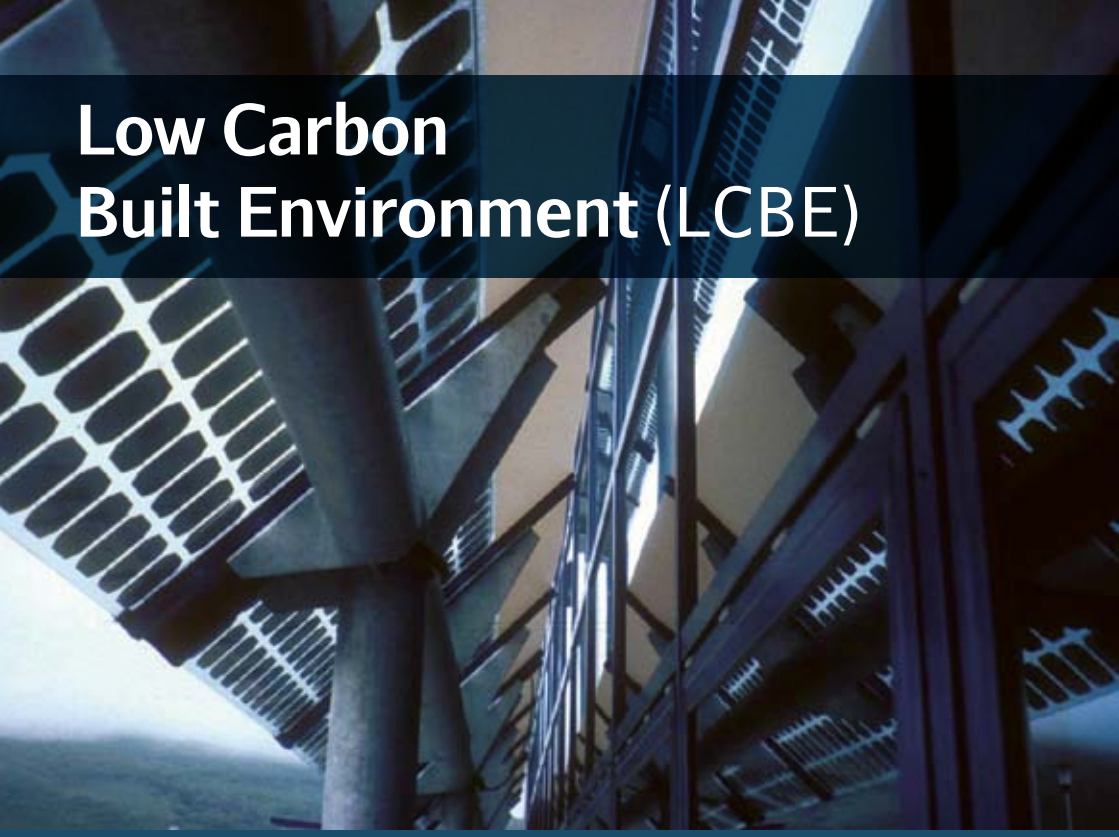


Low Carbon Built Environment (LCBE)

The Low Carbon Built Environment (LCBE) project brings Welsh academics and industry together to reduce carbon dioxide emissions associated with the built environment.

The programme targets the built environment sector at all scales from component to building to region. It will also include all stages of the built environment process from planning through design and construction to operation.

New and existing buildings will be considered and the performance of different building related technologies will be monitored. In addition the process of innovation, technology deployment and market development will be examined.

The Low Carbon Built Environment project is part of the Low Carbon Research Institute.

LCRI LOW CARBON RESEARCH INSTITUTE

CARDIFF UNIVERSITY
PRIFYSGOL CAERDYDD

WSA

ERDF

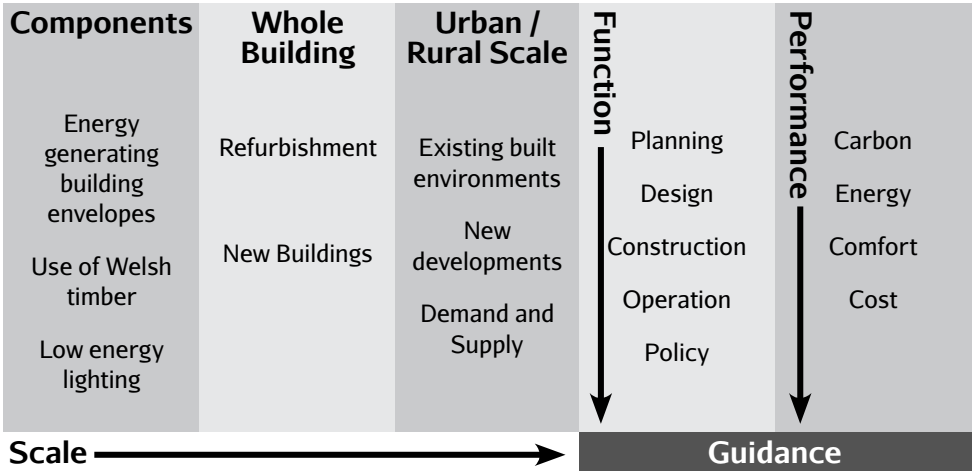
Low Carbon Built Environment (LCBE)

The project aims to consider reducing low carbon in the built environment as a matrix of scale, function and performance.

On the small end of the scale, individual components will be considered. These include energy generating building envelopes, the use of local Welsh timber for construction and low energy lighting. Whole building design (in terms of new build and refurbishment) will lead to large scale modelling including demand, supply, new developments and existing environments.

Function will span the full range from planning design and construction to operation and policy.

Both scale and function will be considered in terms of energy consumption, carbon emissions, occupant comfort and cost.



Partners

Welsh School of Architecture, Cardiff University (lead partner)
Bangor University
Boyes Rees Architects
BRE Wales
Bron Afon Housing
Cardiff School of Art and Design, University of Wales Institute, Cardiff
Coastal Housing Association
DVLA
Powell Dobson Architects
RPA Associates
Rumm Ltd
School of Engineering, Swansea University
Tata
Warm Wales

For further information about the LCBE please contact Debbie Taylor, Project Manager
Email: taylorD4@cardiff.ac.uk **Tel:** 029 20875959

Components

LCBE is working with industry to develop new components for low carbon buildings

Welsh Timber for Construction

Using local materials is an important way to reduce the carbon dioxide emissions across the entire life-cycle of a building. Timber is viewed as a carbon neutral material, but the quality of Welsh timber is such that it is not used extensively in the construction industry. This work will facilitate increased use of Welsh timber in construction by developing design strategies for components and buildings that exploit the properties of Welsh timber and minimise its shortcomings.

Design and Implementation of Energy Efficient Lighting Solutions

Lighting accounts for some 20% of world energy usage and current lighting efficiencies are generally still low. This work package develops high efficiency lighting solutions, primarily based on LED technology, that will significantly reduce energy wasted by lighting in the built environment. A unique feature of LED technology is that efficiencies are still improving exponentially. While already four times better than incandescent and comparable with fluorescent lighting, LED efficiencies will continue to improve significantly over the next five years.

Energy Generating Building Envelopes

The building envelope has traditionally performed a passive role of energy conservation and weather tightness. The role of SBEC is to use the building envelope / fabric to capture the sun's energy by solar-thermal and photovoltaic technologies. The energy generated will be stored and delivered in a useable manner while optimally managing the process and enhancing the overall efficiency of building. This will be done in a complimentary manner alongside modern building service technologies to deliver low to zero carbon buildings.

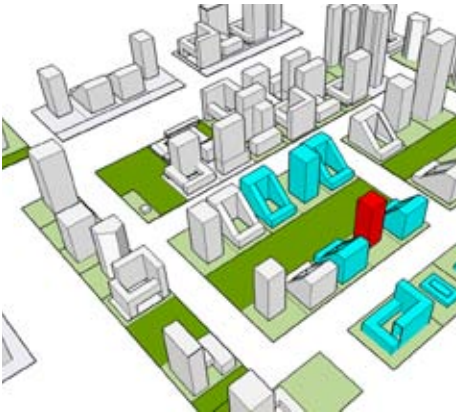
Low Carbon Building Design Solutions

LCBE will consider whole building design from inception to construction to maintenance.

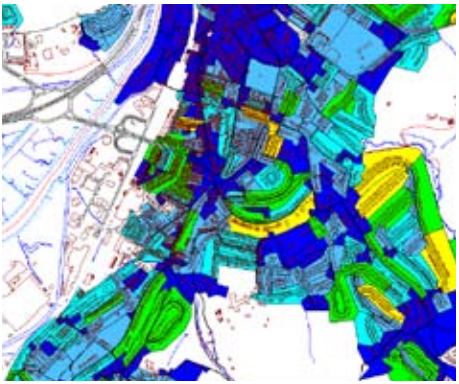
Socio economic backgrounds in terms of how buildings are developed and delivered will be considered in as much depth as technical solutions to reach affordable solutions.

Generic, robust, repeatable design solutions that can be adopted across the breadth of the construction industry will be developed.

Urban Scale Demand and Supply



Large scale built environments on a local authority or regional scale can be modelled using the Energy and Environmental Prediction model (EEP) developed at the Welsh School of Architecture. The EEP model can currently be used to perform "what if" scenarios based on conventional energy efficiency measures such as cavity wall insulation, double glazing and loft insulation. LCBE will develop the EEP model to investigate the potential of achieving deep carbon cuts at a regional scale through the use of emerging low carbon technologies.

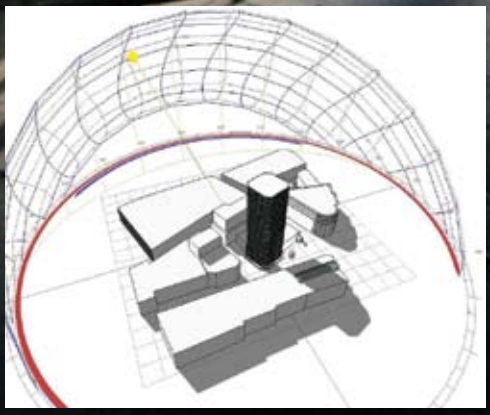


Environmental Laboratory

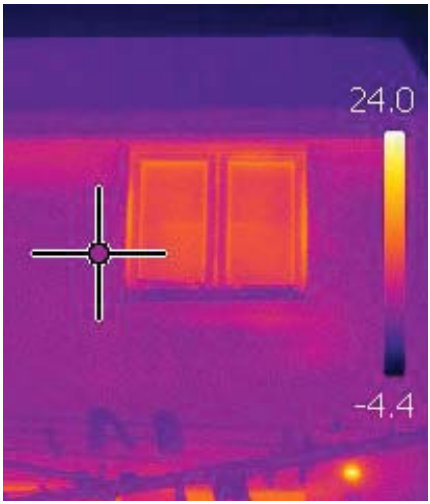
Equipped with a Wind Tunnel and an Artificial Sky and Heliodon (the most advanced of its kind in the UK). The Laboratory provides a unique facility for simulating wind and sun effects around buildings and is used for environmental scale modelling.

Computational Modelling Software

Harnessed to deliver state-of-the-art environmental design and other aspects of building and urban-scale design and management. Includes environmental design software (HTB2) and an Energy and Environmental Prediction Tool (EEP) for urban scale modelling.



Monitoring Low Carbon Buildings



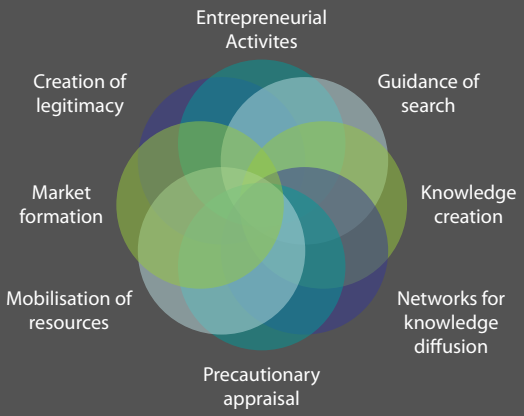
Many technologies developed for buildings to reduce carbon dioxide emissions are novel or are being used in innovative combinations. LCBE will provide expertise on how to monitor and assess the performance of low carbon buildings through their conception, design, construction and operation, to discover how low carbon products and concepts are brought into the design, implemented through construction and realised in occupied buildings.

LCBE will inform on the best ways to embed monitoring and building performance evaluation across the construction life cycle. This will include guidance on how performance evaluation can be accommodated in the design and construction stages.

Innovation, Technology Deployment and Market Development

Reaching a low carbon built environment needs new networks and supply chains to bridge the gap between innovative products and developing markets. Appropriate economic and policy drivers will be required to support the growth of consumer demand for low carbon buildings.

LCBE will develop insights and recommendations enabling industry, academia and policymakers to promote the transition to a low carbon built environment, while capturing the economic, social and environmental benefits for Wales.



Low Carbon Research Institute (LCRI)

The Institute was set up to unite and promote energy research in Wales, UK to help deliver a low carbon future. The multidisciplinary LCRI aims to support the energy sector, UK and globally, to develop low carbon generation, storage, distribution and end use technologies, and to offer policy advice.

The Higher Education Funding Council For Wales (HEFCW) granted £5.1 million to develop the LCRI for 5 years from April 2008. LCRI's research is also supported by contracts from the Research Councils, Industry and Government.

In 2010 LCRI secured £15 million from the Welsh European Funding Office, a contribution to a £34 million programme to enable Wales and its industry partners to lead the way in research to cut carbon emissions, as part of the European Research Development Fund's Convergence, Regional Competitiveness and Employment programmes.

The LCRI comprises staff from:

Welsh School of Architecture (WSA), Cardiff University

Cardiff School of Engineering (CSE), Cardiff University

Sustainable Environment Research Centre (SERC), University of Glamorgan

School of Engineering (SoE), Swansea University

School of Chemistry (SoC), University of Wales, Bangor

The Centre for Solar Energy Research (CSER), Glyndwr University

Institute of Biological, Environmental and Rural Sciences (IBERS), Aberystwyth University

Contact

LCRI Chair: Professor Phil Jones. **LCRI Director:** Professor Peter Pearson

For further information about the LCRI please contact Kelly Butt, LCRI Administrator

Welsh School of Architecture, Cardiff University, Bute Building, King Edward VII Ave., Cardiff CF10 3NB

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