

Annex C: Monitoring Progress Report

## **COST**

Domain Committee “Transport and Urban Development”

### **COST Action C23**

Strategies for a Low Carbon Built  
Environment

## **MONITORING PROGRESS REPORT**

***Period: from 9<sup>th</sup> June 2005  
to 31<sup>st</sup> August 2007***

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 C23** – *Strategies for a Low Carbon 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**

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*

<a href="#">Austria</a>	09/06/2005
<a href="#">Belgium</a>	09/06/2005
<a href="#">Cyprus</a>	12/09/2005
<a href="#">Denmark</a>	09/05/2005
<a href="#">Finland</a>	09/06/2005
<a href="#">Germany</a>	09/06/2005

<a href="#">Greece</a>	19/08/2005
<a href="#">Italy</a>	20/06/2005
<a href="#">Lithuania</a>	19/06/2006
<a href="#">Malta</a>	15/03/2006
<a href="#">Netherlands</a>	03/05/2005
<a href="#">Norway</a>	21/06/2005
<a href="#">Poland</a>	12/04/2006
<a href="#">Portugal</a>	05/09/2005
<a href="#">Serbia and Montenegro</a>	21/11/2005
<a href="#">Slovenia</a>	30/08/2005
<a href="#">Spain</a>	21/09/2005
<a href="#">Switzerland</a>	10/01/2006
<a href="#">United Kingdom</a>	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>
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**I.B. Management Committee member list**

Austria	<a href="#">Mr. Konrad WILDENAUER</a>
Austria	<a href="#">Professor Gerald LEINDECKER</a>
Belgium	<a href="#">Professor Marc FRERE</a>
Cyprus	<a href="#">Dr. PETROS LAPITHIS</a>
Denmark	<a href="#">Mr. Torben DAHL</a>
Denmark	<a href="#">Dr. Morten ELLE</a>
Finland	<a href="#">Mr. Kari OJALA</a>
Finland	<a href="#">Mr. Pekka LAHTI</a>
Germany	<a href="#">Professor Geralt SIEBERT</a>
Germany	<a href="#">Dr. Werner LANG</a>
Greece	<a href="#">- Demetris BOURIS</a>
Greece	<a href="#">Professor Christopher KORONEOS</a>
Italy	<a href="#">Dr. Rossano ALBATICI</a>
Italy	<a href="#">Antonio FRATTARI</a>
Lithuania	<a href="#">Mr. Juozas RAMANAUSKAS</a>

Lithuania (delegate)	Raimondas BLIUDZIUS (full details not available)
Malta	<a href="#">Dr. Vincent BUHAGIAR</a>
Netherlands	<a href="#">Mr. René WANSDRONK</a>
Norway	<a href="#">Professor Anne Grete HESTNES</a>
Norway	<a href="#">Professor Oyvind ASCHEHOUG</a>
Poland	<a href="#">Dr. Adam RYBKA</a>
Portugal	<a href="#">Professor Paulo PINHO</a>
Serbia	<a href="#">Professor Aleksandra KRSTIC -FURUNDZIC</a>
Slovenia	<a href="#">Dr. Marjana SIJANEC ZAVRL</a>
Spain	<a href="#">Professor FERNANDO RODRIGUEZ</a>
Switzerland	<a href="#">Dr. Veronique STEIN</a>
Switzerland	<a href="#">Mr. Willi HÜSLER</a>
United Kingdom	<a href="#">Professor Phillip John JONES</a>
United Kingdom	<a href="#">Dr. Chris TWEED</a>



### I.C. Overview activities and expenditures

#### 2006 Budget

Total Action Budget	70000
Remaining Action Commitment	2260

#### Meetings

Meeting Type	Date	Place	Cost	Total
Joint Management Committee/Working Group	12/01/2006	Porto (PT)	19698	
Joint Management Committee/Working Group	19/06/2006	Trondheim (NO)	25503	
Working Group	14/09/2006	london (GB)	3339	
Working Group	4/12/2006	trento (IT)	19200	
				<b>67740</b>

#### STSM

Beneficiary	Date	From	Cost	Total
				<b>0</b>

#### Workshops

Title	Date	Place	Cost	Total
				<b>0</b>

#### General Support Grants

Title	Date		Cost	Total
				<b>0</b>

#### Schools

Title	Date	Place	Cost	Total
				<b>0</b>

**67 740**

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**2007 Budget (01 January 2007-30 June 2007)**

**Total Action Budget** 66 100  
**Remaining Action Commitment** 0

**Meetings**

Meeting Type	Date	Place	Cost	Total
Joint Management Committee/Working Group	01/02/2007	Athens (GR)	22801.03	
Joint Management Committee/Working Group	16/04/2007	Vienna(AT)	35591.29	
				<b>58 392</b>

**STSM**

Beneficiary	Date	From	To	Total
Vesna Kosoric	01/04/2007	Belgrade	CH	<b>2 500</b>

**Workshops**

Title	Date	Place	Cost	Total
Joint MC and WG	01/02/2007	Athens (GR)	3000	<b>0</b>
Joint MC and WG	16/04/2007	Vienna (AT)	600	
				<b>3 600</b>

**General Support Grants**

Title	Date		Cost	Total
Website	04/05/2007			<b>2 000</b>

**Schools**

Title	Date	Place	Cost	Total
				<b>0</b>

**66 492**

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

### **II.A. Results achieved during the period June 2005 to August 2007**

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.

The Action 'kicked off' 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 (Chris Tweed and Paulo Pinho).

Since May 2005 six meetings have been held:

- Cardiff, UK - 13<sup>th</sup> -14<sup>th</sup> October, 2005
- Porto, Portugal - 12<sup>th</sup> -13<sup>th</sup> January 2006
- Trondheim, Norway - 19<sup>th</sup> - 20<sup>th</sup> June 2006
- Trento, Italy - 4<sup>th</sup> – 5<sup>th</sup> December 2006
- Athens, Greece - 1<sup>st</sup> – 2<sup>nd</sup> February 2007
- Vienna, Austria - 16<sup>th</sup>, 17<sup>th</sup> and 18<sup>th</sup> April 2007

Generally, C23 holds MC and WG meetings in parallel to ensure maximum attendance and financial efficiency. There is also overlap between the WGs which is enhanced during combined meetings. A WG3 meeting was held in London on 14<sup>th</sup> September 2006 to discuss the April 2007 conference.

#### **Objectives**

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:

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### **Tasks**

WG1 and WG2 have been working towards the following tasks:

#### **1 Response to 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**

Preliminary information about the implementation of EPBD in 9 member states has been collected 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**

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. '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.

Case studies are being collected for:

- existing and new buildings ,
- urban infrastructure,
- cities.

For each case study type a template is provided to allow data to be organised and presented in a consistent manner. These will be published on the Icube website and also in the final output at the end of the Action.

The following information for each case study 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 case studies from at least 18 different 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.

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. Therefore case studies of cities are being collected in order to investigate 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 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.

***WG3 dissemination is discussed in Section II.B below.***

Key tasks for C23 have been agreed and work towards the final output progressing satisfactorily.

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 assists with the coordination of the Action. One short term scientific mission has already taken place by a young scientist from Serbia and another is planned for autumn 2007.

## **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 conference entitled 'Strategies for a low carbon urban built environment'. The papers 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 behavior and energy use: examples from metropolitan areas in Denmark and China - Peter Naess,
- 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 February 2008.

Towards the end of C23 guidelines will be produced to assist built environment professionals with procedures to ensure maximum consideration for low carbon are made for all built environment construction and renovation. These will focus on carbon reduction strategies identified and reviewed from WG1 and WG2 relating to new/existing buildings and urban infrastructure. It is proposed that the final output for the Action will combine the output from both WGs presenting the information on a country by country basis. This could produce a 'European Carbon Atlas' which will provide a picture of what Europe is like in relation to low carbon urban built environments at the different scales.

### **Conferences and Workshops**

The first C23 L-CUBE conference took place on Tuesday 17<sup>th</sup> and Wednesday 18<sup>th</sup> 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 as illustrated in the Programme as follows. 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. Information about the presenters can be found in the attached document c23speakerinfo 0407.pdf.

The programme of the conference was as follows:

**Tuesday 17th April 2007**

8.30 Registration and coffee

**9.00 Welcome and Presentation of C23 Action**

Phil Jones, Welsh School of Architecture, Cardiff University

**9.30 Keynote speaker 1: Bill Dunster,**

ZEDfactory Ltd. Practice specialising in Zero (fossil) Energy Development (ZED) buildings in the UK.

**10.15 Keynote speaker 2: Hermann Kaufmann**

Institute of building construction and design, Department timber construction, Technical University, Munich.

*11.00 Break*

**11.30 Keynote speaker 3: Ardeshir Mahdavi**

Director, Department of Building Physics and Building Ecology Vienna University of Technology.

**12.15 Keynote speaker 4: Karl Hoyer**

Professor and Research Director of the research programme Technology, Design & Environment,

*13.00 Lunch*

**14.00 Working Group 1 Session - New/existing buildings**

Chair and Introduction: Chris Tweed

**14.15 Christian Pöhn**

Head of laboratory for physics in construction

**14.45 Phil Roberts**

Deputy Chief Executive, Grwp Gwalia. Social Housing provider in Wales, UK.

*15.15 Break*

**15.45 Stéphanie Nourricier**

'Implementation of the EBPD in Belgium: Performances of the simplified method for primary energy consumption calculations'

**16.05 Eric Dumont**

'Integrated modelling of a dwelling and its heating system'

**16.25 Jørgen Munch-Andersen**

'Improving thermal insulation of concrete sandwich buildings'

**16.45 Rossano Albatici**

'Elements and strategies for sustainable interventions in the residential building sector: a case study'

17.15 Questions and close

**CONFERENCE DINNER IN EVENING**

**Wednesday 18th April 2007**

**9.00 C24 presentation - Hedzer van der Kooi**

'Analysis and Design of Innovative Systems for Low-EXergy in the Built Environment'

**9.15 C25 presentation – Helena Gervasio**

'Sustainability of Constructions: Integrated Approach to Life-time Structural Engineering'

**9.30 Working Group 2 Session - Urban Infrastructure**

Chair and Introduction: Paulo Pinho

**9.45 Juan Luis de las Rivas Sanz**

'TOD - transport oriented development - strategies: changing the planning model'

**10.15 Petter Naess**

'Residential location, travel behaviour and energy use: examples from metropolitan areas in Denmark and China.'

*10.45 Break*

**11.15 Christopher Koroneos**

Energy Production from Municipal Solid Waste – An LCA Approach'

**11.30 George Xydis**

'Exergy Analysis in Low Carbon Technologies – The case of Renewable Energy'

**11.45 Evanthia Nanaki**

'Environmental comparison of the use of biodiesel and gasoline for transportation- the case of Athens'.

**12.00 Willi Husler**

'Transportation politics in Zurich: two examples 1. "Das Fahrtenmodell" a new instrument to limit the number of car trips based on parking policy. 2. Modes of traffic: selective supply or arms race? Comparative studies in the outskirts of Zurich.'

**12.30 Jan Gorski**

'ZEITMOP concept - A polygeneration system for municipal clean energy demands'

*13.00 Lunch*

### 2.00 Excursion

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' during Spring 2008.

### Website

The Cost Action C23 L-CUBE website can be found at <http://www.lcube.eu.com>. The website has recently been upgraded and is now much more visually appealing and easy to navigate.

The website provides a location for collation of meeting minutes and other documents to allow for transfer of information between members. It also provides a mechanism for presenting the information that has collected by members of the Action to other interested stakeholders as it is publicly available. This website includes the sections:

- An introduction to L-CUBE,
- Management Committee - list of members and meeting venues, dates agendas, minutes and additional documents,
- Descriptions of WG1, WG2 and WG3 together with tasks and meeting venues, dates agendas, minutes and additional documents,
- Memorandum of Understanding,
- A list of the participants,
- 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)
- Link to the COST home page.

The website has had almost 9,000 page requests over the reporting period.

### Scientific and Technical Cooperation

*List briefly cooperation and contacts established with scientific institutions, with other research programmes (especially in the EU Framework programme), and with potential users.*

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.

### Transfer of results

*List briefly cooperation and contacts established with the Commission, with normalisation and standardisation bodies, with industry and operators.*

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'. Local end users will continue to be invited to meetings to make presentations and be involved in discussions.

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 2<sup>nd</sup> to June 1<sup>st</sup> 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.

An application by Mr Budimir Sudimac also from the Faculty of Architecture - University of Belgrade has been made for a STSM to investigate Solar shading devices and Daylight at Universitat Stuttgart, Fakultat 1 Architektur during October and November 2007.

#### **Contacts in the ERA**

*List the contacts, if any, with other activities in the Community R&D programmes, EUREKA, the European Science Foundation and other European cooperative research frameworks etc.*

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 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).*

Whilst analysing building and infrastructure 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.

Case studies of cities are therefore being collated in order to investigate what characteristics of cities are causing this 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 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.

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.

The membership of the Action continues to grow which is enriching the content of the discussions and outputs.

Presentations by end users during C23 meetings have provided stimulation for interesting and relevant discussions and debate. The publication of papers presented at the C23 conference in April in the international journal 'Indoor and Built Environment' will provide an opportunity for a wide range of strategies for low carbon urban built environments to be presented to a wider audience.