

COST

Domain Committee Transport and Urban Development

COST Action 23

Strategies for a Low Carbon Urban Built Environment

MONITORING PROGRESS REPORT

Period: 10th May 2005 to 15th April 2008

This Report is presented to the relevant Domain Committee and contains two parts:

- I. Management Report prepared by the COST Office*
- II. Scientific Report prepared by the Chair of the Management Committee of the Action*

The report is a “cumulative” report, i.e. it is updated annually and covers the entire period of the Action.

Confidentiality: the documents will be made available to the public via the COST Action web page except for chapter *II.C. Self evaluation*.

Based on the monitoring results, the COST Office will decide on the following year's budget allocation.

I. Management Report prepared by the COST Office

I.A. COST Action Fact Sheet

- **COST Action 23** – *Strategies for a Low Carbon Urban Built Environment*
- **Domain** *Transport and Urban Development*

- **Action details:**

CSO Approval: (15/03/2005)

End date: (12/10/2009)

Entry into force: (09/06/2005)

Extension:

- **Objectives** (from DB as in About COST)

The main objective of C23 is to investigate, across the EU, how carbon reductions can be achieved through appropriate design and management of the urban built environment. This involves investigating:

- minimising energy use and associated emissions from buildings,
- 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.

- **Signatories:** *list of countries and date of signature*

Austria	09/06/2005
Belgium	09/06/2005
Cyprus	12/09/2005
Denmark	09/05/2005
Finland	09/06/2005
Germany	09/06/2005
Greece	19/08/2005
Italy	20/06/2005
Lithuania	19/06/2006

Malta	15/03/2006
Netherlands	03/05/2005
Norway	21/06/2005
Poland	12/04/2006
Portugal	05/09/2005
Serbia and Montenegro	21/11/2005
Slovenia	30/08/2005
Spain	21/09/2005
Switzerland	10/01/2006
United Kingdom	21/06/2005

• **Intentions to sign:** *NONE*

• **Participating Institutes of non-COST countries:** *None*

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• **Action Web site:** <http://www.lcube.eu.com>

• **Working Groups** (*list of WGs and name*)

WG1 – New and existing buildings

WG2 – Urban infrastructure

WG3 – Dissemination and reporting

I.B. Management Committee member list

Austria	Mr. Konrad WILDENAUER
Austria	Professor Gerald LEINDECKER
Belgium	Professor Marc FRERE
Cyprus	Dr. PETROS LAPITHIS
Denmark	Mr. Torben DAHL
Denmark	Dr. Morten ELLE
Finland	Mr. Kari OJALA
Finland	Mr. Pekka LAHTI
Germany	Professor Geralt SIEBERT
Germany	Dr. Werner LANG
Greece	Demetris BOURIS
Greece	Professor Christopher KORONEOS
Italy	Dr. Rossano ALBATICI
Italy	Antonio FRATTARI
Lithuania	Mr. Juozas RAMANAUSKAS
Lithuania (delegate)	Raimondas BLIUDZIUS (full details not available)
Malta	Dr. Vincent BUHAGIAR

Netherlands	Mr. René WANSDRONK
Norway	Professor Anne Grete HESTNES
Norway	Professor Oyvind ASCHEHOUG
Poland	Dr. Adam RYBKA
Portugal	Professor Paulo PINHO
Serbia	Professor Aleksandra KRSTIC-FURUNDZIC
Slovenia	Dr. Mariana SIJANEC ZAVRL
Spain	Professor FERNANDO RODRIGUEZ
Switzerland	Dr. Veronique STEIN
Switzerland	Mr. Willi HÜSLER
United Kingdom	Professor Phillip John JONES
United Kingdom	Dr. Chris TWEED



I.C. Overview activities and expenditures

2007 Budget (1 June 2007-31 May 2008)

Total Action Budget: **89,000**

Remaining Action Commitment: **19,135**

Meetings

Meeting Type	Date	Place	Cost	Total
Workshop/MC & WG	10/09/07	Geneva	15,178	
Working Group	23/11/2007	Cardiff	1,549	
MC and WG	03/12/2007	Madrid	20,139	
MC and WG	08/04/2008	Rzeszow	25,600	
				62466

Workshop

Beneficiary	Date	Place	Cost	Total
Rzeszow University	08/04/2008	Rzeszow	3000	3000

STSM

Beneficiary	Date		Place		Cost	Total
	From	To	From	To		
Budimir Sudimac	Belgrade	Germany	01/10/2007	15/11/2007	2400	2400

General Support Grants

Title	Date	Cost	Total
Website	04/05/2007	2000	2000

Schools

Title	Date	Place	Cost	Total
				0

Action Total : **69,865**

II. Scientific Report prepared by the Chair of the Management Committee of the Action

II.A. Results achieved during the period 10th May 2005 to 15th April 2008

Describe in no more than 2 pages the main results achieved, indicating the key scientific and technical outcomes of the Action compared to the international state-of-the art, and with an assessment of the results obtained compared to the objectives. Describe briefly the progress with respect to timetable and possible scientific problems encountered. Additional documentation such as extended scientific reports, proceedings of workshops, seminars or conferences may be provided separately as an annex to the annual progress report, and should be referenced in the report. Describe the efforts made and success achieved in involving younger scientists.

C23 began in May 2005 with a meeting in Brussels. At this meeting it was agreed that Professor Phil Jones should chair the Action and three working groups were set up:

- WG1 - New and existing buildings - Chair Chris Tweed,
- WG2 - Urban Infrastructure - Chair Paulo Pinho,
- WG3 - Dissemination - Chair Phil Jones.

C23 Vice-chairs are the chairs of WG1 and WG2. Since May 2005 meetings have been held:

- Cardiff, UK - 13th -14th October, 2005
- Porto, Portugal - 12th -13th January 2006
- Trondheim, Norway - 19th - 20th June 2006
- London, UK - 14th September 2006 (WG3 conference meeting)
- Trento, Italy - 4th - 5th December 2006
- Athens, Greece - 1st - 2nd February 2007
- Vienna, Austria - 16th, 17th and 18th April 2007
- Geneva, Switzerland - 10th and 11th September 2007
- Cardiff, UK - 30th November 2007 (WG3 conference meeting)
- Madrid, Spain - 3rd and 4th December 2007.

Generally, C23 holds MC and WG meetings in parallel to ensure maximum attendance and financial efficiency. There is also significant overlap between the WGs which is enhanced during combined meetings.

The main objective of C23 is to investigate, across the EU, how carbon reductions can be achieved through appropriate design and management of the urban built environment. This involves investigating:

- minimising energy use and associated emissions from buildings,
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Carbon emissions are associated with the construction, refurbishment and operation of buildings. Sources of emissions relating to buildings include:

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Tasks

WG1 and WG2 have been working towards the following tasks:

1 Response to Directives, Legislation and guidelines

C23 members from WG1 are currently investigating how EU member states are implementing the requirements of the EU Energy Performance Building Directive (EPBD).

WG2 members are collecting national and regional planning guidelines and regulations for each country aimed at reducing the energy burden of urban areas.

Investigation of legislation 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. 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.

Results

Information about the implementation of EPBD has been collected for 14 countries with further information being prepared for more. The information is being structured according to the headings context, physical features and management of buildings, performance criteria, decision making and cost analysis.

National and regional planning guidelines and regulations together with more general planning policy documents are being collected on a country basis in order to provide evidence of what further developments are required in the future for planning guidelines for urban infrastructure and the wider urban area. This infrastructure/urban scale task has proved to be far more difficult to carry out than expected, because so far, very few, interesting planning guidelines have been found. The lack of information illustrates that, at the planning level, a lot has to be done at both national and regional level to reduce the energy burden of cities.

2 Illustration of low carbon in practice

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. 'Cases' are not necessarily examples of 'best practice' but are intended to promote discussion, debate and learning. Cases help others to gain knowledge of what has been applied in practice.

Existing and new buildings and urban infrastructure - Case studies are being collected for existing and new buildings, urban infrastructure and cities. For each case study type a template is provided to allow data to be organised and presented in a consistent manner for each case/country. For each building and urban case study the following information will be collected:

- a. Short description of the case study,
- b. Context of the case study,
- c. Aims of the project – Performance criteria,
- d. Decision-making processes,
- e. Cost analysis,
- f. Overall assessment from a low carbon perspective,
- g. Lessons learnt.

Information has been collected for more than 20 building and infrastructure case studies from at least 19 countries from both in and outside the European Union. These explore a range of low carbon technologies and approaches to design and planning for new/existing buildings and urban infrastructure. The case studies cover a range of different built environment structures from an education building for unemployed in Belgium, refurbishment of a retail shop in Slovenia to the construction of a biomass power station in Austria. Some of the case studies also investigate in detail the use of tools to evaluate sustainability.

Cities - 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 as a result of increased floor area of buildings, increase in consumer goods, urban sprawl and the resultant increase in transportation. Case studies of cities are being collected in order to explore what characteristics of cities are causing this increase in emissions to occur. Although there is recognition at government level of the need to reduce carbon emissions, there is not much realisation at a city scale.

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 across Europe 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. Collecting case city data for cities across Europe will allow for exploration of differences in carbon to be made.

WG3 dissemination is discussed in Section II.B below.

A grant application was submitted to COST in June to cover the costs of the Action. A budget of 89,000 Euros has been allocated to the Action for expenses and management costs which will cover the period from 1st July 2007 till 31st May 2008. COST is not yet ready to fully implement the COST Grant System. Therefore until further notice the COST Office will continue to allocate the funding.

Key tasks, as discussed above and in section IIB for C23 have been agreed and work towards the final output progressing satisfactorily. Information that has been collected throughout the duration of the Action to date is being collated to form a picture of Europe in relation to low carbon in the urban built environment at different scales. This will include a book, the Euro Carbon Atlas and, in more detail on the Icube website. Further information about this can be found in section II.B below. It is planned that the majority of the

information for the final outputs will be collected by the May 2008 meeting. Exploration of the data collected will then be carried out in order to provide an analysis of low carbon urban built environments across Europe.

Members of the Action are anticipating developing future research proposals together. In order to identify relevant opportunities sub-groups for WG1 and WG2 have been set up to monitor relevant funding opportunities that will be circulated when identified.

C23 encourages membership of younger scientists to the Action. At the C23 conference in April 2007 a number of the presentations made were by younger scientists and these have been followed up by the preparation of papers for the special edition of the international journal 'Indoor and Built Environment'.

A young scientist undertakes the coordination of the Action at the Welsh School of Architecture at Cardiff University, UK.

Two short term scientific missions have taken place by young scientists from Serbia. Vesna Kosoric of Faculty of Architecture of the Belgrade University took part in a Short Term Scientific Mission (STS) at the Laboratory of Solar Energy and Building Physics of Ecole Polytechnique Federale de Lausanne from April the 2nd to June 1st 2007. During her visit, she worked on a survey of the Swiss solar thermal collector market, concentrating on flat plate, unglazed flat plates and evacuated tubes systems, mainly targeted at the flexibility offered by collector manufacturers in term of architectural integration freedom. The research undertaken is very important for Serbia to keep abreast of developments of EU countries and will provide useful information to C23 on the application of low carbon technologies in the built environment.

Mr Budimir Sudimac, Faculty of Architecture - University of Belgrade, Department of Architectural Technologies visited Stefan Behling at the Universitat Stuttgart from October 1st to November 15th to investigate solar shading devices and daylight. During his visit he undertook a survey of the German solar thermal collector market. Identification and thorough examination of existing thermal collectors is very important for identification of their global drawbacks and limitations and will significantly help in determining major guidelines for future development and modifications of thermal collectors. This work is the beginning of his PhD thesis which will assist both science and practice in the field of application solar energy in architecture and it will be very important for research and development work on the Faculty of Architecture.

Student competitions are taking place at C23 member institutions on LCUBE related subjects. Posters will be produced by the students as a result of each of the competitions and the two best projects will be chosen from each institution. The posters will be exhibited at the LCUBE conference in Munich. Each country will be able to bring up to two winning students to the conference in Munich with funding provided.

II.B. Dissemination of results

Action related Publications and Reports

The international journal 'Indoor and Built Environment' have agreed to publish a special edition dedicated to a collection of papers that were presented at the C23 2007 conference in Vienna entitled 'Strategies for a low carbon urban built environment'. The papers to be included are as follows:

- Low carbon urban built environments: A UK perspective - Phil Jones and Joanne Patterson,
- Elements and strategies for sustainable intervention in the residential building sector: a case study - Rossano Albatici,
- Improving thermal insulation of concrete sandwich buildings - Jørgen Munch-Andersen,
- Exergy Analysis in Low Carbon Technologies - The case of Renewable energy in the Building Sector - George Xydis,
- The Energy and Cost Implications of the Renewable Energy Scheme at the Integrated Home for Older People, Plas y Môr, Llanelli, Wales - Phil Roberts,
- Patterns and implications of user control actions in buildings - Ardeshir Mahdavi,
- Zeitmop concept - A polygeneration system for municipal energy demands - Jan Gorski,
- Environmental comparison of the use of biodiesel and gasoline for transportation- the case study of Athens – Eva Nanaki,
- Residential location, travel behaviour and energy use: examples from metropolitan areas in Denmark and China - Peter Naess,
- New Strategies for the reduction of shopping centres generated car trips - Theory and experiences Willi Hüsler and Luca Urbani,
- Combining Stationary and Mobile Energy Requirements. The Importance of the Meso-Level in Sustainable Urban Development - Karl Georg Høyer.

These papers are written by a combination of C23 participants and invited speakers. It is anticipated that the journal will be published in 2008.

A C23 'Euro Carbon Atlas' is currently being developed, this will be the final output of the Action and will be published as a book. This will bring together the information that has been collected throughout the action and will assist built environment professionals with procedures to ensure maximum consideration for low carbon is made for all built environment construction and renovation. This will provide a picture of what Europe is like in relation to low carbon urban built environments at the different scales. The proposed content of the Euro Carbon Atlas is as follows:

- 1 *Executive summary*
- 2 *Introduction*
- 3 *National components* - Information will be set out on a country by country basis with a maximum of 10 pages for each country to include:
 - National context - including demographic, geographic, energy use data,
 - EPBD implementation at a national level,
 - Building case studies,
 - Low carbon planning legislation and regulation at national level,
 - Urban case study,
 - City case study,
 - National conclusions.
- 4 *Conclusions*
 - Summary table to collate situation in each country.
 - 'what has been learnt?' related to successes and common problems,
 - Inform policy – what could be done?,

Full documents of text that have been collated will be included on the Icube website under a new main menu heading 'Euro Carbon Atlas'.

Conferences and Workshops

The first C23 L-CUBE conference took place on Tuesday 17th and Wednesday 18th April 2007 in Vienna, Austria entitled 'Strategies for a low carbon urban built environment'. Current results of the working groups together with relevant input from external experts from the relevant fields were presented. The conference also helped to establish stronger links and scientific exchange with other cost sponsored networks related to the domain of C23, representatives from C24 and C25 made presentations.

The papers from the conference presented on the C23 website and a selection will also be published in the international journal 'Indoor and Built Environment' in 2008.

A second C23 Conference 'Low Carbon Urban Built Environments' is being held at the Universität de Bundeswehr in Munich on Wednesday 24th and Thursday 25th September 2008. This conference will illustrate what is being done to move towards a low carbon built environment at different scales from buildings to infrastructure to cities and nations. The event will include seminar sessions, paper presentations and 'power' posters. The call deadline is February 29th 2008. The cost of the conference is 65 Euros.

Website

The Cost Action C23 LCUBE website can be found at <http://www.lcube.eu.com> and is managed by the Welsh School of Architecture. This website includes the sections information about the aims of C23 and the separate WGs, a list of members and meeting venues, dates agendas, minutes and additional documents, the Memorandum of Understanding, a list of the case studies (currently password protected as work is in progress – available to C23 participants only. When documents have been approved they will become publicly available) and a link to the COST home page. The website has received over 15,000 hits to date.

Scientific and Technical Cooperation

The LCUBE conference held in April helped to establish stronger links and scientific exchange with other cost sponsored networks related to the domain of C23. Presentations were made by Hedzer van der Kooi, acting Chair of C24 'Analysis and Design of Innovative Systems for Low-EXergy in the Built Environment' and Helena Gervasio represented C25 'Sustainability of Constructions: Integrated Approach to Life-time Structural Engineering'. These representatives were therefore able to hear about the progress of C23 at this event.

Sub-groups for WG1 and WG2 have been set up to monitor relevant funding opportunities. Relevant opportunities will be circulated when identified

Transfer of results

C23 is promoted to relevant national and regional governments and other regulatory bodies and organisations by partners in an informal manner where appropriate.

End users are invited to attend and make presentations at C23 meetings. At the meeting in Trondheim in June 2006 Wolfgang Schoelkopf of ZAE Bayern, Munich made a presentation on 'Solar District Heating Plants' and Jorgen Munch-Andersen of SBI presented a 'Comparison of energy efficiency of buildings build to different standards and rules'. Costas Balaras of the Institute for Environmental Research and Sustainable Development at the National Observatory of Athens presented 'Energy Performance Assessment of Buildings according to the European Directive (EPBD) and the new European Standards'.

Dr Myriam Garbely, Scientific associate at the Departement du territoire, Service cantonal de l'Energie presented 'The 2000 watt society without nuclear energy A new vision for the energy policy of Geneva' at the C23 meeting in Geneva. At the Madrid meeting in December 2007 Luis Irastorza, DUCH, presented an overview and proposals for reduction of Green House Gas Emissions in the building and urban transport sectors whilst, Jose Luis Montull, SDT Energy Munichre, illustrated the use of insurance as a tool for the implementation of EPBD. Local end users will continue to be invited to meetings to make presentations and be involved in discussions.

Two additional STSMs have taken place in March 2008. This brings the total STSMs through the action to four. All C23 members who are interested in hosting a STSM are being encouraged to send a brief paragraph of their institution including relevant activities and a website link which can be used to attract STSMs from other countries. This information will be put on the lcube website to allow potential STSM participants to identify a suitable venue to visit.

Contacts in the ERA

Information has been used in connection with the Asian Link project 'Sustainable urban housing : strengthening capacity in policy formation an implementation in the city of Xi'an china' which has partners in the Xi'an Urban/Rural Construction Committee , Xi'an University of Architecture and Technology, WWF UK and Joanneum Research, Austria (also a WG2 member of the COST ACTION).

II.C. Self evaluation

Indicate in no more than 1 page what, in the opinion of the MC, were the main successes, drawbacks (if any) and the key difficulties encountered (if any).

The Action is now approaching its final stages. Work is concentrating on producing the final deliverables which will be centered around the production of the Atlas. Each country is working on its own section and progress will be assessed at the next meeting in Poland on 8th, 9th May 2008.

Two successful short term scientific missions have been carried out from Portugal to Cardiff in March 2008.

A number of case studies have been completed and presented by partners since the last meeting.

Preparation is underway for the conference later in the year in Munich. Abstracts have been received and progress will be assessed during the Poland meeting.

The Welsh School of Architecture ran a student competition within Cardiff University. The two best projects were selected and the student winners will be invited to exhibit their project posters at the Munich conference later this year.