# COASTAL CONNEMARA HOME

This property in Connemara sits at the end of a narrow road and the sloping site is home to an existing cottage perched right on the edge of the Atlantic Ocean.

"Achieving a low energy build was as important to the client as capturing those great northern views."

It's exposed and inaccessible. Despite being a hugely challenging site, the house manages to take full advantage of its setting and still delivers low energy efficiency.

Contractor Niall Dolan of GreenTec Ecological Homes explains that despite the fact that part of the road leading from the house was actually washed away during the storms in Winter 2014 and the property getting a battering from the elements, the client was blissfully unaware of how bad the weather actually was. "They didn't know it was even windy outside," he says, "because inside in the house with the wall build-up and triple-glazed windows, they were completely protected."

The client wished to retain the existing cottage as an annex, which essentially made this a new build project. The first difficulty facing the design team, in addition to the exposed nature of the site and its inaccessibility, was the fact that it faced exactly the wrong way.

Architect Eugene Mulcaire explained the dilemma, "you have these terrific views literally facing true north. All our solar energy is behind us." How to create open, light-filled living areas and at the same time respond to the landscape's natural contours? The solution was placing the living areas on the upper floor and the bedroom spaces downstairs.

"The road to which the building relates is elevated over the landscape," says Mulcaire. "There's a very old retaining stone wall, probably about a storey tall which means we come in off the road onto the entrance level. We played with that a little bit, so that the building is approached by way of a bridge just to accentuate that idea of being elevated over the landscape."

Achieving a low energy build was as important to the client as capturing those great northern views. Keeping glazed areas to a minimum would be the norm on that elevation in order to maintain a high performance building envelope. Also, there was nothing to see on the southern elevation, where all the passive solar gains lie.

The architects came up with a solution. They took a monopitch roof, then elevated the southern edge to create an overstorey consisting of high level ribbon glazing which overlooks a narrow flat roof. A white membrane on this roof converts it into a light shelf, which amplifies the southern light, directing it up into those high level windows which overlook the vaulted living spaces below.

The southern elevation features long, slot windows which are very precisely positioned to deliver light directly to kitchen worktops in one instance, and to the stairwell in another. With the living spaces flooded with southern light, the next step was to tackle the northern views.

Mulcaire explains, "we pointed out the orientation contradiction to the clients and they were more than happy to invest significantly in a window package." They chose triple-glazed timber aluclad windows from True Windows in Sligo, which deliver a whole window U-value of 0.92.

Mulcaire believes "Before even committing to specs, it's incumbent on the low energy design team to flag these contradictions and these hotspots and get a buy-in from the client very early." The window spec features double height glazing that turns the corner on the northeastern corner and a zinc-clad oriel window in the northwest.

Niall Dolan of GreenTec took responsibility for managing both thermal bridging and airtightness. He says that the Letterard house was one of the trickiest he has ever worked on.

Installing the long-span slot windows also required a lot of what Eugene Mulcaire calls 'hidden structure'. Wherever possible, the steel systems were installed so that they didn't cross from outer to inner leaf, and so didn't break the thermal envelope.

The build method chosen was traditional with a difference: block, but with an extra-wide 250mm cavity pumped with EPS platinum bead insulation. Blocks were chosen primarily because on the one hand they deliver the thermal performance required, and on the other, a block built house relies on local skills and suppliers.

"When you can plug into local skills pools and local supply chains, you're going to get a bit more security attached to your endeavour."

Building in this environment and terrain brought all kinds of logistical difficulties. Including getting sand down to the site and having no room for the crane which would usually be used to position the hollowcore concrete





# SELECTED PROJECT DETAILS

| | | | |
|---|---|---|---|
| **Architects:** | **Mulcaire Heffernan** | **Airtightness Testing:** | **2eva.ie** |
| **Contractor:** | **GreenTec Ecological Homes Ltd** | **AAC blocks:** | **Quinn Lite** |
| **Structural engineers:** | **John Britton Consulting** | **Thermal breaks:** | **Armadillo & Ancon** |
| **Mechanical contractor:** | **Airflow Renewable Solutions** | **Low carbon cement:** | **Ecocem** |
| **Windows:** | **True Windows** | **Cellulose insulation:** | **Sustainable Insulation Products Ltd.** |
| **Larch Cladding:** | **MTS Wood Components** | **Wool insulation:** | **Sheep Wool Insulation Ltd** |
| **Zinc:** | **Let it Rain** | **Foundation insulation:** | **Xtratherm** |
| **Airtight products:** | **Partel** | **Wood burning stove & flue:** | **Spartherm & Schiedel** |
| **Air to water heat pump:** | **Mitsubishi** | **Flooring:** | **Junkers** |
| **Heat recovery ventilation:** | **Brink** | | |

"Building in this environment and terrain brought all kinds of logistical difficulties."

floor. Instead, each slab was maneuvered into place using a tracking machine with rolls of heavy duty DPC used to protect it and stop it tearing. Blocklaying was also routinely postponed, due to the severity of the wind.

The wet-plaster finish acted as the primary airtight layer. A range of additional details were required to get the building down to a target of 0.6 ACH. Niall Dolan estimates that over 2km of sealing tape was used, in particular on the aforementioned structural details. Ply boxes were used behind the windows to close the cavities, and here again, extensive use was made of airtightness tapes to provide the required seals.

The clients decided early in the project that while they would aim for passive house standards, they would not seek certification. Eugene Mulcaire says that in recent years, the costs involved in full certification have made it a difficult sell.

"What's emerging is a lot of willingness to go low energy, to drive the elemental composition as hard as possible. But certifying passive adds to the overall cost considerably, and there's no real net gain at the moment in the marketplace."

## PROJECT OVERVIEW

**Building type:** 167 square metres, two storey, wide cavity masonry build

**Location:** Letterard, Co. Galway

**Completion date:** January 2014

**Budget:** Confidential

**Passive house certification:** n/a

**Space heating demand (PHPP):** n/a

**Heat load (PHPP):** n/a

**Primary energy demand (PHPP):** n/a

**Airtightness (at 50 Pascals):** 0.56 ACH at 50 Pa or 0.61m3/m2/hr at 50 Pa

**Energy performance certificate (EPC):** Pending

**Carbon performance coefficient (CPC):** Pending

**BER:** Pending

**Thermal bridging:** Armatherm bolt-through structural thermal breaks were used on the cantilevered steel balcony. In addition to this the first course of all warm walls are in Quinn Lite blocks. Low thermal conductivity TeploTie cavity wall ties were used throughout. The eaves were also thermally broken using a double wall plate.

**Ground floor:** Traditional cold raft foundation with 140mm of Xtratherm PIR insulation board on top and 50mm isolation perimeter insulation, U-value: 0.13

**Walls:** Sand and cement render on concrete block external leaf with 250mm cavity pump filled with EPS platinum bead insulation with concrete block inner leaf with airtight sand and cement render. U-value: 0.12

**Flat roof:** Kaliko PVC-P membrane on WBP plywood on firing joist on Ampac's Ampatop Protecta membrane on 500mm twin joist 150mm top and 100mm bottom. Twin joist zone pump filled with of high density cellulose insulation, with 40mm uninsulated service cavity and 12.5mm plasterboard under. U-value: 0.09

**Lean to roof:** Standing seam zinc cladding on two staggered layers of 9mm OSB sheets on battens for air flow on Ampac's Ampatop Protecta membrane on 225mm timber joists pump filled with high density cellulose insulation, with 100mm service cavity filled with Sheep Wool Insulation with 12.5mm plasterboard under. U-value: 0.13

**Windows:** Triple-glazed, aluclad timber by True Windows, overall U-value of 0.92

**Heating system:** Mitsubishi Eco Ecodan Monobloc air source heat pump with a COP of 4.18 (assuming an air input temperature of 7C and water output of 35C) running with underfloor heating with stats in every room. Forecasted running cost for space heating and hot water is €320 annually.

**Ventilation:** Brink 400 heat recovery ventilation system — SAP Appendix Q testing 88% heat exchange efficiency

**Green materials:** Cellulose insulation, sheepswool insulation, all constructional timber is native and from sustainable managed sources, 50% ecocem in foundations



# home&build

SELF BUILDERS GUIDE

# STOVE FEATURE SPECIAL