Contribution of COST to achieving the Rio Agenda
The case of COST Action C23 'Strategies for a Low Carbon Urban Built Environment'

Contact: Joanne Patterson, Welsh School of Architecture, Cardiff University, UK. Email: patterson@cardiff.ac.uk

COST Action C23 'Strategies for a Low Carbon Urban Built Environment'

The main objective of this Action is to investigate, across the European Union, how carbon reductions can be achieved through appropriate design and management of the urban built environment. This involves:

- minimising energy use and associated emissions from buildings,
- examining the indirect energy impacts of infrastructure developments.

Carbon emissions are associated with the construction, refurbishment and operation of buildings. Sources of emissions relating to buildings include:

- Direct emissions from heating, lighting and ventilation of buildings,
- Indirect including construction of buildings, transportation of people and materials, and the treatment of water, waste and sewage.

Both the case of newly constructed and refurbished buildings are being investigated together with the wider urban built environment. Social and economic implications of the incorporation of low carbon modifications are being considered to prevent conflict.

C23 began in June 2005 and will continue until October 2009. 19 countries are currently signed up to the Action involving over 50 experts.

COST Action C23 contribution to the documents resulting from Rio 1992

From 3rd to 14th June 1992, The United Nations Conference on Environment and Development met in Rio de Janeiro. This meeting aimed to reaffirm and sought to build upon, the Declaration of the United Nations Conference on the Human Environment which had been adopted at Stockholm on 16 June 1972. Outputs from the Rio conference include Agenda 21, the Rio Declaration on Environment and Development, the Statement of Forest Principles, the International Treaty 'United Nations Framework Convention on Climate Change' and the United Nations 'Convention on Biological Diversity'.

A 'low carbon urban built environment' addresses many of the outputs from Rio, both directly and indirectly. The main means of achieving carbon reductions in the urban built environment are:

i) Higher standards of energy efficiency to reduce overall *demand* for energy,
ii) The use of renewable and alternative sources of energy to ensure that the *supply* of energy is from sustainable sources.

The built environment includes new and existing buildings together with urban planning, urban design and urban engineering which includes transport and land-use, water and sewage, waste and green/blue structures. Figure 1 illustrates the main impacts of the aim of the Action 'To improve design and management of the built environment for a low carbon urban built environment'.

Over half of the resources consumed globally are used in construction, and 45% of the energy generated across the world is used to heat, light and ventilate buildings with a further 5% being used in construction (Edwards, 2001). By promoting appropriate design and management of the built environment C23 can support reduced resource consumption of energy through encouraging the use of renewable energy sources, reducing energy demands through better design and the construction and incorporation of low embodied energy materials and planning. Therefore, C23 directly contributes to the Agenda 21 objective of *'Changing consumption patterns'* and Principle 8 of the Rio Declaration *'unsustainable patterns of production and consumption'*.

Carbon emissions from different sectors of the built environment exceed the capacity for maintaining the planet at a sustainable level. Modifying the built environment to reduce the need to travel, to provide more sustainable means of travel, and to reduce the use of water and the production and treatment of waste and sewage will result in a holistic reduction of energy consumption and emissions, so contributing to a low carbon built environment. C23 is also examining carbon emissions associated with the construction processes itself, including transportation associated with materials and people, water consumption and treatment and disposal of waste. The Third Assessment Report produced by the Intergovernmental Panel on Climate Change (IPCC, 2001) documented technological and biological options to mitigate climate change. This document reported that although several technologies to alleviate greenhouse gas emissions exist, by the year 2010, most of the opportunities to reduce emissions will still come from energy efficiency gains in the end use sectors. In the

energy consuming sector, it is major government actions that can promote energy efficient use and the replacement of high (such as coal) to lower carbon fuels (such as natural gas and renewables).

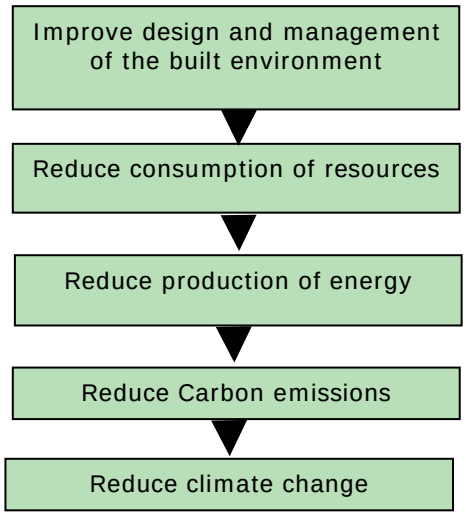

Figure 1 – Main contributions of 'Strategies for a Low Carbon Urban Built Environment' to Rio processes

C23 members are currently investigating how EU member states are implementing the requirements of the Energy Performance Building Directive (EPBD, 2002) and are also collecting national and regional planning guidelines and regulations for each country aimed at reducing the energy burden of urban areas. This allows for comparisons across the member states to be made and to elaborate the legal, economic and social frameworks as a context for new carbon legislation. This task promotes Section IV of Agenda 21 '*Means of Implementation'* particularly *'International legal instruments and mechanisms*' and '*Information for decision-making*' together with Rio Principle that encourages '*enactment of effective environmental legislation'*. C23 is therefore encouraging consistency in low carbon development across the EU by identifying discrepancies between countries to fill the gaps by transfer of knowledge and good practice.

Through reducing consumption, production of energy will be reduced which will reduce the demand of natural resources. Therefore C23 contributes to the 'Convention on Biological Diversity', a pact among the vast majority of the world's governments that sets out commitments for maintaining the world's ecological underpinnings as we go about the business of economic development. By reducing overall energy demand through better design and construction '*the sustainable use of its components'* will be enhanced through better resource management.

A set of case studies are currently being compiled that illustrate interesting aspects of developing and implementing low carbon strategies in new and existing buildings and also in the fields of urban infrastructure and urban planning that promote a low carbon built environment. Case studies are required to exemplify good practice for a low carbon built environment and help others to gain knowledge of what has been applied in practice. Although there is much existing knowledge and experience about technical performance of the built environment in relation to energy efficiency, a lack of good practice case studies illustrates that there are still problems in the integration of these technical solutions and in managing associated change and social acceptability which case studies demonstrate.

Whilst analysing case studies C23 has uniquely identified that although significant improvements in energy efficiency and carbon reductions are taking place on an individual building level, at the macro-level of cities, carbon emissions are continuing to rise. Although there is recognition at government level of the need to reduce carbon emissions, there is not much realisation at a city scale. It has been recognised that the members of C23 have a wide diversity of skills and are in a position to utilise these skills to explore the integration of scales from building to city in response to these issues.

Collecting information on the efficiency of case study cities in relation to their main 'carbon' related aspects, including, dominant building types, transport systems, sustainability policy, population etc.. will assist in demonstrating baseline carbon emissions and identifying areas of rising carbon emissions to illustrate whether carbon emissions are increasing from a consistent source or are varied depending on the form and function of the city. The contextual situation of low carbon buildings within the urban situation will also be looked at. For

example, a low carbon building in a location that results in higher travel to work distances, may result in an overall increase in carbon emissions.

The building and city scale case studies collated support the Agenda 21 objectives of '*Integrating environment and development in decision making*', '*promoting sustainable human settlement*' and '*Integrated approach to the planning and management of land resources'* together with a number of the Principles of Rio including '*cooperate to strengthen endogenous capacity-building for sustainable development by improving scientific understanding through exchanges of scientific and technological knowledge, and by enhancing the development, adaptation, diffusion and transfer of technologies, including new and innovative technologies'*.

The Rio Declaration Principle 10 states that '*Environmental issues are best handled with the participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided.*' By presenting good practice case studies all concerned citizens can be made aware of actions that are taking place in other regions and countries to alleviate carbon emissions.

The C23 network website www.lcube.eu.com, network meetings and conferences enable the transfer of knowledge between COST Action members and the wider audiences which also respond to the issues discussed above. This also supports many of the objectives in Section IV of Agenda 21 including '*Transfer of environmentally sound technology, cooperation and capacity-building'* and '*Promoting education, public awareness and training*'.

It is believed that carbon emissions have a direct impact on climate change. Therefore by promoting reduced carbon emissions C23 will contribute to the Agenda 21 objective '*protection of the atmosphere*' and help to the fight against *climate change* which is a key initiative from Rio and the resulting treaty 'Kyoto Protocol' of 1997 which has legally binding measures that require to reduce greenhouse gas emissions below levels specified. These add up to a total cut in greenhouse gas emissions of at least 5% from 1990 levels in the commitment period 2008-2012.

By contributing to reduced carbon emissions C23 supports a number of the social aspects of Agenda 21 including '*protecting and promoting human health conditions*' and Principle 1 of Rio Declaration '*Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature.'*

C23 will as a whole assess what factors will really encourage a low carbon built environment – regulation, incentives for change, improved quality of life, joined up thinking between relevant actors including local authorities, industry, professional bodies and public, appropriate taxation such as on the use of raw materials, carbon trading. The Action will provide advice on what changes need to be made to make low carbon options favourable in order to develop the potential for a low carbon built environment.

Overall C23 is contributing to the Principle 27 of Rio in that the network is '*…. Cooperating in good faith and in a spirit of partnership in the fulfilment of the principles embodied in this Declaration and in the further development of international law in the field of sustainable development'* and that it is promoting *'cooperation in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystem'*.

References

Edwards B, 2001, Rough Guide to Sustainability, RIBA Publications, London.

European Directive 2002/91/EC of the European Parliament and of the Council on Energy Performance of Buildings, December 2002.

IPCC, 2001, Third Assessment Report: Climate Change 2001, Cambridge University Press.