Position paper

FET Proactive

Position Paper on EC Consultation for new FET Proactive topics
(for Work Programme 2016-2017)

Introduction

The position paper has been prepared during intensive consultations with experts within the national technological platform for energy efficient buildings EEB-CZ (http://www.eebcz.eu). The comments are thus aimed towards a specific topic of energy efficient buildings. Within energy efficient buildings, there are three relevant topics in FET Proactive: Bottom-up intelligent construction, Constructive symbiosis, and Time for time. General comments and recommendations for each topic are followed by suggested specific topics.

All of the topics identified by FET Proactive are very vague. We suggest aiming at more concrete actions and more specific topics in order not to lose focus. With regard to the flagship initiative for a resource-efficient Europe under the Europe 2020 strategy and the fact that buildings are responsible for more than 50 % of primary energy consumption in the Western world, we believe that energy efficiency (in buildings in particular) should be seen as one of the key scientific priorities and thus one of the important thematic strands of FET Proactive.

1. Bottom-up intelligent construction

Buildings are, in principle, big structures and possibilities of self-assembly on material level have not yet been sufficiently researched. On the other hand, the self-assembly works well in robotics, even within space probes (see for example IEEE). Thus the FET Proactive call should draw inspiration from robotics and apply these principles in construction engineering. Capitalizing on robotics in construction might be especially fruitful when high degree of precision is needed or during constructions in extreme conditions (such as construction on the Moon or Mars).

There are two specific possibilities of narrowing the topic:

- Self-assembly components for on-site construction
- Self-assembly processes during the manufacture of components

2. Constructive symbiosis

The topic is very broad and needs to be structured to at least three predominant priorities. Although the FET Proactive aims to go beyond the concept of bio-mimicry, bio-mimicry itself plays a crucial role as a starting point. Moreover, we suggest not omitting bio-mimicry as such since there are still too many possibilities for future technologies, not to mention the new emerging ones.

In the framework of Constructive symbiosis and bio-mimicry, there are several possible promising topics:

- Application of advanced nano-materials for intelligent control of wellbeing such as responsive nanomaterial-based air quality sensors, contaminants detection, and active filters for air quality control. These advanced nano-materials might be embedded in the buildings as well as (as a second step) in symbiosis with the human body.
- Super-light-weight (and intelligent) constructions based on algorithms commonly found in nature. The objective is to create a concept of construction, which would require minimum machinery to build. The light-weight elements must be light enough to handle by a man, yet provide decent properties. The ultimate goal is to reduce environmental impact during material transport and on-site machinery, with increased independency of the house builders themselves. The construction must not be only light in terms of weight, but also simple and easy to understand to a construction layman. Due to decreasing demands on volume, price, and machinery (first step), there could be more space to involve intelligent and responsive technologies (second step).
- Energy grids inspired by swarm intelligence (relevant also to the topic Bottom-up intelligent construction) and responsive to environment both in terms of predictive control and adaptation.

3. Time for time

Interaction of time policies, human biology and psychological aspects of human existence (especially in so called Western culture) is a very interesting and highly relevant subject. The topic needs to be flexible, but it is probably too broad, which might lead to vague and ambiguous outcomes. We suggest dividing this topic in more specific areas of interest. However, multidisciplinary approach is absolutely necessary.

There are several topics we consider to be immensely important:

- Transportation in the context of strategic urban planning and regional planning – huge time loss (and energy consumption) due to transportation (to work, schools etc.) in certain areas of Europe is becoming a serious concern. One example of dealing with time-loss might be self-organizing robotic cars (personal tailored travels).
- Home automation and predictive control. Although already functioning, there is still a lot of space for breakthrough innovations as well as for improving existing and emerging technologies.
- Quality aging. Highly important and yet not researched enough is a phenomenon of aging population. Especially in regard to spending time actively; for example in urban areas, using new technologies to enhance quality of life, designing sustainable, “smart”, and comfort housing etc. It corresponds also with public health and its timing protocols and systems (for example dealing with obesity and other lifestyle diseases).
- Intelligent environment for sensitive people (corresponding with the previous point)
    - Intelligent monitoring of health state and indoor environment,

- Application of sensor arrays, data gathering and analysis,
- Provision of continuous health state analysis,
- Prevention of health issues and risks.

Conclusions

Nine topics defined in FET Proactive are too wide and need some more topical structuring (such as listing three, four main specific priorities) in order not to lose focus. We have approached FET Proactive from a specific thematic viewpoint – energy efficiency (in buildings). This topic is rather fragmented in European programmes (such as Horizon 2020) and related agenda distributed across several DGs. Even though intrinsically interdisciplinary, we believe energy efficiency should appear explicitly in the topics of FET Proactive. Specific focus within three topics relevant to energy efficiency has been suggested, considering these topics as the main priorities at least from the perspective of energy efficiency.

About EEB-CZ

The main objective of the Energy efficient buildings platform (EEB-CZ) is to increase the profiling and participation of the Czech research teams in the international structures, to proactively enforce national priorities in the European policy making process and to improve transfer of information from international structures to domestic research and academic organizations. EEB-CZ focuses on strengthening bilateral and multilateral links among relevant institutions from the Czech Republic and other European countries as well as on support of opening new links and research collaborations. EEB-CZ platform has been supported under the project “Support of International Research Profiling of the Czech Republic in Energy Efficient Buildings” and it is financed from LE-EUPRO II program.

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