

Natural Energy Efficiency and Sustainability (NEES)

Pilot Project: The Parnell Cottage, Kilbarraree, Cloyne, Co. Cork Refurbishment and Extension of Historic Cottage

1. Description of the Project

The project entails the refurbishment of an old cottage scheduled for demolition, and a timber framed extension providing services.

The existing single storey cottage of approximately 45m² had three small bedrooms and one main living space. The external walls are of rubble stone, and approximately 450mm thick. The house had no insulation to floor, walls or roof before this project, had single glazed windows and an open fire.

The project entailed demolition of existing partitions to make one large Kitchen, Living and Dining Room. The volume of the attic was opened up into the main room, and lean to extensions and stores added over the years which blocked light were removed. The sills of the windows were dropped and two windows were combined to one large door on the south facing side.

The inside of the room was lined with hemp lime plaster, and the external face of the stone walls were lined with 225mm of hempcrete and lime render. The ceiling was insulated with 400mm of cellulose insulation, and a new suspended timber floor was inserted with 200mm cellulose insulation.

The new extension was constructed using plywood web joists to floor, walls and ceiling, and lined with SmartPly 3 formaldehyde free OSB board. The spaces in between the studs were insulated with cellulose insulation. The exterior was clad with cedar shingles.

Inside the extension provides an entrance porch, a bathroom and a bedroom. The arrangement of the extension with the cottage allows for a series of well sheltered and sunny spaces around the house, with good access from internal rooms to the outdoors.

- Promoter: Private Client
- Funder: Private Client
- Architect: Kevin Gartland, Gartland Architects, 36 dundanon Court, Blackrock, Cork
- Builder: Declan Devoy, Delfino house, Hillside Aghada, Midelton, CoCork.
- NEES Products: EcoCell (cellulose), Steve Allin (Hempcrete) Timber Frame Building using plywood web joists (Declan Devoy & Cork roof truss Company), Triple glazed windows (Munster Joinery), Smart Ply 3 from Coillte.
- NEES Services; Kevin Gartland, Gartland Architects, 36 dundanon Court, Blackrock, Cork
- Other relevant natural products or services; Domestic hot water and space heating by wood burning stove. Reed bed, solar panel and Sedum roof planned for,



Natural Energy Efficiency and Sustainability (NEES)

Draft Template for Pilot Projects

2. Contribution to Resource Efficiency

Detailed calculations to carbon and energy savings are made in an extensive report prepared by Mr. Raoul Empey of Sustineo commissioned by NEES which concludes that the building is more natural, and arguably more 'sustainable' as it attempts to generate jobs locally, it has lower carbon emissions and the cost analysis indicates that the NEES costs are lower than the conventional.

The building is designed and constructed to minimise maintenance. External finishes are lime plaster on hempcrete and cedar shingles, both of which are easy to maintain and repair. The life span of the property is estimated at 100 years. The cellulose insulation is recycled paper, the hempcrete is made with natural or renewable materials. There are few toxic materials used in the house due to the client's allergic reactions to frequently used chemicals.

3. Environment and Health

Due to allergic reactions of the client, almost all materials used on the project are natural and renewable materials, with a minimum of toxic chemicals used. Other than fibreglass which is used as a roof membrane, very few materials used are synthetic and none are hazardous.

Most materials are sourced locally, however some material had to be imported such as lime and hemp used for hempcrete which came from France, and plywood web joists which were manufactured in the UK.

Many of the products used sequester carbon from the atmosphere. The extensive report prepared by Mr. Raoul Empey of Sustineo commissioned by NEES, goes into considerable detail about the carbon footprint and health benefits of the house.

The main health benefits can be attributed to better insulation, better air tightness, and ample natural light from appropriate orientation to suit the room. The cellulose insulation and hempcrete both regulate humidity levels and absorb toxins from the internal atmosphere.

There are no hazardous waste issues involved in construction or end-of-life disposal. The building involved minimal disruption to land and biodiversity.

4. Sustainability

The house and extension work together to integrate with the landscape. The extension is situated so as to maximise natural light and shelter,

The materials and labour used in the construction of the project were local where possible, with a minimum of material being exported. Lime and hemp used in hempcrete had to be imported as no local source is available, and plywood web joists are not widely manufactured in Ireland.

Cellulose insulation is NSAI back and has an agreement certificate. Hempcrete however, does not and this would be an impediment to its use in other projects.

The most sustainable action in the design process was to keep the existing house rather than demolish, which was the original intent of the owner. Thus, costs have been kept low, a historically significant structure has been retained and upgraded, and the site disruption has been kept to a minimum.

There are no evident impact issues involved in design and there is no conservation legislation applying. Materials for timber framing are readily available, cellulose is available from Cork City at competitive pricing, and sedum roofs and hempcrete installation require specialist services that are available in the region. However, the craft persons providing these services, e.g. with the required skills, are few.



Natural Energy Efficiency and Sustainability (NEES)

Draft Template for Pilot Projects

5. Enterprise aspects

The retrofit and construction undertaken is low carbon and carbon capturing, and around 90% of materials used are renewable. A number of SMEs carried out most of the works involved. These included:

- Eco Cell (cellulose insulation) Cork – NEES Best Practice
- Steve Allin Hempcrete, Kenmare, Kerry – NEES Best Practice candidate
- Declan Devoy Builder, Midleton, Co. Cork
- Kevin Gartland, Gartland Architects, Cork.

Most of the sub-contractors who worked on the project were local and small scale enterprises.

6. Scalability

The significance of the Parnell Cottages when they were built was that 40,000 similar houses were built within a five year period. Each house was a 'one off', however collectively they had a large scale impact on the built heritage and quality of life of the population.

There are similarities between that original scheme and this project. Given the number of houses that are demolished, it is feasible through positive and skilful design to refurbish and extend a house with natural and renewable materials.

The challenge is supply of competent crafts people in the construction industry and the willingness of building owners to engage them, and the considerable design works necessary to enable them.

Cellulose insulation offered the most positive carbon footprint of any material used on this project, and lends itself to up scaling the most.

7. Conclusions

In this project the most impressive carbon savings were to be found in use of cellulose insulation, while use of hempcrete led to significant use of energy in manufacture and transportation.

This project demonstrates in conjunction with the report prepared by Mr. Raoul Empey of Sustineo, that using natural and renewable materials is not in and of itself a means to delivering reduced carbon footprint for buildings.

Further study into a range of natural materials would provide those involved in design and construction of buildings with emphasis on use of natural materials with a better range of guidance on what would deliver in terms of reducing carbon use.

Kevin Gartland,
Project Architect,
May 2014.