Let's Construct Europe's Future with Innovative Buildings and Infrastructures

ECTP-E2BA Conference
4-5 October 2011, Warsaw

Construction and Europe’s Societal Challenges
Ger Maas

- ECTP Chairman
- ENCORD President
- Director of Strategy, Royal BAM Group
- Professor Eindhoven University of Technology Construction Engineering and Management
Europe 2020

EUROPE 2020
A European strategy for smart, sustainable and inclusive growth
Europe 2020

Smart growth – Innovation ("Innovation Union"), strengthen Research and Development, Education, Digital Society

Sustainable growth – Climate, Energy, Mobility and Competitiveness (20% less CO₂, 20% more renewable energy, 20% more energy efficiency)

Inclusive growth – Employment and Skills, Fighting Poverty, Social and Territorial Cohesion
Competitiveness of construction sector
Competitiveness of construction sector

Challenges to address and to adapt

- Climate change
- Demographic change
- Energy supply & security
- Resource availability
- Food shortages
- Security
- Environmental concerns

Demands for convenience

- Low maintenance
- Automation
- Flexibility
- Health improving features
- Optimal environmental integration
Answers of the European Construction Sector

Meeting Client Requirements

Becoming Sustainable

Transformation of the Construction Sector
Answers of the European Construction Sector

ECTP Strategic Research Agenda SRA-IAP 2007-2013

▷ New Technologies, Concepts and High-tech Materials for Efficient and Clean Buildings
▷ Reduce Environmental and Man-made Impacts of Built Environment and Cities
▷ Sustainable Management of Transports and Utilities Networks
▷ A Living Cultural Heritage
▷ Improve Health, Safety & Security in Construction Sector
▷ Healthy, Safe Accessible and Stimulating Indoor Environments
▷ Innovative Use of Underground Space
▷ New Integrated Processes for the Construction Sector
▷ High Added Value Construction Materials
Answers of the European Construction Sector

European Network of Construction Companies for Research and Development

www.encord.org
ENCORD R&D&I thematic groups

Key issues facing the construction sector today
ICT for Virtual Construction
Eco-efficient construction
Mastering Greenhouse Gas Emissions
Infrastructure
Health & Safety (H&S)
Lean construction
Knowledge Management (KM)
Ageing Society
Implementation of Research Activities
The Challenge

**Figure 2. Estimated Greenhouse Gas Mitigation Potential in 2030 (US$/t CO$_2$e), by Sector**

Cost categories*, US$/t CO$_2$eq.

- <20
- <0
- 0–20
- 20–100

Source: Urge-Vorsatz and Novikova 2008
Energy Efficient Buildings
Towards 2020

Current trend towards 20-20-20 objectives in 2020

Potential of Cost-Efficient Energy Savings
User is key for impact

Reduction of energy bill!

Need help?
Call 0845 000 123
Mon - Fri: 7am - 9pm
Saturday: 9am - 6pm
Sunday: 9am - 4pm
Please have your customer reference number when you call us.

HOW PRICES WILL INCREASE

Average fuel bill 2004

£580

Average fuel bill 2019

£5199

Source: uSwitch

Bill due: 31st March

Your Gas & Electricity Bill

Total: £183.68

1. Energy Supplier
Mrs J Jones,
109 Clear Street,
London,
SW1 1AB

2. Customer Reference Number 1234 5678 1234

3. Bill date: 31st March

4. Billing Summary
Bill period: 01 January to 31st March
Your last bill £193.32
Payment received on 29th December £193.32 credit
Balance before this bill £0.00
Energy you've used (estimated reading) £270.17
VAT at 5% £13.51
Total £283.68

9. Additional information
Any information your supplier wants to show you will be placed here, including details of special offers or online account management.

10. Electricity Supplier Number

We must receive your payment by 31st July
Energy Efficient Buildings

- A major world-wide challenge
  - Buildings = major potential for energy/carbon savings
  - today more than 40% of final energy use
  - and around 30% of GHG emissions

- Issues
  - Replacement rate is very small (1 to 2% per year)
  - Retrofit the existing building stock
  - Even new buildings are far from being all energy efficient
  - Develop future positive energy buildings/districts
  - Integrate new technologies (including RE technologies)
  - Many experiments are taking place but actual impacts are still limited
  - Innovation by research is strongly needed
Energy Efficient Buildings

EeB PPP is the first wave of a Long Term Strategy

- Wave 1: i.e. Retrofitting and reduction of energy use
- Wave 2: i.e. Energy neutral buildings/districts
- Wave 3: i.e. Energy positive buildings/districts

EeB PPP 2010-13

Continuous Research
Nijmegen – Waalfront, Waalsprong

Energyneutral 2050
Barriers and R&D

- Construction professionals do not consider/understand end-users’ needs, expectations, and behavior in their decision making processes when initiating and designing energy neutrality (*focus on researches from an environmental psychology view of point*).

- Not all current technologies are proven and reliable in terms of indoor air quality, health, and comfort (*research should focus on designing energy neutral districts from a life-scenario view point*).

- Energy neutrality often conflicts with comfort (*more focus on sustainable energy supply studies than strictly energy demand reduction*).

- Energy neutrality is currently not cost-efficient at all (*focus on finding efficient financial approaches*).
reFINE – Future Infrastructure Networks of Europe

The challenges of Europe’s Infrastructure Networks
- Massive size of existing networks and key importance for EU economy / society
- Affordability of new investments and of maintenance
- New models required by Transport de-carbonisation, Climate Change and Sustainability

EU Transports 2050 strategy
- White Paper - Roadmap to a single EU transport area (march 2011)
- Strategic Transport Technology Plan (STTP) → end 2011
- Towards a Transport theme in Horizon 2020 Framework Programme
reFINE – Future Infrastructure Networks of Europe

▷ reFINE is an initiative of ECTP,
  - Industry led, supported by major EU stakeholders

▷ reFINE documents
  - Vision document (March 2011)
  - Draft Strategic Agenda .... Today in Warsaw

▷ Contacts with the Commission
  - DG MOVE
  - DG RESEARCH

▷ Relations with ETPs
  - ERRAC (rail), ERTRAC (roads), WATERBORNE (maritime),
    WSSTP (water), SUSCHEM (chemical), ESTEP (steel), ETPIS
    (industrial safety), ARTEMIS (electronics)
reFINE – a new approach to infrastructure

- Infrastructure – up to now
  - ‘Background’ position in modal transport
  - A ‘sub-contractor’ role granted to Construction sector

- Infrastructure – now and in the future
  - A key component of EU transport area
  - At the crossroads of all transport modes
  - A major source of costs that must be optimised
    (new infrastructure and maintenance)

- Growing responsibility of Construction Sector:
  to build / operate / manage infrastructure
Health and Ageing Society
From now to 2035

- Increase of retired persons by 52%
- Increase of the oldest old by 78%
- Workforce has aged and shrunk by 4%
- Support for older people cannot be met by manpower alone

- Provide support at home: aging-in-place
- By ICT and the build environment
## Challenges

<table>
<thead>
<tr>
<th>Activities of Daily Living¹</th>
<th>Health profiles²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Cancer</td>
</tr>
<tr>
<td></td>
<td>2. Depression</td>
</tr>
<tr>
<td></td>
<td>3. Arthritis</td>
</tr>
<tr>
<td></td>
<td>4. COPD, diabetes</td>
</tr>
<tr>
<td></td>
<td>5. Heart diseases</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Listening</th>
<th>can be performed</th>
<th>can be performed</th>
<th>cannot be performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sleeping</td>
<td></td>
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<td></td>
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<tr>
<td>Reading and watching</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparing meals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social activities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eating and drinking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activities behind a desk</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>House hold</td>
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<tr>
<td>Provision care</td>
<td></td>
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<td></td>
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<tr>
<td>Physical activities</td>
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</tr>
</tbody>
</table>

Likert-scale: can be performed | | | cannot be performed
Virtual Construction

- Construction sector is the largest industrial sector with approx. 10% of the entire European GDP.
- Changes brought around by virtual planning, production and operation will have the largest economical impact across the whole European construction market:
  - Do sustainable analysis and calculations over the entire product life cycle at a very early stage.
  - Simulate and optimize production process and project operation & maintenance phase.
Virtual Construction

BIM = Building Information Modelling
Virtual Construction - Challenges

- Interoperability
- Process Integration from design to operation and maintenance
- Life Cycle Analysis / Simulation
- Behavioral Change in organizations / companies
Cultural Heritage
£1 spent on construction output generates directly £2.84 in total economic activity (mainly locally)
Impact on economic activity

- Construction is one of the best ways of stimulating economic activity
- The construction industry is a driver of growth in other sectors due to its heavy reliance on an extended and varied supply chain.
- Low level of imports, so stimulus spending stays within national economies.

Contribution to employment

Benefits of investment

- Not only immediate economic production, also investment rather than consumption, which provides significant long-term economic and social benefits.
The Construction Sector in EU27

Share of GDP

- Agriculture: 69.0%
- Services: 28.8%
- Construction: 10.4%
- Other Industry: 2.2%

18.4%
The Construction Sector in EU27

▷ The biggest industrial employer
  - 10.4% of GDP and 49.2% of Gross Fixed Capital Formation (FIEC, 2008)
  - 30% of industrial employment, 7.6% of total employment (16.3 million operatives)
  - 3 millions enterprises
    (95% SMEs with <20 workers, local markets, low innovative)

▷ A large influence on the whole economy
  - 48.9 millions workers depending on Construction
  - The buildings/infrastructure supplied by the Construction sector serve a lot of other industries and services
Construction and Economy

Construction production index (2005=100)
The reasons we need the ECTP
The reasons we need ECTP

- around 200 projects identified in 2006 after 4 years FP6
- 315 EC or Transnational Projects launched since 2007

Tentative overview of FP7 and other EC projects (2010-2015)
Version: September 2011
(ONGOING PROJECTS OR PROJECTS UNDER CONTRACT NEGOTIATIONS)

<table>
<thead>
<tr>
<th>Call identifier</th>
<th>Acronym – Title</th>
<th>Coordinator</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>3ENCULT – Efficient Energy for EU Cultural Heritage</td>
<td>EURAC (IT)</td>
</tr>
<tr>
<td>2.</td>
<td>AEROCOINS – Aerogel-Based Composite/Hybrid Nanomaterials for Cost-Effective Building Super-Insulation Systems</td>
<td>Ternaesa</td>
</tr>
<tr>
<td>3.</td>
<td>BEEM-UP – Building Energy Efficiency for Massive market Uptake</td>
<td>Arcosera (ES)</td>
</tr>
<tr>
<td>5.</td>
<td>COOL-COVERINGS - Development of a novel and cost-effective range of nanotech improved coatings to substantially improve NIR (Near Infrared Reflective) properties of the building envelope</td>
<td>Keradco group (ES)</td>
</tr>
<tr>
<td>6.</td>
<td>E2ReBuild – Industrialised energy efficient retrofitting of resident buildings in cold climates</td>
<td>NCC 48 (GR)</td>
</tr>
<tr>
<td>7.</td>
<td>EINSTEIN - Effective Integration of Seasonal Thermal Energy storage systems IN existing buildings</td>
<td>Termaesa (ES)</td>
</tr>
</tbody>
</table>
Results of first EeB Calls

<table>
<thead>
<tr>
<th></th>
<th>July 2009</th>
<th>July 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Success rate</td>
<td>28%</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>17 funded of 60</td>
<td>24 funded of 120</td>
</tr>
<tr>
<td>Share by Org. Type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Higher Education</td>
<td>18%</td>
<td>15%</td>
</tr>
<tr>
<td>- Private for Profit</td>
<td>48%</td>
<td>53%</td>
</tr>
<tr>
<td>- Research Org.</td>
<td>26%</td>
<td>24%</td>
</tr>
<tr>
<td>Share of Funding of SMEs</td>
<td>24%</td>
<td>30%</td>
</tr>
<tr>
<td>Countries of funded partners</td>
<td>24</td>
<td>26</td>
</tr>
</tbody>
</table>
# The program of the conference

## Tuesday 04 October 2011

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>08.00-09.00</td>
<td>Registration</td>
</tr>
<tr>
<td>09.00-10.30</td>
<td><strong>Opening Welcome Session:</strong> Welcome addresses by Polish Authorities and EC Representatives - Conference overview</td>
</tr>
<tr>
<td>10.30-11.00</td>
<td>Coffee Break</td>
</tr>
<tr>
<td>11.00-12.30</td>
<td><strong>Opening Keynote Session:</strong> Overview presentations illustrating the scope of the Conference</td>
</tr>
<tr>
<td>12.30-13.30</td>
<td>Lunch</td>
</tr>
<tr>
<td>13.30-15.00</td>
<td>Parallel Session 1A: Infrastructure Networks for a Sustainable Europe                           Parallel Session 2A: Cultural Heritage                        Parallel Session 3A: Energy-efficient Buildings and Districts: Project Review</td>
</tr>
<tr>
<td>15.00-15.30</td>
<td>Coffee Break</td>
</tr>
<tr>
<td>15.30-17.00</td>
<td>Parallel Session 1B: Infrastructure Networks for a Sustainable Europe                           Parallel Session 2B: Processes                                   Parallel Session 3B: Energy-efficient Buildings and Districts: Project Review</td>
</tr>
<tr>
<td>13.30-19.00</td>
<td>Afternoon Working Sessions (13.30-17.00: EeB Brokering / 17.15-19.00: ICT4E2B Forum / 17.15-19.00: Barriers to Innovation)</td>
</tr>
<tr>
<td>20.00-22.30</td>
<td>Conference Dinner (optional) at Restaurant Krokodyl</td>
</tr>
</tbody>
</table>

## Wednesday 05 October 2011

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>09.00-10.30</td>
<td>Parallel Session 1C: Infrastructure Networks for a Sustainable Europe                           Parallel Session 2C: Eracobuild: National Programmes and Transnational Projects  Parallel Session 3C: Energy-efficient Buildings and Districts: The role of ICT</td>
</tr>
<tr>
<td>10.30-11.00</td>
<td>Coffee Break</td>
</tr>
<tr>
<td>11.00-12.30</td>
<td>Parallel Session 1D: Ageing and Construction                                                        Parallel Session 2D: Eracobuild: National Programmes and Transnational Projects  Parallel Session 3D: Energy-efficient Buildings and Districts: Roadmapping</td>
</tr>
<tr>
<td>09.00-12.30</td>
<td>Morning Working Sessions (09.00-10.30: SMEs in European RDI / 11.00-12.30: reFINE meeting)</td>
</tr>
<tr>
<td>12.30-13.30</td>
<td>Lunch</td>
</tr>
<tr>
<td>13.30-15.00</td>
<td>Concluding Session and Closing</td>
</tr>
<tr>
<td>15.00-15.30</td>
<td>Coffee Break</td>
</tr>
<tr>
<td>15.30-17.00</td>
<td>ECTP General Assembly</td>
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</tbody>
</table>
Construction and Europe’s Societal Challenges

The essence towards a positive living environment for Society

- £1 spent on *construction* output generates directly **£2.84 in total economic activity** in this large sector mainly locally and through SME’s.
- **Energy** reduction of the existing stock of 200 million houses, **Ageing Society** and obsolete **Infrastructure** are the core issues for the refurbishment of our living environment.
- Enable **Construction Industry** to move towards responsibility for performance by the introduction of new tools (e.g. Virtual Construction or Lean Construction Management) as well as respective legislation.
- **Innovation** by research and integration of inputs from other sectors is essential through setting up appropriate tools (such as PPPs / European Innovation Partnerships) in FP8
Let's Construct Europe's Future with Innovative Buildings and Infrastructures

ECTP-E2BA Conference
4-5 October 2011, Warsaw

Construction to serve society