



**CONSTRUCTING
EXCELLENCE**
in the built environment



demonstration project



Earthship Brighton from the West

Earthship Brighton

Client:	Low Carbon Trust
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Sector:	Sustainable Buildings
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Themes:	Sustainability

Domestic buildings account for 29% of the UK's total carbon footprint. The Low Carbon Trust was formed in 2001 to highlight the connection between buildings, the carbon emissions they produce and climate change it causes, through innovative construction projects and communications work.

Earthship Brighton was the Low Carbon Trust's first project and the first Earthship to be built in England. The project was designed to be a sustainable community centre for Stanmer Organics and sited within 17 acres of a country park near Brighton, East Sussex.

"Earthship" construction is a pioneering design and construction technique developed by Mike Reynolds of Earthship Biotecture and the residents of three Earthship communities in New Mexico, USA. Earthships are designed to be entirely self sustaining and "off grid". Solar panels and a wind turbine provide all the energy required by the development and rainwater and grey water are treated for reuse onsite using plants and filters. Energy and water conservation are also central to the technique and extensive energy efficiency and water conservation features are included throughout the building. Earthships are timber framed and earth sheltered to provide extra insulation. The walls are constructed using old car tyres, other waste materials and rammed earth.

The original Earthship model was designed to be a residential development and was adapted for the community centre. The project was funded by a combination of individual donations, public grants and corporate sponsorship.

Drivers for Change

The key drivers for this unique project were:

- To deliver a sustainable community centre in response to a genuine local need
- To change values in the construction industry
- To inspire positive action in individuals to generate environmental change through modifying people's behaviour to less carbon intensive lifestyles

The project was designed to demonstrate the possibilities created by an integrated approach to passive solar design, renewable energy, rainwater harvesting and on-site waste-water treatment. The project also aimed to inspire people to adopt less carbon intensive lifestyles.

Targets

The following targets were set for the project:

- To deliver the first Earthship in England
- To adapt an established design for a cutting edge eco-build to UK building regulations
- To pave the way for the use of whole car tyres in construction
- To successfully harvest and supply rainwater as potable water in a public building



Earthship Brighton during construction

Project Successes

Integrated Teams

To minimize costs the project team approached corporate partners, many of whom were suppliers of sustainable building materials. The corporate partners were essential to the success of the project as many donated free materials and services. By donating materials and services they were able to showcase their product in situ and were offered the chance to display their logo on the project website. The project team were able to obtain free glazing, roof materials, sun pipes, rainwater tanks and insulation amongst other things. The suppliers then benefitted from the high level of public interest and publicity in the project.

Raising Awareness

At least 8,000 people have been given tours of the project so far including 600 children, 160 people from the public sector, over 180 people from the construction industry and the former Secretary of State for the Environment, Rt Hon David Milliband MP and Sir Menzies Campbell MP. The tours included explanations of how the building was designed and constructed and the benefits of onsite water treatment and renewable energy generation. The project has also recently taken part in the "Eco Open Houses in

Brighton and Hove" event which invited members of the public to tour and learn about low carbon developments across the area. As well as this, the team have disseminated the learning from the project by delivering CPD seminars to the Royal Institute of Chartered Surveyors and the Royal Institute of British Architects.

The unusual design and construction of the project has attracted extensive media attention. It has featured in over 140 mainstream articles including the front page of the Guardian and has appeared on television on programmes such as "Grand Designs". The project website www.lowcarbon.co.uk generates around 150,000 hits per month.

Training

The Earthship has served as an educational facility as well as a community centre for Stanmer Organics. Two and four day training courses on Earthship construction techniques were delivered to 124 people over the duration of the project. The construction phase of the project also provided volunteering opportunities for those interested in learning more about construction and sustainable development. The team intend to revive the training courses in the near future.

Post-Occupancy Review

The team are keen to monitor the success of the design features and renewable energy technology during the operational phase of the building. To this end, the University of Brighton are currently undertaking a three year thermographic study to monitor the performance of the building. In addition, in future, the team would like to undertake a study to monitor the quality of the rain water capturing system.

Lessons Learnt

Design

The Earthship design originated in New Mexico and is best suited to an extreme climate. The design relies on inter seasonal thermal storage which captures the heat in summer and stores it for release in the winter. England has a more temperate climate which meant that the temperature in Earthship Brighton could be low in winter. The team felt that further insulating features such as under floor insulation, extension of the south facing sun space, further sun pipes and sky lights would have been beneficial and would also have increased the amount of natural light in the building.

Materials

Challenges associated with sourcing recycled materials and the costs of processing the materials meant that, in some cases, anticipated cost savings were not made and the final expenditure was comparable to the cost of virgin materials.

Carbon Reduction

A carbon footprinting exercise was conducted to assess the impact of the first phase of the project. It found that around 80% of the carbon impact of the build at that stage was attributable to the air travel of the American crew that trained the workforce in the Earthship building method. Now the project team have developed their own expertise, training will not be necessary for future projects. Another area of concern for the team was the use of cement which has high embodied carbon content. In their next project the team would like to investigate alternative products to replace the cement used to pack out the tyres. The specific design requirements of the project would make it unsuitable for use on a largescale residential development as specific site criteria must be met for the building to have sufficient energy generation and thermal properties.

Conclusions

Some of the team had no previous construction experience and the project presented an extremely steep learning curve. The method of building had not been used before in England and financial difficulties complicated matters further. In future, the team felt that time and money could have been saved by more detailed and informed budgeting upfront.

The successful completion of the project was dependent upon the exceptional commitment of the dedicated core team. Labour was provided on a voluntary basis and many of the project team supported the project financially. The project also enjoyed support from Brighton and Hove City Council who provided funding and assistance at the planning stage. Corporate partners were essential to the successful completion of the project as they provided materials and services at no cost. The exceptional media interest proved a useful tool for accessing further support and the team feel that they have been able to raise awareness of the project and of climate change issues far beyond expectations.

Awards

- The Low Carbon Network won an innovation award in the South East renewable Energy Awards 2005.
- Water Efficiency Awards 2007 – Inspiring Change - Finalist
- Water Efficiency Awards 2007 – Construction & Renovation - Commended
- Constructing Excellence Awards - Highly commended
- Green Apple Awards 2007 for Business - National Gold Winner
- South East Low Carbon Awards 2007 – Low Carbon Development of the Year Highly commended
- National Energy Efficiency Awards 2007 – Construction & Renovation Highly commended
- Earthship Brighton was the national Gold Winner of the “Green Apple Award” for the built environment and architectural heritage in the new build tourism category in 2007.
- RICS South East Awards 2008 – Sustainability category – highly commended

Further information about the project and the “Earthship” build techniques can be found at www.lowcarbon.co.uk and in the book “Earthships: Building A Low Carbon Future for Homes” by Mischa Hewitt and Kevin Telfer. Available at <http://www.lowcarbon.co.uk/publications>.



Solar panels at Earthship Brighton



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