

Energy Performance Certificate



21, The Street,
Ringland,
NORWICH,
NR8 6JB

Dwelling type: Semi-detached house
Date of assessment: 03 June 2009
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Reference number: 8081-6726-6100-4227-5002
Total floor area: 76 m²

This home's performance is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO₂) emissions.

Energy Efficiency Rating		Environmental Impact (CO ₂) Rating	
	Current	Potential	
<i>Very energy efficient - lower running costs</i>			
(92-plus) A			<i>Very environmentally friendly - lower CO₂ emissions</i>
(81-91) B			(92-plus) A
(69-80) C	71	71	(81-91) B
(55-68) D			(69-80) C
(39-54) E			(55-68) D
(21-38) F			(39-54) E
(1-20) G			(21-38) F
<i>Not energy efficient - higher running costs</i>			
EU Directive 2002/91/EC		EU Directive 2002/91/EC	
England & Wales		England & Wales	

The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

The environmental impact rating is a measure of this home's impact on the environment in terms of Carbon Dioxide (CO₂) emissions. The higher the rating the less impact it has on the environment.

Estimated energy use, carbon dioxide (CO₂) emissions and fuel costs of this home

	Current	Potential
Energy use	212 kWh/m ² per year	212 kWh/m ² per year
Carbon dioxide emissions	1.1 tonnes per year	1.1 tonnes per year
Lighting	£46 per year	£46 per year
Heating	£321 per year	£321 per year
Hot water	£71 per year	£71 per year

Based on standardised assumptions about occupancy, heating patterns and geographical location, the above table provides an indication of how much it will cost to provide lighting, heating and hot water to this home. The fuel costs only take into account the cost of fuel and not any associated service, maintenance or safety inspection. This certificate has been provided for comparative purposes only and enables one home to be compared with another. Always check the date the certificate was issued, because fuel prices can increase over time and energy saving recommendations will evolve.

About the impact of buildings on the environment

One of the biggest contributors to global warming is carbon dioxide. The way we use energy in buildings causes emissions of carbon. The energy we use for heating, lighting and power in homes produces over a quarter of the UK's carbon dioxide emissions and other buildings produce a further one-sixth. The average household causes about 6 tonnes of carbon dioxide every year. Adopting the recommendations in this report can reduce emissions and protect the environment. You could reduce emissions even more by switching to renewable energy sources. In addition there are many simple everyday measures that will save money, improve comfort and reduce the impact on the environment. Some examples are given at the end of this report.

To see how this home can achieve its potential rating please see the recommended measures.



GREENING THE BOX Ringland UK

Greening-the-Box is an initiative adopted by Wherry Housing Association for the environmental responsible adaptation of an existing dwelling to standards fit for the inevitable...low carbon future



Greening-the-Box(GTB) is an initiative introduced by SEArch (Sustainable Ecological Architecture Ltd), adopted by Wherry Housing Association in partnership with Broadland District Council for the environmental responsible adaptation of an existing dwelling to standards fit for the inevitable...low carbon future

Why GTB?



It is widely acknowledged that the finite nature of fossil fuels and our over reliance on them is unsustainable. In response, GTB offers solutions for our existing building stock that reduces a household's reliance on such finite resources to a minimum.

As with many rural housing providers, Wherry has a number of homes that are not covered by the gas network and therefore residents are more likely to rely on more expensive electric or oil heating options which can exacerbate fuel poverty. This pilot project involves the retrofit of an existing social housing unit in rural Norfolk to reduce carbon emissions and energy costs for occupants. The family that live next door will move into the home so that they can compare the experience of living in GTB to their existing home.

What is the need for GTB?

More than a quarter of the UK's carbon dioxide emissions come from housing and the majority (80%) of people will be living in the same house in 40 years time; the UK's existing housing stock needs to be modified to hit Government emission targets. With around 1.7 million homes in management nationally, housing associations face a huge challenge to improve homes, particularly as many of our residents will be classified as living in fuel poverty**.

What else is unique about the project?

- Low Technology - a low technological approach, reducing ongoing servicing, maintenance and replacement of high tech equipment e.g. boilers, fans, central heating systems etc
- Zero Heating - a natural heating regime, relying on solar gains and human occupation with supplementary backup heating (no mechanical heating boiler, radiators, gas, oil)
- Passive Ventilation - Passive stack and cross ventilation regimes built into the building. (no mechanical ventilation)
- Super Insulation- super insulated building envelope, Floor 0.22W/m2K, Walls 0.29W/m2K, Roof 0.17W/m2K
- High Thermal Mass - inherent high thermal heat capacity within buildings fabric for storage of heat (storage radiator effect)
- Remodelling Fenestration - glazed surface areas to the north elevation have been reduced, thus reducing rates of heat loss while glazed areas to the south have been increased to encourage greater quantities of solar gain, contributing to the natural heating of the property

What is happening as part of the building adaptation project?

The property was chosen as it is typical of Wherry's 'hard to heat, hard to treat' properties being solid walled, 1920's construction and off the gas network. On going research includes behavioural change, Life Cycle Assessments and Life cycle costing analysis. This will be periodically uploaded onto our website

What technologies are used?

GTB is a low technological approach to building adaptation, with an agenda to reduce energy and carbon emissions.

1. Solar Water Heating - 1.7kW
2. Photovoltaics - 800Wp monocrystalline panels possibly to be installed later in the year subject to funding availability.
3. Rainwater Harvesting - 1000 Litre capacity

Is this the first project of its kind to deliver these results?



Adaptation of our existing building stock for a low carbon future is a laudable agenda and considered by Wherry and SEArch as an imperative need if we are to deal with the consequences of diminishing availability of finite resources such as

fossil fuels. The current vogue within the UK construction industry for high tech solutions e.g. ground source heat pumps, air to air heat source pumps, rather suggests that GTB is on its own in delivering low technological solutions for building adaptation.

What learning can other housing associations take from this?

Low technological response to building adaptation leads to low energy running costs, low servicing, low maintenance and low replacement costs.



How long will it take to monitor the results?

A three year monitoring programme will cover LCA (Life Cycle Analysis), Thermal Performance, Energy Consumption and comparative studies against a conventional house. From the LCA calculations, Lifetime Embodied Energy comparisons with conventional housing can be made. It is anticipated that these assessments will demonstrate that the GTB approach to housing adaptation will cost the HA considerably less over the lifetime of the building.



What difference will it make to the residents lives?

No or little reliance on the national utility infrastructure could be liberating for the residents.

Tell us more about the residents?

The residents are a family of four. They will record their experience of living in the box and we will measure their energy usage and fuel costs as an integral part of the project.

How long has the retrofit taken?

Sixteen weeks

What makes it different from other retrofits?

Low invasive refurbishment techniques have challenged the conventions in the industry i.e. no mechanical space heating, no mechanical ventilation and a completely tiled floor at ground floor level.

Have you involved any academic research in this project? What challenges have been faced?



GTB has evolved from the evidence based research of Dr Jeremy Harralls' Doctorate in so far as the environmental performance of twenty two buildings designed by SEArch have provided performance data for naturally heated, passively ventilated buildings without the encumbrance of fossil fuels.

How much did it cost?



The total cost of the works is approximately £100,000, however the bulk of this cost is for non-energy related works such as a new kitchen and bathroom due to the original condition of the property. The cost of the energy related works is £36,613 and is itemised in the next column.



Greening the box - Energy related work costs (Forecast)

Solar Water Heater	£4905
Roof Strengthening	£599
Roof Inspection and Insulation	£2171
Wood Burning Stove	£1965
Break out ground floor slab and reduce levels	£1246
Lay new reinforced concrete slab, DPM and insulation	£754
Remove existing ceilings and fit insulation, plasterboard and skim	£992
Electric underfloor heating	£1374
Passive ventilation	£1680
Remove exiting floor boards to first floor, repair and lay insulation	£353
External cladding	£13,214
Scaffold	£1350
Relocate overhead electricity supply	£593
Rainwater harvesting	£2717
Adapting window openings	£2700
Total:	£36,613

Why is it not using alternative fuel sources?

Electricity is the fuel of the future, easily generated with proven technologies and familiar to the residents.

What are the projected savings?



To follow, a complete project costing analysis will itemise the element costs and potential savings against conventional costings. This analysis will be on our web site: www.greeningthebox.co.uk

What else is Wherry doing to help residents in fuel poverty?

Wherry is working on solutions to help. These include working with energy companies to access matched funding for improving homes and provide residents with energy saving devices, providing training for frontline staff to give advice to residents and working with the Energy Saving Trust to access national best practice.

To track the progress of the project or request further information visit www.greeningthebox.co.uk

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** The definition of fuel poverty is when a household needs to spend more than 10% of their household income on all domestic fuel use including appliances to heat their home to an adequate level of affordable warmth.