



Project Acronyms and n°s:
BRITA in PuBs TREN/04/FP6EN/SO7.31038/503135
ECO-Culture TREN/04/FP6EN/SO7.30902/503079
DEMOHOUSE TREN/04/FP6EN/503186
SARA TREN/04/FP6EN/SO7.31838/503183



What are Eco-buildings and are they needed in the Seventh Framework Programme (FP7)?

Instrument : Integrated project
Thematic Priority : [6.1.3.2.1] [ECO-BUILDINGS]

A Discussion Document from the EU-FP 6 Eco-building Projects for Use in the Preparation of Calls in the Seventh Framework Programme

Experience period covered **from 2004 to 2007** Date: **April 2007**

Project coordinators: Revision:

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Disclaimer:

Bringing Retrofit Innovation to Application in Public Buildings – BRITA in PuBs,
ECO-CULTURE,
DEMOHOUSE and
SARA

have received funding from the EU 6th Framework Programme under the contracts:

TREN/04/FP6EN/S07.31038/503135

TREN/04/FP6EN/S07.31038/503079

TREN/04/FP6EN/S07.31038/503186

TREN/04/FP6EN/S07.31038/503183

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1 Introduction

1.1 Background

This discussion document has been prepared by the four Eco-building projects ongoing under the Sixth Framework Programme (FP6): , namely: BRITA-in-PuBs, Demohouse, Eco-culture and SARA (more information at: www.ecobuildings.info).

One of the tasks of the four projects is to further the awareness of Eco-buildings in general as well as contribute to the continuous development of Eco-buildings.

1.2 Context

This short report was written in order to document the importance of the European Commission (EC) DG TREN programme Eco-buildings. During the time of the preparation of the report the Commission is considering whether or not to include calls for Eco-buildings projects within the FP7 as there are voices within the EC that question the need for further Eco-buildings calls. This document aims to explain why there is a need for continuing the Eco-buildings programme. By way of example:

Q: Concerto projects (dealing with whole settlements linked to the same energy supply) include Eco-buildings. Therefore is there any need for a separate Eco-buildings call?

A: The scale of Eco-buildings projects can provide a more specific focus for buildings technology than CONCERTO and tend to be on a scale more accessible for the majority of public authorities than the very large CONCERTO consortia. Eco-buildings initiate solutions for single (existing) buildings without having to be used for complete settlements. The single building solution is mostly needed in the reality of renovation projects.

Q: If “Passive houses” have lower energy consumption should the focus be for Passive buildings rather than Eco-buildings?

A: The use the name passive house as synonym or even as higher form of eco-buildings is erroneous. Passive houses, often equally incorrectly called “houses without heating systems” are nearly always dwellings with generally low heating energy demands and mechanically ventilation system that is used for heating as well (warm air heating). Therefore passive houses are a subgroup or mainly a sub-technology of eco-buildings and it is important to show that eco-buildings can be realised with a broad variety of technologies. As lighting and cooling are major energy elements in most of the buildings, the focus on heating only (restricted to the use of air heating systems) – as done by the passive house approach – presents a too limited view on energy efficient building concepts. Eco-buildings with their holistic approach and without any restriction to a specific technology are still the right strategy to cover the whole building stock.

1.3 Document structure

The document begins by defining the current concept of “Eco-building” anticipating how this definition may change in the future. It then offers observations from the Eco-building projects are based on a brief SWOT-analysis of the demonstration project current experience. To conclude, recommendations concerning the use of Eco-buildings within FP7 are given.

We hope that the document will increase the focus on Eco-buildings with the FP7 and in general.

2 Definition of Eco-buildings

This section tries to define the term Eco-building, as a clear definition does not exist

Eco-buildings are defined by the EC as *a building concept that is expected to be the meeting point of short-term development and demonstration in order to support legislative and regulatory measures for energy efficiency and enhanced use of renewable energy solutions within the building sector, which goes beyond the Directive on the Energy Performance of Buildings.*

As the national requirements are different from country to country in the EU and are strengthened from time to time (e.g. in connection with the new Directive on the Energy Performance of Buildings), the definition of eco-buildings will have to be adapted. This definition includes the design approach adopted in what are known as Passive Houses¹ and also includes many other design approaches to address other situations.

The authors of the report have decided to use three different phases for defining the state of art: now (FP6), immediate future (FP7) and vision for 2020 (EU action plan)

2.1 Now (FP6)

2.1.1 State of the art

- Beyond national requirements – reduced energy consumptions + use of renewables:
 - Energy efficiency/bio-climatic/solar design considerations as standard architectural design requirement
 - High insulation and building tightness standards
 - Efficient installations + integration of renewable energy sources RES

2.1.2 Demand pull (business interest)

- Opportunities created by new legislative framework (for suppliers and installers - e.g. insulation, glazing, solar installations, etc.)
- Demonstrate products, constructions and technologies that are feasible

2.1.3 Technology push (policy and research interests)

- Public sector leading role by exemplary buildings, by complimentary legislation (by-laws, incentive schemes, creation of new roles such as energy managers, etc.)
- Accompanying development of professional sectors and services: energy analysts, certification specialists, third party energy contractors, ESCOs, turn key solutions etc., identifying directions for further developments.
- Demonstration of feasible, affordable products, constructions and technologies

¹ Note on passive houses: The use the name passive house as synonym or even as higher form of eco-buildings is erroneous. Passive houses are a subgroup or mainly a sub-technology of eco-buildings and it is important to show that eco-buildings can be realised with a broad variety of technologies applied to various situations, including those associated with passive houses.

2.2 Immediate future (FP7)

2.2.1 State of the art

- Beyond the EPBD – reduced primary energy consumptions + reduced CO₂-emissions + use of renewables
 - Double the energy efficiency: Half the fossil fuel consumption in buildings compared to national requirements during FP5/6 period
 - Towards high-performance buildings
 - Towards building integrated generation/polygeneration

2.2.2 Demand pull (business interests)

- Higher client/consumer expectations and demands based on more information and knowledge of performance criteria post EPBD
- Emergence of new products resulting from R&D work.

2.2.3 Technology push (policy and research interests)

- Beyond Kyoto and security of supply concerns pushing political agenda and thus investment in key technological development and options.
- Expected trend is for push to be from local level upwards (see examples of US municipal for sustainable development, solar cities, ICLEI, etc.)
- Demonstrate large-scale application of energy saving concepts
- Demonstrate the diversity and competitiveness of technologies, strategies and concepts
- Develop training, education and dissemination plans

2.3 Vision for 2020 (EU Action Plan)

2.3.1 State of the art

- Extreme energy efficiency
- Carbon neutral built environment, towards zero emission houses
- Sustainability as a standard

2.3.2 Demand pull (business interests)

- Continual opportunities in renovation of existing building stock as expected high energy prices continue to make energy saving cost effective
- Continual demand for high performance technologies and services as the solar economy develops.

2.3.3 Technology push (policy and research interests)

- Security of supply becomes key policy issue in Europe and Solar and construction industries continue to be an economic driver in terms of investment in technological innovation and added value.
- Permanent evaluation and improvement of concepts.

2.4 Conclusions:

As the need for continual improvement of standards and incorporation of emergent technology for the construction sector is recognised and given the importance of buildings both in terms of energy consumption (40%) and contribution to the national economy, it is clear that there is a role for Eco-buildings demonstration programmes to facilitate and accelerate the transition of emergent technology and high standards from pioneer projects to standards practice².

Eco-buildings to 2020 are therefore buildings that aim towards an extremely energy efficient (E³) and carbon neutral built environment.

The definition is deliberately flexible to ensure that it remains valid and enables calls and programmes to become increasingly demanding by further definition of specific eligibility and evaluation criteria. By 2020 such criteria should include:

- Lifecycle energy costs of a building (not just energy in use)
- Energy efficiency of the building compared to standards before or at the begin of the implementation of the EPBD in the EU Member States (efficiency factor rating)
- Related energy costs beyond the boundary of the building (such as mobility issues, Greenfield vs. brown field sites, etc.)
- Environmental impact assessment to promote sustainable resource use beyond the bounds of energy analysis (e.g. Forest Stewardship, water use, health and safety, etc.).

² *In response to the question about the validity of Eco-buildings now that CONCERTO is established as a major demonstration programme including Eco-building. A collection of Eco-buildings may act as an advanced Concerto project. However the Concerto approach cannot substitute the Eco-buildings programme as the focus is on the total community solution and this may overlook many possibilities that can be captured by the Eco-building focus on individual buildings such as improvement of energy efficiency in the existing building stock or typological foci (health sector, municipal services, cultural buildings, etc.).*

3 FP6 project participant feedback on Demo and RTD activities

Project participants were invited to give an overview of their experiences and vision of the partner consortia of the four Eco-buildings projects concerning strengths, weaknesses, opportunities and threats (SWOT) of participation as demonstration partner or as RTD partner in an Eco-building project.

The purpose of the analysis is to gather the many experiences gained within the four projects in order to condense it into clear and operational conclusions. The results of this exercise are summarised below and reproduced in full in the annex to this document.

3.1 *Demonstration activities*

Eco-building are an important driver of the continuous development of the EPBD and help implementation of new technologies as it offers focus on energy throughout the entire building project.

Use of Eco-buildings increases the awareness of the local population and authorities.

However, the lack of a clear definition of the term Eco-building reduces the effectiveness of this energy focus as at the local level it may be confused with other broader policy priorities.

3.2 *RTD activities*

Eco-building creates important networks and knowledge transfer between European research communities.

The developed knowledge can be used directly by other parties in other Eco-building projects, and the demonstration makes dissemination of RTD results easier.

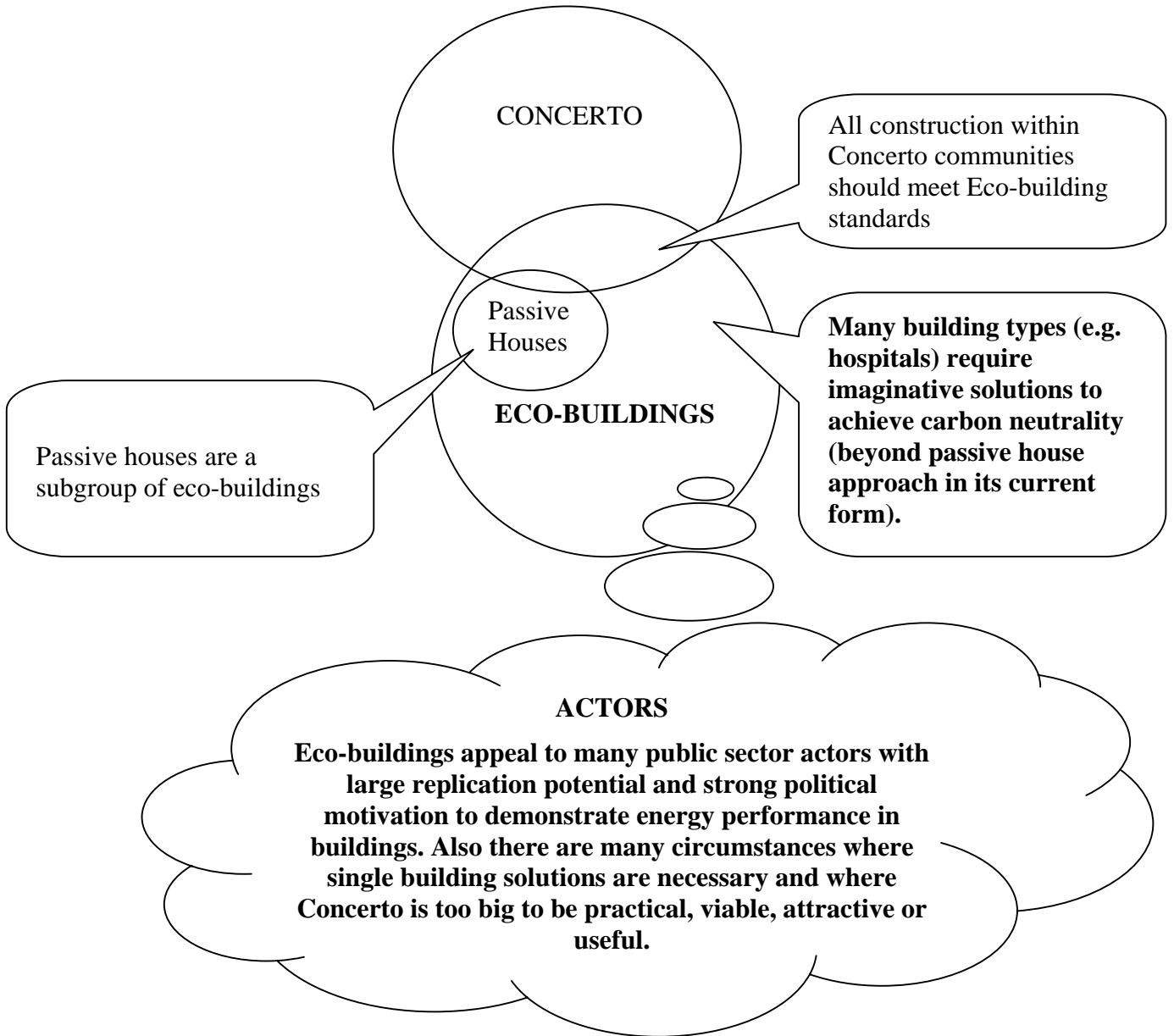
However the focus on local building projects reduces the common research ambitions. Low funding levels also reduce innovative developments.

Given that these are demonstration projects and that the relative of importance of RTD is (<20%, of EC support compared to >60% for demonstration) once possible route for improvement would be to cluster or network research activities between projects or consortia to produce a critical mass or to specify key areas of research to be addressed in the call in order to facilitate this subsequent clustering.

4 Conclusions

4.1 Why Eco-buildings demonstration is needed in FP7

A fraction of residential buildings may be addressed by a “towards passive housing trend”, but there are different equally significant trends in the building technology (like for example low-ex or waste energy concepts) which cover the same idea of energy resource conservation but allow a much wider approach, i.e. monolithic building constructions, natural or hybrid ventilation, carbon-free generators. Each passive house is an Eco-building, but not each Eco-building has to be a passive house.



The key arguments are condensed in a PPT presentation in Annex 2

4.2 What stimulation the market needs

A clear label/benchmark is needed to promote Eco-buildings as the advanced concept in the building market. The industry and building users want to have an energy/environmental quality criteria for the whole building.

4.3 How to learn from the FP6 experience

- It is important to set up a support activity to form an Ecobuildings/E³ buildings information and promotion platform within or besides the ECTP and renewables platform.
- The amendments of inevitable modifications in the demonstration building process have to be simplified (is an official amendment really necessary?)

4.4 Eco-buildings is not a strong brand name

The name Eco-buildings is not clearly defined and needs interpretation in the communication to the public and politicians. For the time being, all Coordinators uses a different definition in their project. Therefore the name should be reconsidered and clearly adjusted to the focus: Buildings that go beyond the current and future environment requirements (e.g. E³ - extreme energy/environmental efficient – buildings).

5 Annex 1: Analysis of Strengths, Weaknesses, Opportunities and Threats (SWOT) of Eco-buildings

Project participants were invited to give an overview of their experiences and vision of the partner consortia of the four Eco-buildings projects concerning strengths, weaknesses, opportunities and threats of participation as demonstration partner or as RTD partner in an Eco-building project.

The purpose of the analysis is to gather the many experiences gained within the four projects in order to condense it into clear and operational conclusions. The results of this exercise have provided the material for section 2 of this report and are reproduced in full below.

A SWOT analysis is explained in the following table:

<p><i>Strengths:</i></p> <ul style="list-style-type: none">• What advantages do you have?• What do you do better than anyone else?• What unique resources do you have?• What do people see as your strengths?	<p><i>Weaknesses:</i></p> <ul style="list-style-type: none">• What could you improve?• What should you avoid?• What are people in your market likely to see as weaknesses?
<p><i>Opportunities:</i></p> <ul style="list-style-type: none">• Where are the good opportunities facing you?• What are the interesting trends you are aware of?	<p><i>Threats:</i></p> <ul style="list-style-type: none">• What obstacles do you face?• What is your competition doing?• Are the task specifications changing?• Could any of your weaknesses seriously threaten your business?

5.1 Demonstration activities

The demonstration partners came up with the following results of the SWOT analysis:

DEMO Strengths	DEMO Weaknesses
<ul style="list-style-type: none">• In general, public sector led projects have achieved objectives and kept to schedule• Timing perfect in relation to EPBD implementation and interest generated in professional sectors and media• Project identity is viewed as strong and solid externally (feedback is positive)• Technical discussion and examination has been productive, informative and stimulating• Keep our edge (competitive advantages) within the Eco-building sector• Transfer of technical know-how from other countries/companies to us• Transfer of experience to other building projects possible and important• Keeps energy efficiency elements in the project (not cut during tender phase)• Building owner becomes more interested in energy• Exchange of knowledge and experience is viewed as very informative and useful.• Demo projects have lot of attention at the local level• Increased awareness of possibilities by local authorities and housing associations• Allowance of innovation	<ul style="list-style-type: none">• No clear definition of eco-buildings existing• Brandname eco-buildings is powerless• Eco-building concept is too wide (could be reduced to existing buildings)• Several private/speculative developments have failed despite initial guarantees or testimonials backing them. (lesson to be learnt?)• Proposals/project descriptions did not plan /anticipate complications that have occurred (maybe always the case but there is scope for improvement)• EC support is a tiny part of the total construction project. As such, the demo project is vulnerable to deviations from plan due to local changes in construction or finance issues• Administrative burden is a high proportion of time and resource dedication• The project - and changes - are very slow moving• The time schedule of the building process prevail the FP6-project• Long-term approach of the eco-buildings in contrast to the short-term projects and Commission ideas

DEMO Opportunities	DEMO Threats
<ul style="list-style-type: none"> • Existing buildings are crucial to fulfil EC/governmental decisions (20 % in 2020) • Most buildings are already built therefore passive houses cannot substitute Eco-buildings • New building directive -> certification necessary • Eco-buildings focus on individual building -> it is possible to set landmarks/light houses • Project participation enables local political leverage to push sustainable energy policy objectives and criteria • Participation in the DEMO community is productive in terms of ideas and contacts • Replication – Much interest received in completed buildings. Most successful elements already repeated in other buildings • Dissemination as general public starts to become aware of EPBD applications and implications • Important contact to other partners within the Eco-building sector • Increases the possibility to use our state-of-the art knowledge ("fun" projects) • Knowledge transfer becomes more "real" during discussions of the actual demonstration project (oppose to theoretical R&D discussions) • New technologies brought to the attention of the participating countries • Partners in the demonstration projects become more and more aware of energy saving possibilities • New technological developments have proven to be feasible in various countries 	<ul style="list-style-type: none"> • Rapidly changing market: EPBD is now provoking changes - DEMO buildings are innovative when proposals are submitted and almost standard once completed! • Cash flow issues for small participants • Dependency on other partners and sub-projects • EC payment delays (months/years) create significant cash flow problems for participants (especially SMEs) • Long initial contract negotiation period complicates subsequent project development as building construction and EC project schedules diverge. Negotiation should take less than 6 months (instead of more than 1 year) • Low innovative character of demonstrated technologies • Enthusiasm diminished by bureaucracy within the Commission • "Never Again" feelings • No Commission promotion for Eco-buildings but: <ul style="list-style-type: none"> ○ Huge passive house building movement supported by the Commission ○ Concerto movement supported by the Commission • Low funding (35 %)

5.2 RTD activities (including dissemination)

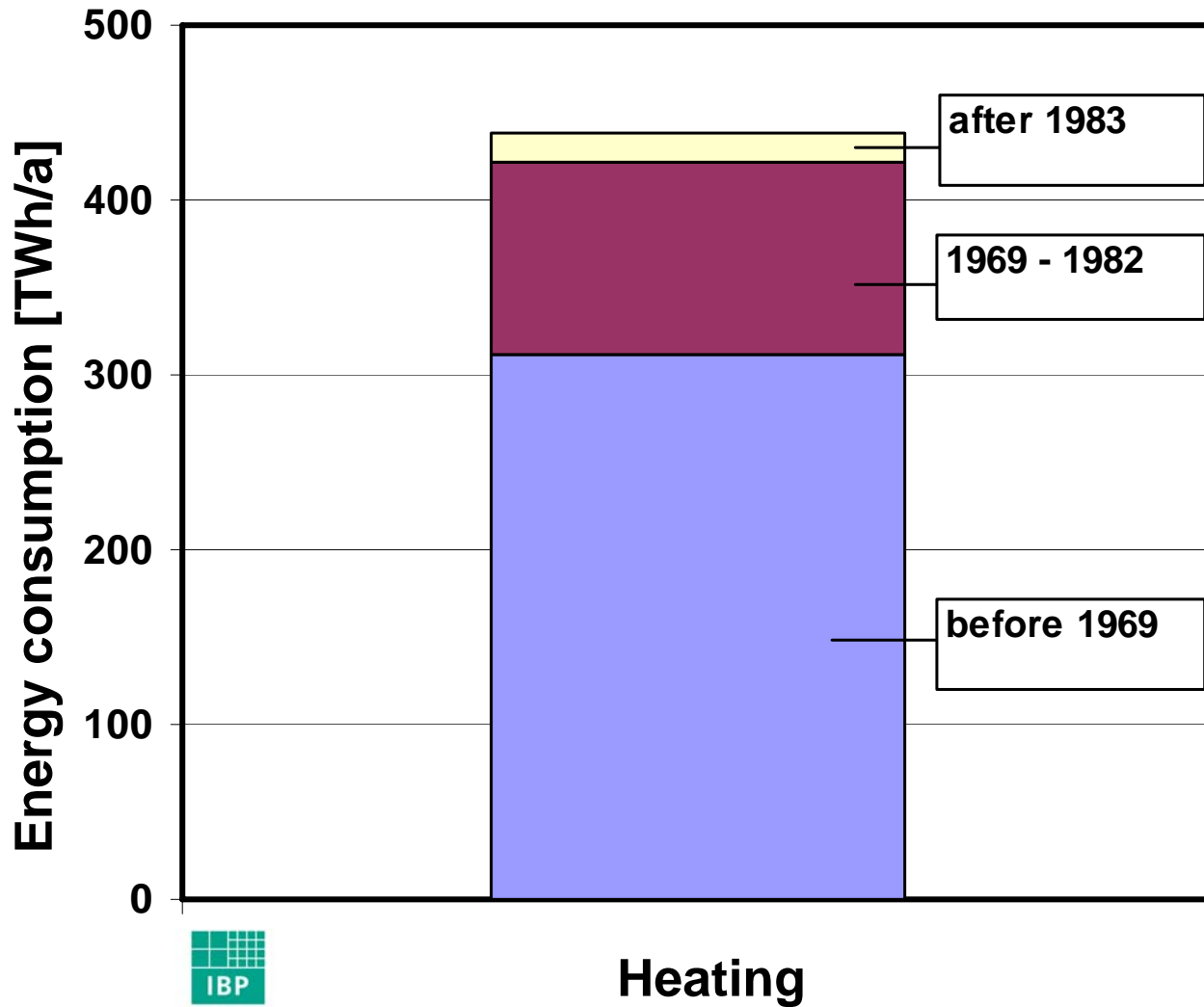
The RTD partners came up with the following results of the SWOT analysis:

RTD Strengths	RTD Weaknesses
<ul style="list-style-type: none"> • Sharing of experiences, learning from others (practice – research) • Stimulating collaborative effort between the most active participants. • Knowledge exchange between EU countries and cultures. • The public awareness makes dissemination easier once the buildings are completed • Broad knowledge in the Eco-building projects • Bringing research to application (from theory to practice) • Networking • Exchange of knowledge (inter-disciplinary approach) • Initial ideas of theme groups, in order to identify, evaluate and promote various themes of sustainability • Systematic analysis, comparison and evaluation of design and results • Publicity for the organisation • Make research work understandable 	<ul style="list-style-type: none"> • “Lowest common denominator” the expectations of the weakest collaborator determine the results • Continuous dissemination is not easy • Coordinated dissemination in all countries is not easy • Renovation process too slow to raise permanent interest • Lack of dynamics in the process • Goal for common dissemination was undefined for a long time • Theme groups were not able to work as intended, due to changes in the project approach in the contract negotiation phase. • Dynamics of the renovation process do not fit the research planning • Initial ideas were killed in the contract negotiations. Consequently, the project is just a demonstration of feasibilities, not the top of the bill. • Exchange of knowledge is limited, due to changes in the project approach in the contract negotiations • Distance between end-user and EU • Low funding level • Technical research is not welcome in the Eco-building programme • Cross-contracting is needed but not allowed • Different understanding of the term “innovation” between researchers, demonstration partners and EU Commission • Eco-buildings have no clear definition • Name “eco-building” is not suitable in all countries • No promotion platform exists • There is no industry back-up

RTD Opportunities	RTD Threats
<ul style="list-style-type: none"> • Energy efficiency is important for public, policy and policy-makers right now • Global warming can be used to emphasize the necessity for energy efficiency • Decreasing fossil fuel stock and high energy prices can be used for emphasizing the necessity for energy efficiency • Retrofit potential is bigger than new building potential (comparison to passive houses and Concerto) • National legislations are changing right now • General application: Eco-buildings can be broader used than Concerto (settlements, focus on energy production) and passive houses (dwellings, new buildings, limit on certain technologies like air-heating, passive houses are a limited sub-part of eco-buildings, not vice versa) • Good opportunity for research in a “real” environment rather than in the lab • Innovative work and knowledge exchange opportunities • Utilisation of the Common Eco-building community • Common sense about methodologies 	<ul style="list-style-type: none"> • Poor performance of some buildings or partners adversely affects results of others (repeated) • Timing problems with delays in construction critical to RTD activities • Too local (non European) dissemination • Dissemination done by engineers rather than communications sector professionals • Process too slow to raise permanent interest (repeated) • No application of findings and results of research • Consequently, the research is of limited interest • Bureaucracy at the Commission takes the drive out of the programme and the projects • Eco-buildings is reduced to passive houses (also by Commission and the Commissioner), which is wrong • Strong branding/platform of renewables/passive houses, but not on eco-buildings

6 Annex 2: PPT Presentation on the key arguments

The Challenge: Existing Buildings



The solution of the Commission: Ecobuildings

eco buildings 4 projects co-funded by the European Commission in FP 6 with the same aim

 <p>project BRITA in PuBs</p> <p>23 partners 9 countries 8 demo projects</p> <p>retrofit design guides BIT information tool quality control toolbox e-learning module</p> <p>BRITA in PuBs</p>	 <p>project Demohouse</p> <p>16 partners 7 countries 6 demo projects</p> <p>common dissemination protocol state-of-the-art-in-renovation report</p> <p>demohouse</p>
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Towards an energy efficient European building stock beyond national requirements

 <p>ECO-Culture</p> <p>6 partners 3 countries 3 demo projects</p> <p>thermoactive slabs aquifer energy storage building integrated PV cultural buildings as ecobuildings</p> <p>project ECO-Culture</p>	 <p>SARA</p> <p>15 partners 8 countries 7 demo projects</p> <p>instant replicability potential integrated BMS & monitoring shared solutions and interests technical advice and support</p> <p>project SARA</p>
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www.ecobuildings.info

EU-Definition of Ecobuildings:

The **Ecobuildings concept** is expected to be the meeting point of short-term development and demonstration in order to **support legislative and regulatory measures for energy efficiency and enhanced use of renewable energy solutions within the building sector, which goes beyond the Directive on the Energy Performance of Buildings.**

Ecobuildings projects aim at a **new approach for the design, construction and operation of new and/or refurbished buildings**, which is based on the best combination of the double approach: **to reduce substantially, and if possible, to avoid demand for heating, cooling and lighting and to supply the necessary heating and cooling and lighting in the most efficient way and based as much as possible on renewable energy sources and polygeneration.**

Action Plan for Energy Efficiency

(3) Making buildings more energy efficient

Priority Action 2

Building performance requirements and very low energy buildings ("passive houses")

The Commission will propose expanding the scope of the Energy Performance of Buildings Directive substantially in 2009, after its complete implementation. It will also propose EU minimum performance requirements for new and renovated buildings (kWh/m²). For new buildings, the Commission will also by the end of 2008 develop a strategy for very low energy or passive houses²⁴ in dialogue with Member States and key stakeholders towards more wide-spread deployment of these houses by 2015. The Commission will set a good example by leading the way, as far as its own buildings are concerned.

²⁴ Passive house are commonly defined as houses without traditional heating systems and without active cooling. This would involve very good insulation levels, and a mechanical ventilation system with highly efficient heat recovery. They can also be called: zero-energy houses, houses without heating.

not correct



Ecobuildings – Concerto – Passive Houses – Zero-Energy Houses



EU 6FP programme for local communities
(Demo + Research + Dissemination):

- Ecobuildings (renewables + energy efficiency)
- Poly-generation, CHP
- District heating (ideally with biomass)

-> mainly used for new settlements



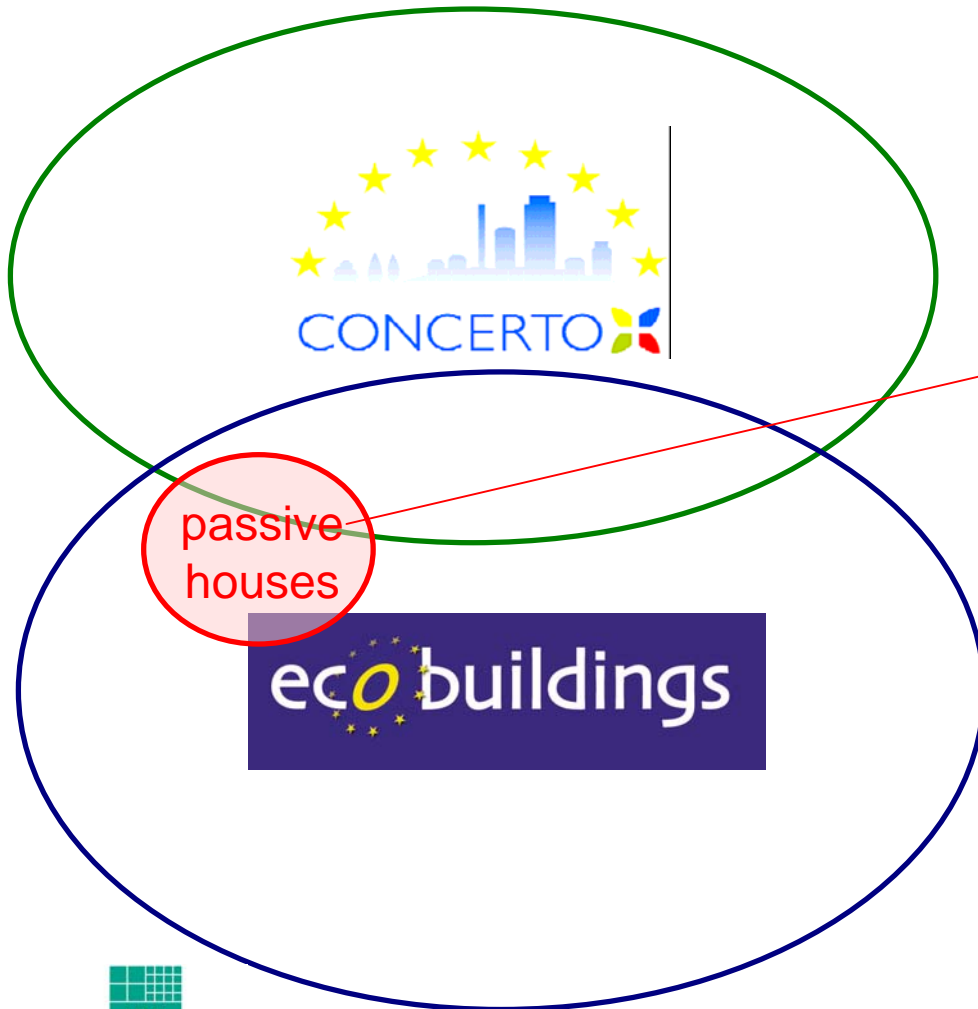
EU 6FP programme for new and existing buildings
(Demo + Research + Dissemination):

- Energy efficiency + Renewables
- Poly-generation, CHP

-> used for single buildings, new and existing, public and private



Ecobuildings – Concerto – Passive Houses – Zero-Energy Houses



Single projects within the EU-programmes

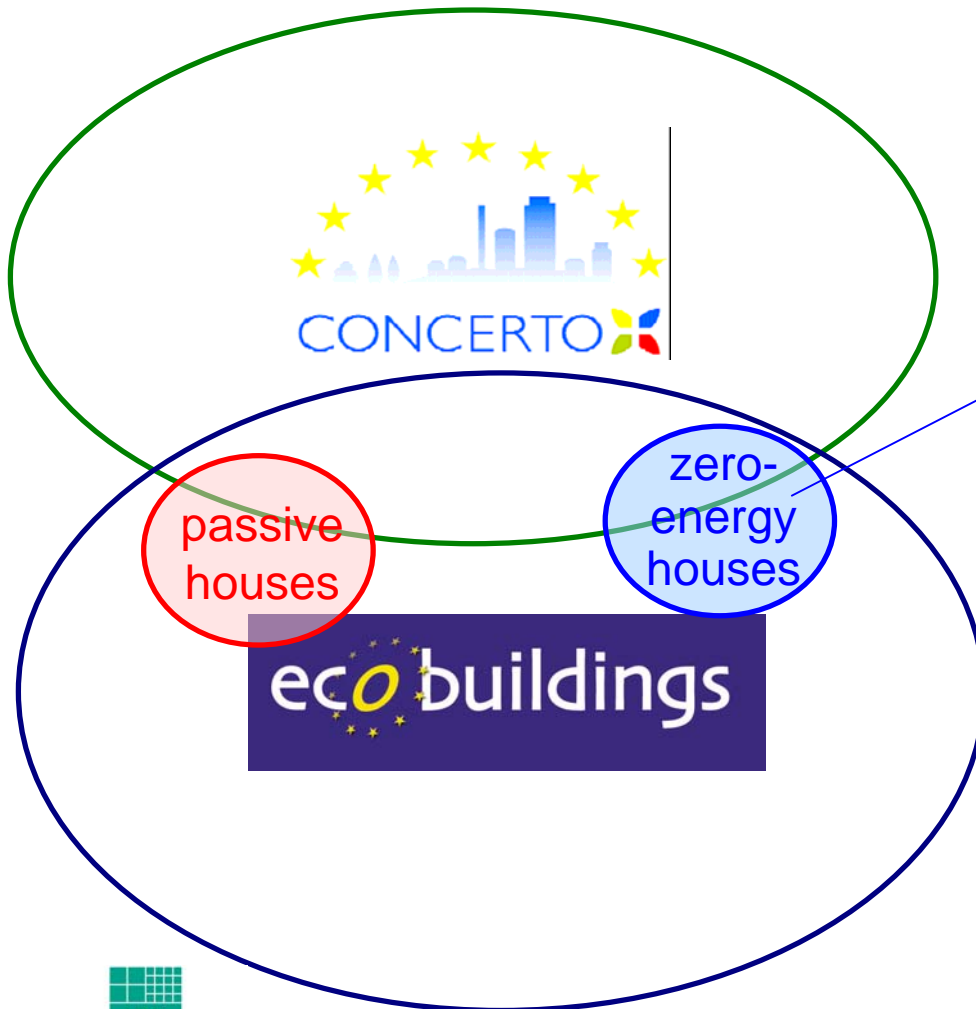
- high performance building envelope
- mechanical ventilation with heat recovery and **air-heating!**

≠ **zero energy houses!**

-> used for single new buildings,
nearly only dwellings



Ecobuildings – Concerto – Passive Houses – Zero-Energy Houses



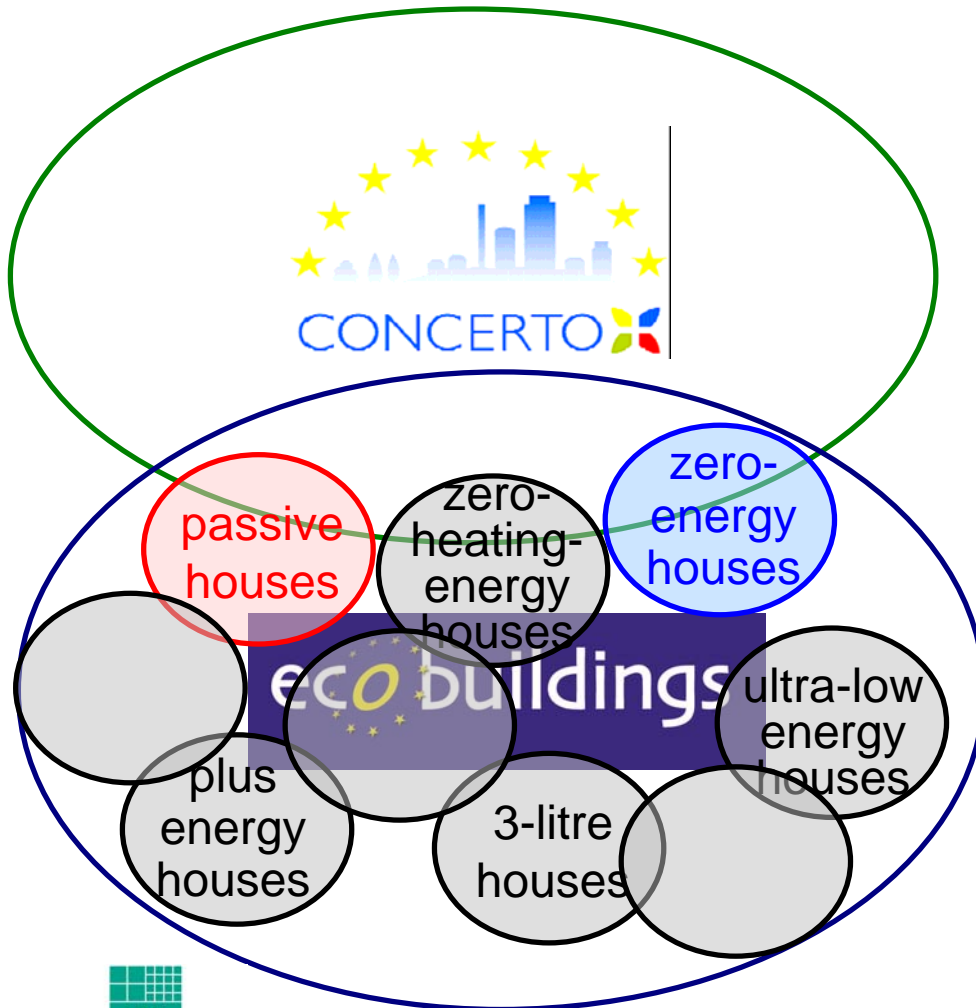
Single projects not yet within the EU-programmes

- high performance building envelope
- mechanical ventilation with high performance heat recovery
- use of PV and/or other renewables
- seasonal storage for heating and electricity
- no connection to grid and net

->realised at one building only yet
(Energieautarkes Haus in Freiburg)



Ecobuildings – Concerto – Passive Houses – Zero-Energy Houses



The Commission should change the vocabulary from „passive houses“ back to „Ecobuildings“

-> The Ecobuildings programme has to be continued in FP7

as it is applicable in:

- new buildings
- existing buildings
- single buildings
- settlements (CONCERTO)

