

# P R E C *i* S

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## Evaluation of Kincardine O'Neil innovative rural housing design project: Canmore Place

The award winning innovative rural housing design project at Canmore Place in Kincardine O'Neil, a development of 14 houses, was grant aided by Communities Scotland in partnership with Kincardine Estate in May 1998 and completed in September 1999. It aimed to achieve significant capital cost savings through innovative design, improve flexibility in space provision and promote rural sustainability. The main findings were:

The project achieved a high standard of design in terms of external and internal layout, natural lighting and flexibility through potential expansion in the attic space. The generous space standards and open plan kitchen/dining/living arrangement were much appreciated by the tenants and the scheme won the DTI 2000 Homes Innovation Award.

The use of timber shingles for the roof cladding and timber vertical board cladding on external walls has been successful to date, with no maintenance required in the first five years. Extensive use has been made of timber frames, windows and doors, though none of the timber was sourced locally.

Whilst the housing development has helped sustain local businesses to a degree and tenants are employed in the regional economy it has not by itself provided a significant means of stimulating the local economy.

The scheme provided flexible space built into the attic but the landlord has been reluctant to allow tenants to use this as he wanted to avoid over-provision of large houses.

If the flexibility in the house design had been used it is estimated that a saving of almost 40 per cent on build costs would have been made. However, the potential cost saving proved irrelevant as no attic conversions took place.

The original aim to achieve a 40 per cent cost saving appears to have contributed to inappropriate specification of the heating and ventilation systems, despite the project exceeding building standards for external insulation, and meeting all other standards at the time.

The absence of appropriate thermal mass in the lightweight construction led to overheating of the interior in the summer and rapid cooling in the winter. Thermal mass refers to the amount of construction material which can usefully absorb heat in a building.

The very high level of overall tenant satisfaction with this housing demonstrates that good quality internal spatial design and affordable rent levels were traded off by tenants against relatively plain exteriors as well as poor thermal and acoustic conditions.

The provision of social housing by grant aiding the private landlord reduced grant leverage considerably while addressing rural housing need in an area where there is a shortfall of affordable land for affordable housing. The landlord will not be able to repeat this one-off project without tax reform and policy changes in Communities Scotland.

## Background

Kincardine O'Neil is a remote village with a population of 200 in the upper Deeside valley. The Grampian upland climate is severe with the area relatively exposed to prevailing winds and relatively extreme temperatures. A very high number of buildings in the village are listed giving it a unique historical character which reflects the local vernacular architecture. Affordable housing was seen as the key to stabilising the decline of the local working population. The challenge was to provide housing which integrated with the village and extended parameters of design to incorporate low-cost high quality homes. The aim was to achieve significant cost savings through innovative design, improve flexibility in space provision and promote rural sustainability.

The development of fourteen new-build houses was the demonstration phase of a study into Affordable Rural Housing carried out by The Robert Gordon University Faculty of Design, jointly commissioned by Scottish Homes and Gordon District Council. The private landlord, Kincardine Estate, received grant approval from Scottish Homes and completed the development in September 1999 which was designed by Gokay Deveci, architect, and built by Stewart Milne Ltd.

The housing mix varied widely from 2 person/1 bedroom accommodation of 60m<sup>2</sup> to 6 person/5 bedroom accommodation of 130 m<sup>2</sup>, all contained within four rows of 1.5 storey terraced housing and two individual gatehouses. The plan form developed tried to optimise the flexibility of the house plans both in terms of room alterations and future expansion. All terraced houses had a built in attic space that has the potential for conversion into additional bedrooms/workspace and were designed to provide barrier-free accommodation for wheelchair users.

## Flexibility and space standards

The project achieved a high standard of design in terms of external and internal layout, natural lighting and flexibility through potential expansion. The generous space standards and open plan kitchen/dining/living arrangement were much appreciated by the tenants. Despite this, the size of the kitchen was deemed too small by some. Lack of storage space was also an issue with no built-in cupboard space in the house.

There was a tension between the landlord's desire to maintain an appropriate housing mix and some of the tenants wishing to have the attic space converted (the room in the roof concept). The landlord continues to have concerns about who would pay for re-conversion work should a smaller household wish to move into a converted house. The landlord also has concerns about issues related to potential increases in rental values and the community charge. Flexible space built into the attic has not been converted to date because of this, although tenants do make use of it on an informal basis. The ability to be able to reconvert flexible space cost effectively is a critical design issue. Until these issues are resolved the design of expandable attic space must be questionable.

Little use had been made of the flexible space planning to alter room uses and the "moveable" panels were felt to be too heavy to move.

## Cost

If the flexibility in the house design had been used it is estimated that a saving of almost 40 per cent on build costs would have been made by keeping the form compact, terraced and simple. The potential cost saving proved irrelevant because no attic conversions have taken place.

The original aim to achieve a high cost saving contributed to inappropriate specification of the heating and ventilation systems as well as omission of insulation between the unused attic space and living accommodation, despite the project exceeding building standards for external insulation, and meeting all other standards at the time. This appears to have resulted in relatively high heating costs for the tenants.

## Heating and ventilation

Each house was supplied with an electric heating package consisting of storage heaters for the hall and living room, convector heaters for the bedrooms, and an immersion heater for hot water. This form of heating was chosen to complement the design, meet the lower cost objective of the development and the lack of a mains gas supply.

Electricity bills from March 2000-March 2001, which were obtained from the energy supplier, varied from £22.16 per week for a 1-2 bed

detached house down to £11.70 per week for a 2-bed mid terrace house. Evidence on the achievement of anticipated savings on running costs proved inconclusive although tenants felt their heating bills were high. Houses were difficult to heat in the winter, due partly to the unnecessary heating of the large unused attic space, which could be addressed by adding extra insulation in between the living space and attic. Tenants also experienced overheating of the house in the summer, due to passive solar gain, lack of thermal mass and inadequate cross-ventilation.

Five years on from initial occupation, heating costs were the single most important issue that tenants were dissatisfied about. The storage heating system did not respond quickly to the rapid changes in temperature which occurred in the lightweight construction. Thermal mass in housing is particularly useful in upland areas such as Kincardine O'Neil, which can experience large temperature differences between day and night, because it evens out temperature variations over time.

Initial problems with mechanical ventilation and mould growth in shower rooms were overcome with the installation of a more powerful fan. With no induction on how to live in innovative housing, over-ventilation by tenants undermined the design attempts at energy efficiency. Some felt the need to keep at least one window open all the time which negated any real benefit from the insulation provided.

The development has high overall carbon dioxide emissions ranging between 99-251 CO<sub>2</sub>/kg/m<sup>2</sup> per year. Although not untypical for new housing developments in the UK which use electrically-based heating systems, these figures are well below government targets set out in the 2003 Energy White Paper.

### Tenant satisfaction

Most households were very complimentary about the housing design: "fine and spacious", "bright and airy feel" and "nice and relaxing". There was genuine surprise experienced when tenants first saw inside the housing. They found the contrast between the relatively plain exterior and the very pleasant

and spacious interior surprising. Many felt that the layout of the development had fostered a sense of "a community within a community". Everyone interviewed found the home easy to clean. Most of the households, however, complained about the standard of sound insulation.

The very high level of overall tenant satisfaction with this housing demonstrates that good quality internal spatial design and affordable rent levels were traded off by tenants against relatively plain exteriors as well as poor thermal and acoustic conditions.

### Sustainability

Although the housing development has encouraged people to stay in the village it has not provided a significant means of stimulating the local economy or social life of the village. After five years there is still relatively little social integration between the tenants of the project and the existing villagers.

Almost all the households, however, have someone in employment within the area helping to sustain the regional economy. The development is perceived as the first step in promoting a sustainable development strategy for the village. The landlord is now looking to develop a commercial venture in the village and mixed tenure housing in order to protect the sustainability of the local community.

Surprisingly the development required relatively low maintenance over five years, apart from the upgrading of the shower room fans and some re-painting. The use of timber shingles for the roof cladding and timber vertical board cladding on the external walls has been successful to date in terms of maintenance and sets a positive precedent for the re-introduction of this traditional and environmentally benign technology in Scotland. The design of the housing itself has minimised environmental impact through the extensive use of timber framing, windows, doors and cladding even though these timbers could not be sourced locally.

### Barriers to private landlords in rural areas

The accredited landlord would have been

keen to continue developing social housing but could not as the grant mechanism has been withdrawn. In addition the low level of grant previously on offer presented difficulties as did Capital Gains tax and Inheritance tax, neither of which recognises social housing provided by private landlords as being eligible for business relief. The grant aid for Canmore Place was 33 per cent compared to the average figure of 62 per cent for housing associations in Scottish Homes' Grampian Area at that time. There is clearly fertile ground between the two figures where the private rented sector could deliver value for money for affordable housing. This is unlikely, however, without tax reform and policy changes within Communities Scotland.

## Conclusion

Through Communities Scotland grant funding to a private accredited landlord Canmore Place pioneered a number of innovatory concepts in relation to sustainable housing design. These included the use of terraced housing in rural situations, barrier-free design, timber cladding and flexible space. The high level of overall satisfaction with the innovative housing validates a design approach which has placed emphasis on the quality and size of internal space while keeping the external appearance relatively simple. Good quality internal design has led to tenants "forgiving" the poor acoustic and thermal comfort conditions and demonstrates the value of design in terms of achieving satisfaction. Perhaps one of the disappointing aspects of the project has been the under-utilisation of the flexible design for the room in the roof concept.

## The way forward

Greater emphasis needs to be placed on tenant induction and education in relation to innovative housing schemes if energy efficiency measures are to work successfully. Local practice has changed significantly following the experience of this project. All schemes with innovative elements must include tenant training.

There needs to be improved understanding in specifying timber frame construction ensuring there is appropriate levels of thermal mass and new approaches to ventilation. As a result of these findings the local Communities Scotland office has alerted its RSL and developer clients of this

requirement and is supporting other innovative projects where thermal mass in lightweight construction is being addressed through other approaches.

Housing designs that have lower CO<sub>2</sub> emissions are now a key design target.

Energy standards for new developments funded by Communities Scotland have been raised since this evaluation and will continue to be kept under review.

Further thought is needed on mechanisms to allow reconversion of "the expandable space" if smaller units are subsequently required to meet local need.

The failure to use indigenous timber needs further evaluation.

The methodology for measuring community sustainability and economic uplift needs more detailed consideration.

The methodology for measuring energy efficiency needs further development.

Those practitioners involved in innovative housing projects must ensure that capital cost savings are not achieved at the expense of long term sustainability and usability of houses.

## About the study

The study was undertaken by EDG (Ecological Design Group) based at the School of Architecture in the University of Dundee. It consisted of an initial survey of tenants, the procurement team and village businesses in 2002, two and half years after scheme completion, and a further survey of the landlord, client, architect and tenants in 2004. Additionally, construction drawings, maintenance records, electricity bills and the physical development itself were examined in terms of the objectives of the study and cross-related to the surveys.

## Further information

Further information about this research can be obtained from Jackie Wilkins, Planning Manager, Communities Scotland by telephone, 01224 624960 or by email, [jackie.wilkins@communitiesscotland.gsi.gov.uk](mailto:jackie.wilkins@communitiesscotland.gsi.gov.uk). The report is available on our website [www.communitiesscotland.gov.uk](http://www.communitiesscotland.gov.uk).