineer by profession, he is building his own family home in Ballinasloe, Co Galway to achieve an A3 rating under the BER system. The 3,400 square foot house will have five bedrooms with the option of two extra bedrooms in the attic space. He is receiving a €3,000 grant from Sustainable Energy Ireland for installing solar panels (81% efficient or better) on the roof for water heating and a €4,200 grant for installing a wood pellet boiler (97% efficient or better). Apart from the roof, the concrete block house with plaster render and some stone cladding is virtually complete.

Galway-based **Ecobead Ltd** is supplying a total insulation solution for the development. They are also supplying the solar panels in the roof, the solar piping and solar pump station expansion vessel and the wiring of the solar station to the solar panels. 'They will commission that system in conjunction with my plumber,' says Liam. 'They are also carrying out all of the energy calculations for the house and the BER rating. I'm trying to get an A3 rating so I'm building a 150mm cavity in the external walls that will be pumped with Platinum Ecobead, which is a full fill cavity system. I will achieve a 0.2 U value in the walls (the Building Regulations require a 0.27 U value). The windows will have a U value of 1.1 W/m<sup>2</sup>k while the U value of the solid doors will be 3 W/m<sup>2</sup>k. To achieve an A rating you would need a 0.2 U value in the walls, roofs and floors. In the horizontal attic area we are using 400mm Warmcel Cellulose. We are installing 150mm of Aerodorm with 25mm of Platinum insulated plasterboard in the sloping sections and stud walls. There will be 75mm of Polyiso insulation in the ground floor.'



Foundation detail.

**The Gilmartin Group in Galway supply and install Polypearl (also known as Ecobead) bonded beads.**