Promoting Innovation for Energy Efficient Buildings and Districts

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* The Energy Efficient Buildings Association (E2BA) & the European Construction Technology Platform (ECTP) gather more than 200 Member-Organisations

Horizon 2020
Brussels, 24 September 2013
Relevance of (existing) buildings

• The construction sector is the largest European single activity and industrial employer; it is highly fragmented with many micro or small enterprises; the turnover felt significantly during the crisis and has not yet recovered
• The built environment affects the life and work of all EU-citizens
• Buildings use 40% of total EU energy consumption and generates 1/3 of GHG in Europe
• Investments in improved energy efficiency in buildings could generate an additional 2-3.5 million jobs in Europe and the United States alone
From a project to a programme logic

EeB PPP as first wave of a Long Term Strategy

Years 01 02 03 04 05 06 07 08 09 10
Wave 1
EeB PPP 2010-13
Wave 2
Wave 3
Continuous Research

i.e. Retrofitting and reduction of energy use
i.e. Energy neutral buildings/districts
i.e. Energy positive buildings/districts

[Diagram with years 2010-2013 and waves 1 to 3, showing continuous research and energy efficient building projects]
A working R&D PPP within FP7

More than 100 projects so far supported by the EC and Industry

ICT integration for effective energy management and decision making from buildings to neighborhoods and cities

Fostering the development of new technologies and their integration in buildings and districts

€ 500 million engaged by FP7 from 2010 to 2013

Large scale demonstration of most promising solutions and their contribution to future smart cities

ICT

NMP

ENERGY

ENVIRONMENT

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Involving all critical stakeholders along the value chain

Large Industry (25%)
SMEs (25%)
Academia & RTOs (40%)
End users, owners...

>350 organisations participating in projects and showing that industry is not doing ‘business as usual’

An open and transparent approach:
70% of budget going to participants outside the Association
EeB PPP Project Review
issued every year
Development of new technologies

- Multifunctional and nanotechnology supported materials/products
- Lower energy consumption and GHG emissions
- Lower embodied energy and better durability
- Safe, healthy and comfortable
- Easier installation and maintenance
- Optimisation of material combinations
- Measurable/controlable products
- Bio-based products
- Sustainable, Innovative and Energy-Efficient Concrete
- Integration of wastes
- Recycling
- Textile Membranes, Plasters & Coatings for Retrofitting
- Integrated Air Quality Sensors Tools to Improve Comfort
- Operational Guidance for Life Cycle Assessment Studies

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Integration and demonstration of technologies for energy efficiency

New Processes and Business models
- Economic, Organisational & Social Innovation
- Business Performance-Based Models
- Interaction with Real Flagship Projects

Building Interaction & Integration with Energy Networks at District Level
- Micro-CHP & SOFC
- Waste Solutions
- Thermo Chemical Storage
- External Insulation
- Renewable Energies
- Matching Supply & Demand
- Integrated Concept of Interconnectivity

Building Retrofiting
- Systemic Renovation Packages
- Prefabricated Elements
- Integration Supervision & Evaluation
- SME Friendly Procedures for selecting Best Solutions

Demonstration
- DEMONSTRATION
  - 10 Projects
  - 44 Demo Sites: 600 000 m²
  - User Engagement: 5000 citizens
  - 10 000 tCO₂ avoided

  17 full scale sites for deep retrofitting: >75% energy saving
  14 sites for new buildings: low and near-zero energy
  13 districts showing between 35 & 85% energy saving

Cultural Heritage
- Solutions for Specific Issues
  - Guidelines/Tools for Analysis & Design

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ICT for energy-efficient buildings

Energy Management
- Platforms for Public Authorities
- Decision Support Systems
- Predicting Energy Demand (region, city, operator, household)
- Innovative use of acoustics

Building Information Modelling (BIM)
- Integrated Design
- Responsive Monitoring
- Able to Learn Systems

Sensor and Appliances Networks
- Powering Sensors
- Fault Detection
- Energy Management
- Low Power Units
- Wireless Technology
- Adaptive Technology
- Airports, Metros, Campus…

Smart Cities
- Tools (District Level) for Design, Intelligent Control, User Awareness, Decision Support, Energy Management

Common metrics
- Standardised Self Learning Architecture

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1.5.2. Technologies enabling Energy-efficient buildings

Reducing energy consumption and CO₂ emissions by the development and deployment of sustainable construction technologies, implementation and replication of measures for an increased uptake of energy-efficient systems and materials in new, renovated and retrofitted buildings. Life-cycle considerations and the growing importance of design-build-operate concepts will be key in addressing the challenge of a transition to nearly zero energy buildings in Europe by 2020 and the realisation of energy-efficient districts through the engagement with the wide stakeholder community.

1.5.3. Sustainable and low-carbon technologies in energy-intensive process industries

Increasing the competitiveness of process industries, such as chemical, pulp and paper, glass, or non-ferrous metals and steel by drastically improving resource and energy efficiencies and...
From COM(2013) 494 final (July 10, 2013)
« Public-private partnerships in Horizon 2020: a powerful tool to deliver on innovation and growth in Europe:
• Complementing the JTIs, the Commission in FP7 also engaged in structured partnerships with the private sector to seek direct input into the preparation of the work programmes in areas which were defined upfront and which are of great industrial relevance.
• Contractual public-private partnerships are being considered in the following areas:
  • Factories of the Future
  • Energy-efficient Buildings
  • Green Vehicles
  • Future Internet
  • Sustainable Process Industry
  • Robotics
  • Photonics
  • High Performance Computing
From an end-use driven approach...
...to a value chain and «challenge based» approach

PPP Energy-efficient Buildings
“Towards the creation of a high-tech building industry. Turning energy efficiency into sustainable business”
Research & Innovation Roadmap 2014-20

12th June 2013

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Roadmap 2014-2020
General objectives

• Develop technologies and solutions enabling to speed up the reduction in energy use and GHG emission in line with the 2020 goals, e.g. through a higher renovation rate of the building stock at lower cost and to meet regulatory needs;
• Develop energy efficiency solutions in order to turn the building industry into a knowledge-driven sustainable business, with higher productivity and higher-skilled employees;
• Develop innovative and smart systemic approaches for green buildings and districts, helping to improve the competitiveness of EU building industry by providing cost-effective, user-friendly, healthy and safe products for smart cities.

This would ultimately create a solid foundation for continuous innovation in the building sector through sustainable partnerships.
Specific objectives

To develop, integrate and demonstrate **new technologies** in:

- **Innovative construction** e.g. building envelope, multi-target design, materials and pre-fabrication methods, approaches adapted to public buildings or commercial/private-housing ones;

- Systemic, cost-effective, mass-customised, high-performing, and minimally invasive **building-retrofitting solutions** integrating innovative energy equipment and storage, to multiply at least by 2.5 by 2020 the yearly energy efficient and high quality renovation rate with tangible benefits for users;

- **Interactive sustainable buildings** for energy neutrality/positivity in a block of buildings, for a further 15% reduction at district and city scale in energy and emissions by 2020;

- **Performance monitoring tools** to ensure energy efficiency during the service life, by providing the full performance predicted at the design phase and long-lasting quality to the end-user, in combination with durable components.
Specific objectives

- Technologies for acceleration of building stock renovation
- Interactive and sustainable buildings embedded at district and city scale
- Ensuring energy performance during service life
## The enabling role of ICT

### Application areas

- **Design**
- **Structure & envelope**
- **Energy equipment & systems**
- **Construction process**
- **Performance monitoring & management**
- **End of life**

### Integration

1. **New business models, processes & services**
2. **Integration of buildings systems**
3. **Integration with mobility, infrastructures, smart cities & citizens**
4. **Integration with grids & local energy systems**
5. **IT & communication infrastructures**
6. **Knowledge sharing, awareness, education & training**
Full synergy and complementarity with EIP on Smart Cities & Communities

**Smart Cities**

1. **Available technologies or their innovative combinations**
2. **R&D**
3. **Buildings or districts demo scale**
4. **Large Scale Deployment Projects (at City level)**
5. **Standards, Regulations, Procurement, ...**
6. **PPP**
7. **Novel solutions**
Conclusions

• The ambition is to drive the **creation of an innovative high-tech energy efficiency industry** extending the scope of the running EeB PPP beyond 2013 until 2020
  – To accelerate, to recover and to become globally competitive…
  – …through a focused set of RDI priorities
  – …with a strong industry commitment

• The PPP is a part of the whole EC strategy
  – With an envisaged **return on investment**
    • Speed up renovation rate up to a yearly 4%
    • Increase economic activity and mobilize investments in RDI
    • Shape a renewed skilled work force
    • Reduce energy needs by 50% and CO₂ emission by 80% by 2050 (ref. 1990)
    • Improve quality of life of EU citizens
  – Keeping **track of progress and impact**
Thanks for your attention

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