Industry needs and research priority topics in the construction sector

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With a yearly turnover around € 1.2 trillion, the European Construction Sector, including its extended value chain (e.g. materials & equipment manufacturers, construction & service companies), is the largest European single activity (10% of GDP) & the biggest industrial employer (14.6 million direct jobs).
The European Construction Technology Platform (ECTP) gathers around 180 member-organizations from the Construction sector and other sectors from the whole supply chain of the Built Environment.

Its main mission is to develop new R&D&I strategies to improve competitiveness, meet societal needs & take up environmental challenges.

The Built Environment is mainly constituted by buildings, infrastructures & cultural landscapes. It can also be considered as a set of natural, physical, economic, human, social and cultural capitals.

The Built Environment is a place of tightly interconnected private & public infrastructure. Its composition & dynamic are very complex, since it offers & is associated to a lot of various services which support our day-to-day life.

The Built Environment serves a lot of industries and services (transport...). It impacts therefore the performance of many sectors.

The Built Environment is our major living environment; this is the place (homes, offices, transport infrastructures, cultural places, etc.) where we spent more than 80% of our time. The quality of the Built Environment therefore directly impacts the quality of our life.

Last but not least, paramount challenges such as energy, climate change, efficiency & more generally sustainability prove to become of utmost importance for the Built Environment and very often need to be tackled within an integrated approach.
ECTP Membership

➢ >180 Members
  • Industry: 35%
    • Large Companies: 18% (including ENCORD Members)
  • SMEs: 17%
  • RTOs: 28%
  • Universities: 22%
  • Miscellaneous: 15%

➢ 26 Countries
ECTP Mission

Developing and promoting a built environment favouring health & autonomy

3 major ECTP Initiatives

- Environment and Life Cycle Assessments
- Health and Safety in Construction
- Indoor Environment Quality
- Water Infrastructure for a Resource Efficient Europe
- Ethics and Community Engagement: Ethics as Business Case
- Innovation by Materials and Technologies: Cultural Heritage and Resource Efficiency

Energy Efficient Buildings

Turning energy efficiency into a sustainable business

Active Ageing in the Built Environment

Developing and promoting a built environment favouring health & autonomy

Research for Future Infrastructures in Europe

Building up infrastructure networks for a sustainable Europe
It would be great if (for example)...

Smart systems and control could allow energy usage optimization whilst guaranteeing optimal comfort, a healthy environment and numerous other services (security, assistance to elderly people...)

Existing buildings could have high insulating envelopes to reduce energy use much below 50 kWh/m²/year while achieving thermal comfort

Buildings could satisfy their own energy needs or even contribute excess power to the community (zero/positive energy buildings)

Most of this could be easily transferable to our cultural heritage buildings and districts

Renewable and non polluting energy sources could be easily integrated

Equipment could be operated at optimal energy performance level (lighting, HVAC...)

Users could change their behavior towards a reasoned usage of energy and being proactive
## Joint Technology Initiatives
- Innovative Medicines (IMI)
- Clean Sky
- Single European Sky ATM Research (SESAR)
- Fuel Cells and Hydrogen (FCH)
- Electronic Components and Systems (ECSEL - old ARTEMIS + ENIAC)

**New:**
- Bio-based Industries (BBI)

## Contractual PPPs
- Factory of the Future (FoF)

**Highlighted:**
- Energy-efficient Buildings (EeB)
- Green Vehicles (EGVI)
- Future internet (5G)

**New:**
- Sustainable Process Industry (SPIRE)
- Robotics
- Photonics
- High Performance Computing
A European Roadmap for Energy Efficient Buildings

Key Research Areas

- Technologies for acceleration of building stock renovation
- Interactive and sustainable buildings embedded at district and city scale
- Ensuring energy performance during service life
A European Roadmap for Energy Efficient Buildings

A value chain & challenge based approach

Design → Structure → Envelope → Energy equipment → Construction process → Energy Performance → End of life

Design → Technology building blocks → Construction process → Energy performance monitoring and management → End of life

Cross-cutting

Roadmap 2014-2020
## A European Roadmap for Energy Efficient Buildings

### Priorities

<table>
<thead>
<tr>
<th>Core area</th>
<th>Priority</th>
<th>Short Term (2014-16)</th>
<th>Medium term (2017-18)</th>
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<tbody>
<tr>
<td><strong>Design</strong></td>
<td>Integrated (holistic) design</td>
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<td>Tools to disclose existing knowledge and technologies (e.g. ICT BIM)</td>
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<td><strong>Structure</strong></td>
<td>Sustainability, adaptability and affordability of structures</td>
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<td><strong>Envelope (incl. finishes)</strong></td>
<td>Energy and environmental performance of the full envelope</td>
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<td></td>
<td>Prefabrication</td>
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<td></td>
<td>Multifunctional and adaptive components, surfaces and finishes</td>
<td>×</td>
<td>×</td>
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<td><strong>Energy equipment</strong></td>
<td>Thermal storage</td>
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<td>Distributed/decentralised energy generation on a district level</td>
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<td>Advanced heating and cooling, domestic hot water including RES &amp; heat recovery</td>
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<td><strong>Construction process</strong></td>
<td>ICT aided construction</td>
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<td></td>
<td>Improving delivered energy performance</td>
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<td>Automated Construction Tools</td>
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<td><strong>Performance monitoring</strong></td>
<td>ICT systems interoperability</td>
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<td>Open data standards</td>
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<td>Prediction = reality (incl. occupancy modelling)</td>
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<td><strong>End of Life</strong></td>
<td>Innovative solutions and decision-support on renovation or new building</td>
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More than 120 Projects so far supported by the EC and Industry through PPP EeB in FP7 (2010-2013 calls) & H2020
Current Achievements

- **Energy and CO₂ Savings**
  - Average reduction in energy use: 34 and 32%
- **Demonstrators**
  - An average of 2.8 demo sites per project
- **Dissemination**
  - 10 training courses or workshops per project
  - Over 70,000 end-users engaged
- **Innovation**
  - An average of 4.9 innovations per project
  - An average of 1 patent per project
- **Standardization**
  - 17% of the overall project portfolio is undertaking standardization activities while an additional 40% has planned standardisation activities as key component of their projects.
MORE INFORMATION

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If Transport Infra does not change

- Construction and maintenance costs to increase beyond control from sustainability requirements
- Quality of services will become more difficult to ensure
- Traffic congestion will continue to grow
- Failing infrastructure will not cope with climate change
- Deteriorating infrastructure will jeopardize competitiveness
- New transport technologies will fail to develop because of inadequate / insufficient infrastructure
- Environmental impact of infrastructure will become dramatic
  - Consumption of land, energy, raw materials
  - Nuisances (noise, vibrations, pollution of air and ground water)
  - Waste generation
The reFINE Pillars

- **Urban Mobility**: To provide continuous and safe mobility for a high quality of life in sustainable European cities.

- **Multimodal Hubs**: To support EU social and territorial cohesion in a sustainable way.

- **Long Distance Corridors**: To support an integrated and efficient transport system for competitive European economy.
Strategic Targets & Expected Impacts

- To provide continuous, efficient and reliable quality of service with minimum environmental impact over their entire life cycle

- To ensure smart and resilient services throughout climate change, natural and man-made hazards

- To optimise and manage maintenance / upgrade so as to preserve the quality of life for the future generations of European citizens
### Strategic Targets & Expected Impacts

**3 Pillars**

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<th>Multi Modal Hubs</th>
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**3 Challenges**

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<th>Smart</th>
<th>Low Cost</th>
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- **Green**
  - -30% CO2
- **Smart**
  - +30% Capacity
- **Low Cost**
  - -30% Ownership Cost
RA1: concepts for generation of new HLSI MH

*ST: Low-intrusive construction methods
*ST: Service life extension
*MT: Back analysis of newly constructed MH
*MT: Concepts and innovative scenarios
*LT: Guidelines
Why ECTP “Active Ageing and Built Environment”?

- Support **active and healthy aging (AHA)** – participation, empowerment, security and health to increase quality of life and independence
- Because the **physical environment is a key factor for shaping AHA** and increase healthy life years (holistically across the life course!)
- Because we have solutions and knowledge, but lack **investment, innovation and scale** -> **construction sector pivotal for up-scaling**
- By **contributing to the European Innovation Partnership on Active and Healthy Ageing (EIP-AHA)**, linking researchers and practitioners from construction, ICT, the ageing disciplines, architecture, urban planning and health
- A major task for the construction and ICT sectors to lead and implement **the upgrade of the European building stock**
  - with an estimated 70-90% of the homes not ready to support active aging and independent living
  - current renovation and replacement rates below 3%
1. To understand the **real power and real size of the market** for age-friendly home (AFH) renovations today, and to **develop tools** to predict future changes in ageing society housing needs

2. To explore **tools, methods and metrics to evaluate AFH** and provide an evidence base regarding empowerment and participation; **improved materials, products, services and processes**

3. **To define how age-friendly home renovations can be supplied in a cost-efficient and user-centered way** (new partnerships), and how this affects current value chains in the construction and ICT sectors

4. To agree upon **new building standards** that consider the longer term social benefits of age-friendly design, and to develop **loan and financing schemes for older home owners**

5. To link with **ongoing social science actions** and understand how to address older home owners as active place makers and “prosumers”
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Thanks for your attention