E2B presentation. Vilnius 24-25 April 2008

Energy Efficient Buildings Joint Technology Initiative
Message from C Lesniak DG RESEARCH

- E2B is the necessary tool to fight climate change and will even apply beyond the European borders
- It will contribute to the fulfilment of Kyoto and Bali goals
- E2B should be opened to all, built on the Artemis model
- E2B will set up a European agreement bringing fruitful synergies between major industrial partners belonging to ECTP and other national technology platforms
- Figures are well known, several nations have initiated national programs in this field, but we should speed up the process.

DG Research fully supports E2B JTI development
Summary

1. Being aware
2. The Big Challenge
3. E2B JTI
4. Roadmap 2008
5. Conclusion
1. Being aware

1.1 Questions

What will be the temperature on earth for my grand-children?

When shall we reach a "no-return" level of CO$_2$?

Will Greenland ice melt faster and faster?

Is peak-oil behind us?

Will our economic system survive?

What is at stake is the stability we have always taken for granted
The scientific community agrees on one point: All countries must drastically and rapidly reduce their CO$_2$ emissions. 

Doing so, Europe will also increase its energy independence.
1. Being aware
1.3 Targets of the SET plan

"Stabilizing energy consumption at the level of 1990 by 2050 and reducing CO₂ emissions by 60 to 80% implies the following targets for 2050:

- Double the present energy efficiency targets i.e. achieve a 40% improvement
- Expand the contribution from renewables to more than 1/3 of total primary energy
- Tend towards a zero-emission electrical sector
- Reduce emissions in the transportation sector by 40% while tending to zero emission houses within the residential sector"

(from Vision Paper for EU SET Plan, Nov 15th, 2007)
1. Being aware
1.4 Buildings

- Buildings use 40% of total EU energy consumption
- The built environment generates 1/3 of GHG in Europe
- Even new buildings are far from being all energy efficient
- Replacement rate is very small (1 to 2% per year)
- The renovation of the existing stock is a real challenge
- Many experiments are made but actual impacts are limited

We have a clear responsibility and objective:

to provide NOW solutions for new and existing buildings
at a very large scale
2. The Big Challenge

A huge challenge is thus in the hands of the European construction sector:
- It is of strategic and vital importance for our countries
- It should be seen at transnational level
- In a construction market with a fragmented organisation
- With existing Community instruments that are not adequate

But this challenge raises high hopes because it could:
- Significantly contribute to CO₂ reduction
- Solve market failures
- Provide competitive advantages to European companies
- Bring new knowledge, raise awareness of all
- Start a worldwide change

Business as usual is not an option
20th June 2007

ECTP High Level Group Meeting

ECTP High Level Group decides to fully support the preparation of a Joint Technology Initiative (JTI)
2. The Big Challenge

E2B JTI stands for: Energy Efficient Buildings Joint Technology Initiative

“The overall objective of E2B JTI is to deliver, implement and optimize building and district concepts that have the technical, economic and societal potential to drastically cut the energy consumption and reduce CO₂ emissions due to existing and new buildings at the overall scale of the European Union. E2B JTI will speed up research on key technologies and develop a competitive industry in the fields of energy efficiency processes, products and services, with the main purpose to reach the goals set forth for 2020 and 2050 to address climate change issues and contribute to improve EU energy independence thereby transforming this challenge into a business opportunity.”
2. The Big Challenge

What is a JTI?

JTI is a long-term, Europe-wide public-private partnership combining:

- Private sector investment (~50%)
- National and European public funding (~50%)

JTIs are:

- Very large scale research programs
- Driven by the industry
- Focused on clear technological and economic objectives

Six JTIs are on their way (Artemis, CleanSky, H2 JTI, IMI, ENIAC, GMES...)

The first two that were adopted in 2007 by EC are:

- Embedded Intelligence and systems (eur 2.7 Billion, 10 years)
- Innovative Medicines Initiative (eur 2 Billion, 10 years)
2. The Big Challenge

Why does EU need a JTI?

Because Energy Efficiency is a strategic but difficult matter

- We should achieve the 2050 goals while also satisfying the "20-20-20" goals for 2020
- Energy prices will rise very significantly
- A large scale coherent movement is needed for all countries
- Beyond technique, it encompasses social and economical aspects

To solve market failures

- Construction lives on fragmented markets and low technology
- Existing buildings are not taken as a major subject
- Available technologies still have a limited impact
- Renewable energies have a low market penetration
- We build like yesterday in a fast changing environment
3. E2B JTI

3.1 Main strategic objectives

- Boost research programs
  - Accelerate programs in energy saving, CO$_2$ reduction, use of renewable energies
  - Succeed in a faster integration of existing new technologies
  - Remove contractual and regulatory barriers

- Think BIG
  - Disseminate widely for a real impact
  - Create mass markets and decrease unit prices
  - Get a strong social significance

- Use sustainable ways
  - Use PPP approaches to ensure long-term commitment
  - Develop life-cycle analysis and global costing

This will be supported by an ambitious program of demonstrators
3. E2B JTI

3.2 Boost research (1)

A more efficient envelope:
- Improved materials (insulation, glazing, energy storage)
- Bioclimatic architecture (natural ventilation, solar radiation, color, vegetation and water…)
- Improve design, new concepts

Better equipment and systems:
- Highly efficient HVAC equipment
- More efficient electric appliances
- Improved monitoring
- Stronger systemic approach
3. E2B JTI
3.2 Boost research (1)

New concepts:
Hypergreen (J. Ferrier - Lafarge)
3. E2B JTI

3.2 Boost research (2)

Stronger integration of renewable energies
- Solar PV
- Solar thermal
- Wind turbines
- Biomass
- Geothermal....

New performance based commissioning

Change collective and individual behavior
- By harmonized EU regulations
- Promotion of EE by public sector
- Disseminate global costing, think long-term
- Improve individual behavior
3. E2B JTI

3.2 Boost research (2)

New designs: Offsite 2007 Event (UK)
3. E2B JTI
3.2 Boost research (2)

New designs: Green Office (Bouygues Immobilier)
3. E2B JTI
3.2 Boost research (2)

New designs: Acciona Solar, 0 emission building
3. E2B JTI

3.2 Boost research (3) : the Wave Concept

We should go fast, and during JTI duration, continuous on-going research supported by the JTI, will feed demonstration projects. With Design and Build lasting ~ 36 months and one year of operation for first feedback, 3 "waves" can be expected in a ten-year program.

Research, Demonstrate, Get Feedback
3. E2B JTI
3.3 Think Big: GeoClusters

**GeoClusters** are geographical areas with strong similarities in terms of:
- Climate
- Culture and behavior
- Construction typologies
- Economic systems
- Gross Domestic Product

About 8 potential GeoClusters have been identified. They are basically transnational.
3. E2B JTI
3.3 Think Big: Work at district level (1)

E2B also has the ambition to address the district level:
- With a holistic approach, at the scale of the challenge
- To consider interactions between buildings, networks, environment, and behaviour
- To address the proper scale for distributed energy production
- To reach a significant impact.
3. E2B JTI
3.3 Think Big: Work at district level (2)

E2B JTI foresees renovation programs:
- In the range of 10 000 to 50 000 sq.m
- Simultaneously coordinated in several countries
- Under the leadership of a general program management
- With clear objectives, performance based, to reach very low energy consumption, and when possible go positive
- Carefully monitored to provide valuable feedback
- Followed by appropriate corrective actions if needed

This would yield a considerable amount of knowledge and lead to a **Quantic Leap**
in terms of innovation and energy efficiency in renovation
3. E2B JTI
3.3 Think Big: An example
One program will focus on Social Housing and School Buildings.

Social Housing because:
- It represents **55 million dwellings** in EU
- It is generally well adapted to global packages and replication
- Poverty resulting from energy prices is a major risk
- Energy savings potential is huge

School and educational buildings because:
- It concerns **130 million young people** under 24 and more than 10 million teachers
- We address awareness of future generations
- It's in the hands of a public client
3. E2B JTI

3.4 Take sustainable ways

We have experienced PPP in France and PFI’s in UK. PPP are very powerful ways to introduce sustainability as a major design factor. Life-cycle models have been developed and optimisation is reached by whole life costing. With these data, construction elements are then selected for an optimum use, no longer for a minimum cost.

*Using does not mean owning...*
3. E2B JTI
3.4 Take sustainable ways

With PPP or PFI, **TIME** as a dimension comes back in construction
3. E2B JTI

3.5 Some deliverables

- From Research
  - Improved new materials and systems
  - Increased use of renewables
  - New, alternative designs, eco solutions
  - Better behavioral knowledge

- By thinking "BIG"
  - Exemplary Energy Efficient Districts and Cities
  - Reach ambitious overall goals at EU level
  - Raise people awareness

- From Sustainability
  - Expertise in life cycle analysis
  - Experience of global costing
  - Transformation of the construction sector
4. Roadmap **2008**

4.1 Action 1 = Build an organisation

- Create an Industrial Non Profit International Association (INPIA) (Belgian law)
- Get founding members together
- Formalize membership rules and financial contributions
- Build up constitutive elements of the INPIA
- Implement the necessary tools (collaborative workplace)
- Mobilize additional members

Status: **STARTED**

Time frame: **FIRST SEMESTER of 2008**
4. Roadmap **2008**

4.1 Action 1 = Build an organisation

- **General Assembly** (All Members)
- **Steering Committee** (Elected by GA)
- **Chairman and Vice Presidents** (Elected by SC)
- **Working Groups**
  - WG 01
  - WG 02
  - WG 03
  - WG n
4. Roadmap 2008

4.1 Action 1 = Build an organisation

- **WG1** Build up a vision, scope, research axes, and reference document(s).
- **WG2** Deals with legal, contractual and financial aspects. Defines the overall budget.
- **WG3** Organises contacts with Member States, prepares adapted programs (geoclusters)
- **WG4** Ensures all communications and disseminations
4. Roadmap **2008**

4.2 Action 2 = Develop the concepts

- Finalise and agree on an accurate definition of objectives
- Define boundaries and time frames
- Demonstrate the need for a JTI, set the overall ambition
- Detail and validate an action plan towards the Joint Undertaking
- Set up Working Groups
- Write down a more detailed, reference document

**Status:** STARTED

**Time frame:** **FIRST SEMESTER 2008**
4. Roadmap **2008**

4.3 Action 3 = Finalise the budget

- Typical Financing is EC = 1/6 MS = 1/3 Ind = 1/2
- Expected duration ~ 10 years
- Mobilisation of potential funds will be among the first INPIA tasks
- The expected budget range is **1,2 to 2,3 Billion €**
- Check potential funding by DG Research, but also DG TREN, DG INFSO, DG Environment and Member States and precise their commitment.

**Status** : TO START

**Time frame** : FIRST SEMESTER 2008
4. Roadmap 2008
4.4 Action 4 = Communicate

- Create adapted presentations
- Update the flyer
- Prepare the reference document
  - Status: STARTED
  - Time frame: FIRST TRIMESTER 2008
- Build up the calendar of formal contacts with EC representatives, Member States and Parliament members
- Prepare and maintain a web site
  - Status: STARTED
  - Time frame: FIRST SEMESTER 2008
4. Roadmap 2008

**European industry & Engineering leaders:**
- Acciona, Arcelor Mittal, ARUP, Bouygues, Cementos Molins, D’appolonia, EDF, FCC, Ferrovial, Hochtief, Inabensa, Isofoton, Keraben, Knauf, Lafarge, Maxit, Mostostal, OHL, Q-Cells, Royal BAM Group, St-Gobain, Uponor, Vinci

**Research organisations:**
- Aidico, Aimplas, Aitemin, Arup, BBRI, CEA-INES, Cidemco, Cimne, CSTB, CNR-ISAC, Dáppolonia, ECN, EURAC, EUREC, Fraunhofer, ICCL, ITB, NTUA, Sintef. Labein, TNO, TZUS Prague, VTT, ZAG

**SMEs**
- ACE, ASM, BIC, CCS, Conserela, CUR Bouw and Infra, EPIA, ESTIF, NTDA Energía, TSB Innovationsagentur, ZRMK

**Universities**

**Clients and Users**
- RICS
5. Conclusion

In less than a century, human genius has led mankind to unexpected heights in human and technical domains. But in the same time, a small part of mankind has:

- Forever consumed some major natural resources
- Altered the thermal equilibrium of the planet.

Human intelligence should now find efficient ways to:
Build sustainable development and solve the energy equation for more than 6 billion people

Energy Efficient Buildings are a part of the solution.
With E2B JTI, we hope to start the demonstration...
"We need to start working on changes on the scale of the problems we face"

(Bill McKibben, environmentalist)
Thank you for your attention

Web site:
http://www.construccion-idi.es/e2bjti/