

Accelerating the Development of the Sustainable Construction Market in Europe

**REPORT OF THE TASKFORCE ON SUSTAINABLE CONSTRUCTION
Composed in preparation of the Communication
“A Lead Market Initiative for Europe”
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1. Background

In September 2006 the European Commission issued its communication on *“Putting Knowledge into Practice: A broad-based innovation strategy for the EU”*. In this communication the Commission acknowledges the importance of EU research framework programmes for increasing the offer of new high-quality products and services and concludes that these need to be complemented by strengthening the demand-side of innovation. It calls for a more strategic and integrated approach to policy-making so as to set the right conditions for innovation-driven lead markets to emerge and develop in Europe.

Lead markets are innovation-friendly markets for creating new innovative products and services in promising areas but where this potential is currently constrained due to regulatory or other obstacles. They are not about protectionism, picking winners or creating national champions, but about creating the right framework conditions for innovation to emerge and come to market. Rather than financing specific innovations, lead markets focus on ensuring appropriate market conditions for the success of new products, services or technologies. They seek to balance technology push and market pull with a policy drive.

Lead markets aim to leverage innovation in with a high growth potential in Europe and globally. EU industry should have the potential to develop competitive advantage in these areas to lead global markets, while the public sector should have the potential to significantly impact market development, whether as regulator, customer or facilitator. Finally, lead markets should provide solutions to economic and societal challenges in areas such as health, energy, environment or transport.

Lead markets have a number of characteristics:

- 1) A high degree of customer ‘intelligence’, with users having a certain degree of anticipatory knowledge of the technology and recognising the premium to be gained from innovation.
- 2) Generic market requirements which provide a reference for potential markets worldwide.
- 3) Evidence of industrial strength in Europe that could develop these opportunities.
- 4) Market fragmentation or other obstacles which are holding back innovation but which could be overcome by public intervention.

The success of the lead markets initiative calls for coordinated action at policy level. It must complement supply-side policies with demand-side instruments such as regulation, standards, Intellectual Property Rights, procurement, awareness and risk capital. The Commission is currently engaged in a wide ranging consultation with stakeholders on how to proceed. This process aims to identify the stakeholders’ interest in developing a lead market approach, the policy instruments to support the emergence of lead markets and a roadmap for implementation.

The following document assembles the views of a Commission’s Task Force and of a number of stakeholders on a possible Lead Market Initiative in the field of sustainable construction. The contents do not necessarily reflect the opinion or position of the European Commission but give useful information as regards the scope of the measures foreseen in the Communication COM (2007) 860.

In parallel to the Lead Market initiative, the Commission services are undertaking complementary initiatives in the field of energy and environmental technologies which also address sustainable construction to some extent. While the Lead Market Initiative aims at developing an institutional “business plan” for demand-side measures on a number of areas in the short term, the Strategic Energy Technologies Plan and the Environmental Technology Action Plan more specifically aim at raising the political profile of energy and environmental technologies from the short to the long term.

2. Sustainable construction and innovation

Sustainable construction can be defined as a dynamic of developers of new solutions, investors, the construction industry, professional services, industry suppliers and other relevant parties towards achieving sustainable development, taking into consideration environmental, socio-economic and cultural issues. It embraces a number of aspects such as design and management of buildings and constructed assets, choice of materials, building performance as well as interaction with urban and economic development and management. Different approaches may be followed according to the local socio-economic context; in some countries, priority is given to resource use (energy, materials, water, and land use), while in others social inclusion and economic cohesion are the more determining factors.

In the context of the Lead Market initiative, the Commission intends to look at the interaction and combined effects of two market drivers on innovation: (a) the rational use of natural resources (energy, water and materials), (b) the user’s convenience and welfare (accessibility, safety & security, indoor air quality, etc.). The choice of these 2 set of drivers is guided by a number of general considerations on the future anticipated market requirements and trends:

2.1 Market segments

- *The residential market*
 - The users’ requirements will change more frequently than before. This behaviour should be anticipated in design and construction processes, for instance by separating the technical utilities from the main structure. Renovation will integrate new components and prefabricated products which can be installed and used rapidly.
 - Accessibility and flexibility will be significantly improved in dwellings throughout their life cycle for all types of users and ages
 - There would be an increased emphasis on energy efficiency, environmental, water, health and safety issues in the selection of materials and structural components.
 - The passive house concept will be more and more widespread even in warm climate conditions, as well as the integration of renewable energies.
 - Building management systems would enable occupants to control a greater variety of functions for a better comfort (ventilation, air filtration, temperature, lighting, etc.). ICT will facilitate remote supervision and control of appliances, equipment and security systems.
 - There would be a growing demand for improving the access to affordable and decent homes and for a more harmonious urban and social mix.
- *The non-residential market*

- The requirements for improved energy efficiency and the integration of renewable energies would influence both the building structure and its utilities.
 - Indoor air quality would be considered as a factor affecting comfort and work efficiency. This will require meeting different needs in terms of heating, cooling, ventilation, lighting and acoustic levels.
 - Business premises will more often be occupied by fast growing and changing organisations which will require business-related facility services. Requirements for adaptability and divisibility of the premises will stimulate the development of new structural and system technological solutions, which will be facilitated by the expansion of the wireless data transmission.
- *The infrastructure market*
 - Investment will be assessed on a more strategic approach towards the long term functional characteristics of the infrastructure and the associated life-cycle costs.

There might be specific considerations depending on the market segment considered and the specific regional context. Overall, for all 3 market segments, it appears that innovation will have to respond to an increasingly differentiated ownership and usage of premises and facility services, as well as to sustainability issues and life-cycle considerations which will become important decision-making criteria. This includes a growing importance of retrofitting of buildings and infrastructure: land-use and resources constraint will lead to opt more often for retrofitting instead of (demolishing and) building new products. The public and the private sectors are becoming more and more aware of the significant impact of the built environment on climate change, the use of natural resources, air quality, health, the economic activity as a whole and the social cohesion and inclusion, and of the importance of integrating various elements in certain ways in order to meet the economic and societal needs.

2.2 Innovation issues

Innovation manifests in many forms, especially at the level of the construction product industries to improve the properties and performances of materials and components, or at the level of the construction asset and of the services provided to the customer/occupants by the supply chain. Within the scope of the Lead Market Initiative, a special attention would be given to the initiatives which could change the attitudes in the construction supply chain from the ‘physical delivery of a construction asset’ into a ‘culture of services’ and develop a full Life Cycle-oriented approach. This should be seen in parallel to a desirable change in the demand side from a cost-driven market to a value-driven market. There are many ways to initiate this transformation, although some appears to have a potential significant impact:

- *The construction industrialisation*

In some market segments and regional contexts, the improvement of quality and productivity will contribute to a greater utilisation of prefabricated products and to a higher industrialisation of the work processes. Without compromising architectural requirements, the transfer of part of the on-site construction activity to off-site production, independent from weather conditions, will ensure a more continuous activity, a better quality of the finished products and an improved control of their environmental characteristics. The partial industrialisation of the on-site activity will be facilitated by product model-based construction

design, the management of product information and e-business, on-site information technology and the use of standardised elements on site. This will reduce potentially the volume of construction wastes and the number of accidents at work. However, the logistic constraints associated with the transport of heavy prefabricated and modular elements and the impact on the European road infrastructure should be considered carefully.

- *Collaborative working in project implementation*

Effective communication and collaboration in the supply chain based on mutual trust could improve construction productivity and provide economically viable life-cycle services. Collaborative working brings together architects, contractors, specialist contractors and suppliers with the client at the decision-making process of the project. It provides for a transparent process, a more efficient supply chain and an opportunity to discuss the use of innovative methods and products. It would likely stimulate relationships that go beyond single projects, bringing benefits in terms of retention and re-use of knowledge and experience.

Construction works involve large investments and penalties which can be severe when projects run late. This could hamper the development of new forms of collaborative working in the supply chain. However, insurance arrangements could spread the risk and liability between customer, contractors and specialist contractors and suppliers should a project face difficulties when implementing novel products or process. Such arrangements might require an independent assessment of the inherent risks associated with the innovative products or processes and of the expected performances.

- *Life-cycle expertise*

The construction sector needs to further develop skills and services to meet the customer and occupants requirements over its life-cycle. These would cover knowledge in energy consumption, environmental impacts, indoor environment, safety, the adaptability of structures and premises, service life planning and facility management, as well as in life-cycle economics. On the customer side, this expertise will build on a closer cooperation between the bodies taking the investment decision and the services responsible for the operation and maintenance of the construction assets.

- *New services models*

The variety of specific customer needs will be addressed by new service models that combine and/or specialise in design, construction and maintenance, and financial services together with a guarantee on environmental and economic performances and indoor air conditions. It is crucial that the industry acquires experience in tackling issues related to the variable nature of the context and of the conditions in which buildings are used. This might require further standardisation work to what is actually done.

Public Private Partnership could help to promote such new services but other initiatives would also stimulate the emergence of such new service models and the empowerment of the end user.

3. Analysis of the market potential

3.1 Present situation

In 2004, the EU-27 construction industry generated a total production of 1305 billion € and employed 13.2 million persons. This represents 10% of GDP and 7.3% of the total employment¹. These figures relate to the new construction and renovation of buildings and civil engineering on-site, e.g. they do not cover the manufacturing industry and the downstream services related to construction. About one third of the GDP is attributable to construction materials and building products². According to FIEC, 26 million workers in the EU depend, directly or indirectly, on the construction sector. Direct employment in the construction materials and building product industry is about 2.5 million jobs.

The residential sector represents 46% of the total EU production, the non-residential sector 31% and civil engineering 23%³. The building sector is characterised by a long service life of several decades or even more, a slow replacement rate of the building stock (about 1% per year) and a much lower rate for building demolition (about 20 times less than new construction)⁴. This means that interventions on the existing buildings such as insulation works, double glazing, acoustic developments, etc. will have immediate effects on climate change, indoor air quality, re-use/recycling and other sustainability issues like safety and accessibility. New construction already incorporates more recent technical solutions and therefore will affect sustainability issues on the long term.

Numerous demonstration programmes in Europe and elsewhere show the significant potential for sustainable construction. In particular, there are many examples of innovative technologies which could substantially improve the energy performance of buildings by more than 30% at reasonable cost conditions on short term or which could offer opportunities for decentralised energy supply with renewable energies. Yet, the market for sustainable construction needs to be more and better developed.

More than 50% of all materials extracted from earth are transformed into construction materials and products. Construction and Demolition Wastes (C&DW) amount to more than 450 million tonnes per year in the EU⁵. However, these figures should be placed in their proper perspective. The construction activity intrinsically requires a lot of raw material per unit of production and C&DW are proportionally significant in quantitative terms. However, this leaves room for rationalisation and large improvement in the sector. Most of C&DW are today recycled or re-used principally in the form of embankment. A significant proportion could potentially be used as a substitute for newly quarried aggregates in certain lower grade applications.

Heating and lighting of buildings accounts for the largest share of energy use (42%) and produces about 35% of all greenhouse emissions. Energy standards for houses and the introduction of more efficient electrical appliances and heating installations have not led to a decrease in total energy and electricity consumption by households. The energy use per

¹ source: EUROSTAT and FIEC

² CEPMC <http://www.cepmc.org/overview.htm>

³ source EUROCONSTRUCT 2004

⁴ Source: Housing statistics in the European Union 2004

⁵ Symonds Group Ltd 46967 Final Report February 1999 see http://ec.europa.eu/environment/waste/studies/cdw/cdw_chapter7-10.pdf

household has remained about constant since 1985 and the final energy consumption has risen due to the increase in number of households as well as surface and comfort demand. The European passive house market is in rapid growth with approximately 1000 new dwellings per year but this represents only 0,1% of the total new construction today⁶. Still, many existing houses have not yet a roof insulation and double-glazing. There is a number of energy services companies remunerated based on a pre-determined energy performance plan but this market is only developed to some extent in few countries.

The World Health Organisation has outlined the effects of indoor air pollution on health; in particular the increased premature mortality caused by lung cancer and other respiratory and cardiovascular diseases, and subsequently, the increased medication use, sick leaves and lowered performances in learning and working. This situation is mostly affecting vulnerable people such as elderly and children. Incorrect air ventilation due to increased thermal insulation and air infiltration tightness as well as thermal bridges in the building structures are the origin of condensation of water and microbial growth, and a faster deterioration of building material. The European Construction Technology Platform has estimated the savings for EU-15 which could result from a more comfortable and healthy indoor environment:

Buildings	Savings (b€/year)
Reduced Allergies and asthma (based on a reduction of 8 to 25% of medical costs) ¹	3-6
Reduced Sick building Syndrome symptoms (based on 20-50% reduction and 2% productivity improvement)	15-45
Increased productivity by comfort related improvements (based on 0.5-5% increase in worker performance)	30-240

Source: European Construction Technology Platform

Various studies undertaken by the Association for Higher Education Access and Disability (AHEAD) show that a high proportion of public buildings and homes are not accessible to people with physical disabilities⁷. Other sources estimate that the actual building stock is not adapted to the ageing of the European population.

3.2 Factors affecting the development of the market

The development of the market would be influenced by a number of interrelated factors:

- *The concept of sustainable construction:* this relatively new concept aims at integrating the objectives of sustainable development into the construction activities. It is generally understood in relation with the environmental performances of construction products and assets (environmental sustainability), and should more largely refer to a balanced economical, ecological and social approach. Its influence on market developments is

⁶ <http://www.europeanpassivehouses.org/> and <http://www.passive-on.org/en/>

⁷ For instance, 80% of secondary schools were not accessible to children with physical disabilities in 2004.

indirect, through the decisions of market actors integrating or not the objectives of sustainable development in their decision process. This can be done through evaluation models and methods, despite some dimensions of sustainability (for example the impact on biodiversity or local value creation or comfort) are not easily quantifiable.

- *The focus on initial costs:* many key decisions are taken on the basis of the lowest costs instead of quality, safety and environmental criteria and life-cycle costs. This applies indistinctly to customer and construction firms. With the actual tendering practices and separation of the budgeting functions within the public sector, there is little incentive to propose solutions with a higher quality which match the customer's requirements. There is a need to identify incentives to offer solutions at the advantage of both the clients and the industry. Best practices that allow acceptance of the "Economical Most Advantageous Tender" (EMAT) and Life-Cycle Costing, and encourage the proposal of technological variants, would be a step forward.
- *Public Procurement:* Opportunities exist for public clients to encourage innovative proposals without the risk of compromising best value or accountability. Green Public Procurement provides a framework for action with respect to environmental criteria. However, public clients rarely take these opportunities, especially for construction works falling outside the scope of the EU public procurement directives. This might be due to legal uncertainties linked to the specific context of construction, to a lack of knowledge in environmental matters, to insufficient political and managerial support and to budgetary constraints. This could discourage innovation in this direction. Whenever appropriate, training and practical guidance to the public sector and to the private operators might remedy this situation consistently.
- *Regulations:* A number of EU Directives and member States legislations concern directly and indirectly sustainability issues related to construction assets, the construction activity itself or the construction product industry, in particular the Building Energy Performance Directive (2002/91), the Energy Services Directive (2006/36), the Waste Framework Directive (2006/12), the Drinking Water Directive (98/83/EC), the Construction Product Directive (89/106/EC), the Equal Treatment in Employment and Occupation Directive (78/2000/EC), etc. In addition to the specific policy objectives served by individual legislation and to the specific conditions of implementation under the responsibility of member States, it is important to consider the overall effect of legislation on the industry competitiveness and on innovation. New or revised legislation can be supportive to the development of a lead market if it contributes to raise the performance standards in the industry, to enlarge the market for innovative products, without imposing unnecessary additional burden on top of current legislative requirements.
- *Standardisation:* The actual standardisation process is very much fragmented and adapting very slowly to technological progress and market development. There is a need to see how it could evolve more rapidly towards a set of standards integrating the various aspects of sustainable development taking benefit of new scientific and technical knowledge. When the standardisation process cannot deal correctly with innovative technologies, alternative paths should be explored to back-up their performance and support their market development without compromising on safety and responsibility issues.

- *The high proportion of small contractors working in a traditional way:* This group of market actors consists of a few large players and many micros to small businesses. The owners of these businesses look for job opportunities in their local areas and are often not inclined to invest time in innovation. Their main concern is to ensure order books for the next 6 to 12 months. This economic reality has an impact on the effectiveness of planning and design activities, and on training requirements.
- *The fragmentation of the supply chain:* the supply chain is composed of many actors: (a) material suppliers, (b) producers of construction materials, (c) architects, engineers and designers, (d) contractors, (d) product distributors (e) service providers. There is a concern about the difficulty to integrate chosen specialists contractors and suppliers into an efficient project teams and supply chain. The knowledge generated in the process design and construction is often lost after the handling over of the project. Long term relationships may partly overcome this difficulty but there might be a concern to achieve a correct balance between competition and cooperation.
- *The lack of adequate education and skills for innovation uptake:* Many construction trades are well known for their low educational background compared to other sectors of the economy. It appears that the experience gained from solving problems is not organised enough in a learning building process which allow solving problems associated with the performance of construction assets and constituent elements in a more systematic way. This could be the case for addressing life-cycle issues, the re-use and recycling of materials. The need for training multi-skilled operatives should be also considered with respect to new organisational forms and construction processes.
- *Liability issues and risks linked to the long-term consequences of failures:* some liability regimes discourage different parties of a project to work as a team and to share risk in the event of a problem. This works against innovation. Most of the insurance regimes also do not stimulate customers to take an active role in this cooperation since they see the indemnity insurance as their safeguard against failure. However, the insurance might play a larger role in innovation by linking insurance premiums to the adoption of appropriate management procedures and to the performance of the construction assets, in particular in terms of environmental impacts. Remedial costs might be incurred if breaches of good practice occurred.

3.3 Market perspectives

In addition to the overall promising economic outlook of the construction sector in the next 2-3 years, there are a number of initiatives at European and national levels which could stimulate a rapid development of the market for sustainable construction.

It is important to establish customer confidence and to avoid problems which occurred in the past with the implementation of innovative construction technologies. It is also important to consolidate the productivity and sustainability of the supply chain. This means that innovation and the markets will need time to develop and to match. However, if the construction sector has to bring a significant contribution to the debate on Climate Change, the Sustainable Use of Natural Resources, Waste Management, Life-Cycle thinking and other sustainability issues, the construction sector and all other private and public stakeholders should become more proactive with respect to the sustainable development agenda within the next 15-20 years.

Along this line, it could be worth considering some global indicative voluntary targets – quantitative and qualitative – to achieve sustainability and the policy instruments which would allow achieving these targets. The baseline is the actual state-of-the-art of the construction industry delivering sustainable solutions with a focus on climate change, the use of natural and water resources, the associated life cycle costs, the qualifications needs, etc. The targets would indicate the expected improvements to be achieved by the supply chains and customers acting more responsibly at 2 timeframes: short term (2010-2012), medium term (2012-2020) and long term (2020-2050). Defining such targets and monitoring progress in a realistic way is not a straightforward exercise and would require socio-economic research and consensus building on a number of socio-economic and environmental indicators. This would consider the interaction of both supply-side and demand-side policies at EU and national levels and the level of progress already achieved.

4. Strategic and societal interest

As it was illustrated before, the construction industry is an important economic actor in Europe and contributes to about 50% of the gross fixed capital formation. It is also a major employer of the economy, all sectors considered.

The creation, use and disposal of built facilities taken together constitute major environmental impacts. Construction activities consume more raw materials by weight than any other industrial sector although a significant part is renewable or re-useable (timber and certain mineral based materials). The built environment accounts for the largest share of greenhouse gas emissions in terms of energy use. Measured by weight, construction and demolition activities also produce one of the largest waste stream even though a large share is recyclable.

This implies that the construction activity and its products/services face significant environmental challenges. At the same time, the sector should take into account a number of social and cultural factors which add complexity in decision making process. Recent studies have confirmed that still today homeowners rate criteria such as aesthetics and convenience over economic and environmental considerations.

The society is little by little recognising the scale of the difficulties involved in achieving sustainability in the built environment. These difficulties are no longer simply national issues or even European ones; they are global in their extent. The worldwide demographic growth, the impacts on climate change and on the human health as well as the increased concern for security issues make that there is an urgent need for a radical transformation of the construction sector.

The EU industry has the potential to offer technical and managerial solutions at international level, especially in countries like India and China where the global construction spending growth is actually more than 8% per year⁸. In many third countries currently going through phases of strong economic growth, it is recognised that the development of comprehensive technical regulations, standards and certification schemes is needed in order to achieve sustained improvements in energy and raw material consumption, wastes, etc. Sharing

⁸ Davis Langdon & Seah International – World Construction Review – Outlook 2004/5

European know-how in these domains could play a key tool for meeting energy and climate change goals on a Global scale. It could also facilitate the export of construction products and services to third countries.

The importance of employment in construction brings with it significant social and economic impacts. Its ability to integrate low skills workers plays an important societal role. As the economic activity and investment expands, construction activities create considerable employment opportunities. It is recognised⁹ that the multiplier effect is such that one job in construction gives rise to two further jobs in the economy as a whole. Not surprisingly therefore, investment in construction is sometimes used by governments to reduce unemployment.

Achieving sustainability in construction will require a twofold approach: firstly, a clear direction and timeframe from the public sector, and secondly a more knowledge-based construction industry. The involvement of all stakeholders, particularly national governments, with the EU Institutions playing a significant coordinating role, but also the private sector, is crucial to raise the level of sustainability.

5. Policy instruments to remove obstacles

Before suggesting policy orientations related to innovation and sustainable construction, it is worth considering some specific aspects of the construction sector:

- The construction sector is highly regulated at national level, in particular with respect to environment and to the materials in use. Builders, design services and specialist contractors have to observe building regulations. Their formulation, legislation and enforcement (control of application and building inspection) are Member States' competence, often with considerable power given to regional and local authorities according to the individual constitutional and administrative system. This responsibility is rather fragmented within various administrations.
- The public sector is a major client in construction (about 40% of the total production value), hence public procurement deserves special attention concerning innovation and sustainability. However, public clients have to respond to budget constraints and accountability criteria, which makes them less inclined towards innovative solutions.
- Construction assets have a long service life. Consequently, it is necessary to make a number of assumptions about the long term functionality, performances and life cycle costs of a construction asset
- Construction is mostly a locally based economic activity with little intra-community trade, except for some segments (hotel, supermarkets, etc.). This is a factor to be considered in any economy of scale.

Moreover, the construction sector is characterised by a complex supply chain with various players having competing interests, among others:

⁹ "The Competitiveness of the Construction Industry" COM(97)539 dated November 1997, chapter 2

- *The owners*: they are at the origin of the project and generally invest in the design and the construction of the asset, except in some cases (PPP for instance).
- *The users*: they may exploit the asset although this is not always the case;
- *Architects and engineering specialists*: they are in charge of the design and, in some cases, of the coordination of the construction phase
- *Contractors*: they are specialised in a wide variety of technical aspects related to the construction
- *Product manufacturers*: they produce the elements needed for the construction
- *Product distributors*: they are commercial/technical intermediaries between product manufacturers and contractors
- *Material suppliers*: they provide to the product manufacturers the materials necessary for the production of construction products
- *Service providers*: they are partly or fully in charge of the exploitation and maintenance of buildings and infrastructures
- *Insurance companies*: they provide a cover for the professional liability and/or the potential damages for the owners/users
- *Inspection, certification and regulatory bodies*: they insure the implementation and the enforcement of the regulations.

These market actors have different motivations with respect to changes and the nature of the innovation process and the innovation drivers differ. In the case of contractors, informal innovation based on the know-how of the employees working on site is overwhelming. The potential for innovation is not the same for a contractor belonging to a financial group as for the many small companies which work with very limited financial resources. For product manufacturers, the innovation process can be radical and rely on ICT and new materials (“smart” glasses, high performance concrete, composite materials, etc.). Product distributors put more emphasis on service, e-commerce and exchange of information with material suppliers.

The traditional ways of operating and innovating in construction are often too restrictive and confrontational and generate many deficiencies in terms of productivity, costs and quality, as it has been outlined in the report “Rethinking construction”¹⁰. In order to eliminate this burden and to address sustainability requirements more closely, the construction industry, its clients and the public sector should reflect about a transformation of the supply chain and appropriate joint initiatives.

The measures suggested hereafter are intended to build a coherent basis for progressive step changes to regulation, standardisation and public procurement practices fostering innovation and sustainability in construction. It is expected through this framework to raise awareness and acceptance about the need to transform the way the client decides and the supply chain operates. It is expected to clarify the overall regulatory framework which has an impact on sustainable construction and to give more importance to a pro-active voluntary approach from both the supply chain and the demand side, including the public sector.

¹⁰ <http://www.strategicforum.org.uk/SirJohnEgan.shtml>

5.1 Regulatory aspects

National laws and regulations will still tend to affect innovation in sustainable construction.

A fundamental requirement for an effective regulatory framework is that it must be focused on targeted performance outputs, including health gains and wellbeing, and not on particular technologies or process to implement them. In other words, it should be non-prescriptive in order to allow industry to find the more appropriate and cost efficient means of achieving specific building performances.

There is also a requirement to create a level playing field for innovative actors by enlightened national building regulations as suggested in the Stern Report on Climate Change. An alternative approach is to complement regulation with voluntary building codes which set a timeframe for the construction industry to evolve. For instance, the introduction in the UK of the Code for Sustainable Homes in December 2006 has given indications to the house-building industry about the way forward to sustainable homes. It defines six levels for raising the environmental performance standard of new homes, with a specific target of zero net carbon emissions post-construction by 2016. This Code offers public recognition to innovators if they wish to move ahead of national regulations. A similar approach has been implemented in France with the label “Haute Qualité Environnementale”.

At European level, there is also a willingness to foster innovation through legislation. For example, within the framework of the Energy Performance of Buildings (2002/91/EC), the Commission will by the end of 2008 develop a strategy for very low energy/carbon footprint or passive houses in dialogue with Member States and key stakeholders towards more widespread deployment of these houses by 2015. The scope is to move towards this type of houses as a standard in new construction in the medium term.

More generally, there is a need for a more strategic and integrated approach in EU legislation in the areas of energy, environment, internal market and health with a view of setting a more coherent and progressive framework towards sustainable construction. In particular, it should consider the cumulative burden imposed by the different legislations and stimulate the development of the internal market of products and services related to sustainable construction.

Such an approach would require better information about the construction processes and use of human and financial resources than appears to exist at present. It is suggested to set up a Panel of stakeholders, including companies covering the whole supply chain, to support the development of such an information base and an evaluation of the innovation potential and cumulative legislative effects. There is also a need for better understanding what a legislative measure would mean in practice, in terms of activities and behaviours of construction interests and clients. This initiative would contribute to further streamlining and better targeting the enforcement of existing legislation.

The development of a lead market on sustainable construction does not *a priori* require specific regulation although the exiting regulatory structures should be reviewed and adapted if necessary. However, there is a need to look at the cross-frontier dimension of the various legislations and to address it through the standardisation process and other measures presented in the following sections. For instance, further operational interfaces should be developed between the Construction Product Directive (89/106/EC), the Waste Framework Directive

(2006/12/EC) and the REACH Regulation (1907/2006) concerning the requirements for the environmental characterisation and declaration of secondary materials used in construction. The same should be considered for the Directive on the Energy Performance of Buildings, the Construction Product Directive and the Integrated Product Policy regarding the assessment of the environmental performance of buildings.

5.2 Standardisation aspects

Standardisation has already done much to create a common language for testing and declaring the performance of products but little has been done to rationalise the numerous different levels and classes of performances that are found in the construction practices of the different Member States. There is a need for more coherence so that the language of the national regulations matches more closely the language of the EU harmonised specifications.

There is a broad consensus towards the withdrawal of national codes and the adoption of Eurocodes for structural design (safety and security). Many countries outside the EU have shown also great interest in Eurocodes, which should consolidate the competitive position of EU companies on international markets. Based on this experience, there exist opportunities to expand the scope of Eurocodes in order to integrate other important aspects in construction design, not least energy and environmental engineering. Such an adoption and expansion of the Eurocodes would open mid to long term open markets to unconventional construction products and techniques with improved environmental performances.

Indoor air quality and emission from construction material is being largely debated in European countries. A number of Member States have already developed a kind of labelling system for construction materials. However, there is an increasing demand for European standards. The current work of CEN TC 350 on the sustainability of construction works¹¹ and of CEN TC 351 (mandatory in the framework of the Construction Product Directive) on the assessment of the release of dangerous substances from construction products¹² is a starting point towards the development of a European sustainable building passport. There is clearly still a need for research and work to develop and standardise life-cycle data on environment and health impacts on European basis, taking into account the assessment tools in use in several Member States (i.e. BREEAM in UK, Total Quality in Austria and the work carried out by the European LCA platform). Ultimately, this work should target the building system level and should be translated into clear and straightforward European standards for practitioners.

There is also scope to simplify the procedure for the certification of innovative construction products. Because of their innovative nature, such products and services will rarely fit the scope of harmonised standards and will need to be subject to independent assessments. In order to facilitate a mutual recognition of these assessments, there is a need for a coherent approach towards a common understanding of assessment procedures. It is essential that the assessment process provides the required reassurance. In the framework of the revision of the Construction Product Directive (89/106/EC), the Commission will explore the ways to improve the procedures to obtain the CE marking for innovative construction products and to reduce the related costs for small manufacturers or for manufacturers having to deal with

¹¹ Voluntary standard within the framework of the Integrated Product Policy

¹² Mandatory standard within the framework of the Construction Product Directive 89/106/EC

small series production. The procedure adopted for glass products (i.e. the “glass code”) could serve as an example for the rapid certification of innovative construction products.

5.3 Public Procurement

Public authorities should show the way to the market by including environmental, health and social aspects as part of their procurement policy. This is particularly relevant for public places such as schools, kindergarten, nursery homes, hospitals, etc. where children, elderly or other vulnerable population groups spend a large part of their time and where appropriate conditions concerning indoor air quality, lighting and noise are required. Helping the Contracting Authorities to better understand the advantages and disadvantages of using the “Economically Most Advantageous Tender” (EMAT) award mechanism, life cycle costs and the possibility for bidders to submit technical variants, could bring positive changes in the construction supply chain. The Commission, in cooperation with public bodies networks dealing with public procurement aspects, should develop an analytical framework which would allow the contracting authorities to motivate the choice of the award mechanism (EMAT or Lowest Cost) in a more objective way from a sustainability point of view. Such voluntary framework should also encourage a more systematic use of Life Cycle Assessment and Life Cycle Costing Approaches in both award mechanisms within a certain timeframe.

In order to develop a Life Cycle Approach, it is necessary to stimulate a stronger cooperation between the contracting authorities and the operational and maintenance services that have the knowledge of real performances of the construction asset and its utilities. Adopting innovative solutions would also require maintaining a market prospective function within the contracting authorities and developing a culture for a proper risk management plan in case of partial non compliance.

Public authorities and development agencies should therefore be better informed and trained on the legal possibilities and practical issues on how to apply sustainability criteria and Life Cycle Costs methods. This should cover the questions related to liability provisions and remedial costs when innovative solutions are implemented in construction works. The “Guide on dealing with innovative solutions in public procurement”¹³ published by the Commission provides a basis to this respect. Moreover, the Commission has recently commissioned a study to develop a common methodological framework for Life Cycle Costing, in particular for public procurement¹⁴. In the framework of the DEEP project (Dissemination of Energy Efficiency Measures in the Public Building Sector), supported by the „Intelligent Energy – Europe“ Programme, the Commission has financially supported the development of a guide for cost-effective sustainable public procurement¹⁵. The ongoing reflection on strengthening Green Public Procurement would contribute to develop common voluntary criteria for “priority” product and service groups, targets for central and local authorities and legal, strategic and economic guidance.

Any further guidance should distil previous work undertaken by the Commission and tackle the specific characteristics of construction works in an objective and practical way. In particular, it should explain the merits but also the conditions and the boundaries of applying rating systems which might be inspired by National Codes or by EU projects and

¹³ Commission staff working paper SEC (2007)280

¹⁴ http://ec.europa.eu/enterprise/construction/compet/lifecycle_en.htm

¹⁵ http://www.european-fair-trade-association.org/FairProcura/Doc/Brochures/Procura+_Manual_complete.pdf

standardisation work. The promotion of pilot tender schemes which take into account environmental, health and social award criteria and classes of life-cycle costs could help in this direction.

5.4 Systemic policies

Innovative services could transform the supply chain into a more efficient integrated process although this can be challenging due to the many actors involved in construction projects. Product manufacturers and specialist contractors are often in a good position to offer design services and advice on the service life of some components and on how they may be recycled and re-used. There is also room for other market actors in the supply chain who could specialise in financial services, performance contracting, etc.

Procurement practices and policies that will encourage the use of the expertise of suppliers will foster innovation in the construction process and deliver more sustainable construction assets¹⁶. In some EU countries (notably Denmark, Finland, the Netherlands, United Kingdom), there is strong support from both government and industry to rethink and improve the collaborative framework of construction contractors, professional services, industrial suppliers and the insurance sector. The Commission will launch a study in 2007 to analyse the conditions for the deployment of collaborative working in construction projects and for supporting the integration of SMEs in the supply chain.

The insurance sector might play a larger role in sustainable construction with insurance premiums being linked to the adoption of responsible management and influenced by the track record of companies. In UK for instance, the National House-building Council uses a “premium rating” mechanism associated to the ability of contractors to construct good quality homes that do not cause problems to their owners, and “premium refunds» given to builders at the end of the ten-year warranty period for homes which have not given rise to claims during that period. Many cases in Belgium have shown that a single insurance policy for all parties involved in a construction project avoids many causes of conflict and promotes a coherent construction team with shared interest.

The involvement of the insurance sector might take the form of enhanced monitoring and enforcement of standards set by existing processes or could extend to those standards being set by insurance interests (as happens, for example, in relation to aspects of fire safety). However, there is a need to ensure a trade-off considering that any proposals that might have the effect of raising costs and therefore prices for works could bring a competitive disadvantage for both insurers and construction firms. One way of addressing this is to promote the use of quality schemes, often linked to insurance or warranty arrangements. Such schemes enable firms that adhere to good standards – which can include environmental, health and safety, training, etc - to promote themselves under a ‘label’ that has customer recognition. The Commission might consider how support for the formation and promotion of such quality schemes might be enhanced, whilst avoiding market distortion through insurance labels.

¹⁶ Under consideration 8 of the Directive 2004/18/EC, a Contracting Authority may seek or accept advice which may be used in the preparation of the specifications provided. However, such advice should not have the effect of precluding competition.

The Commission services have planned to launch a study to assess the evolution of the national liability and insurance regimes in the field of construction and the potential role for the insurance sector in enforcing, and perhaps setting, agreed performance standards and alternative warranty and label schemes.

Finally, there is a need to analyse and assess the future needs for skills and competencies in enterprises of the construction sector, in particular with a view of improving the sector's uptake of recent developments and reducing its low innovative image. This should be done with sufficient anticipation of technological, economical and social developments and their likely impact on the functioning and organisation of the construction sector. The Commission will launch a study in 2007 to develop plausible scenarios in the medium term (5-10 years) and a hands-on practical strategy for upgrading skills and competencies in the construction sector, in particular for small and micro enterprises.

5.5 Market based instruments

Market based instruments (indirect taxation, targeted subsidies and tradable emissions rights) are employed to correct market failures and are usually well accepted by market actors.

Market based instruments can prove to be the appropriate instrument for meeting a well defined common interest objective, when they do not distort competition or create extra administrative burden for enterprises. The decision to use incentives should follow a thorough analysis of potential negative and positive effects which should include social, economic and environmental impacts. Alternatives should be considered, cost effectiveness of options should be compared, and the risks of imperfect implementation and unintended consequences should be carefully taken into account. In general, incentives should be clearly limited in scope and time.

The Commission Green Paper on market-based instruments for environment and related policy purposes seeks to start a broad discussion and consultation process on intensifying the use of economic instruments. Such discussion could include the identification of the most relevant options for the construction sector. It should be noted that the policy of subsidising construction in the EU Member States varies greatly. While some Member States have introduced indirect support by removing the tax burdens associated with building, in others a fixed amount of funding is available regardless of the investment sum.

6. Elements of validations

- Meeting with various European Technology Platforms (27 March 2007)
- Bilateral meeting with individual EU Technology Platform
- Consultation meeting with European Federations (24 April 2007)
- Presentation and discussion at a conference organised by the Forest Based Technology Platform (15 May 2007)
- Meeting with the Steering Group of the European Construction Technology Platform (23d May 2007).

- ETAP Forum on markets for sustainable construction (11 June 2007) where debates covered some of the issues discussed in this paper.

Summary of consultation with stakeholders:

Related initiatives

There are a number of initiatives from the EC targeting sustainable construction. It was emphasized that these initiatives are linked, since they relate to the same set of political priorities, but approach the issue from different policy angles. The possible Joint Technology Initiative on energy-efficient buildings would materialise in a public-private partnership focusing on research; the SET-Plan would focus on energy use; and the possible lead market action would focus on facilitating market take up of innovation in the field. Some actions developed in the Environmental Technologies Action Plan (for example in relation to green public procurement, technology verification, performance targets, championing good practices) could contribute to the lead market initiative, which reciprocally would contribute to reach the objectives of ETAP.

Scope

The Task Force on lead markets for sustainable construction has considered both “The rational use of natural resources and the users’ convenience and welfare”. The European industry federation found that this double approach appears attractive since increased convenience and healthiness of the building should lead to a faster uptake of new products. On the other hand, it needs to lead to a careful consideration of the different parameters for each policy action.

This approach had also been discussed amongst the European Technology Platforms (ETPs), but few representatives from ETPs feared that enlarging the scope has the risk to loose focus and impact. Some ETPs representatives noted that there is a strong market interest in energy efficient buildings, and that the potential for growth and market creation in this field was very clear for private investors. Other issues, such as indoor air quality, deserve attention but their market potential is actually not clear enough. The Task Force has estimated that the Lead Market initiative should adopt a balanced short to long term approach.

ETPs also pointed out that 'sustainable construction' does in fact include more elements than those addressed by the task force, aligned with the three pillars of sustainability. However, it would be challenging to address many intangible issues which would require further socio-economic research. The boundaries of the concept should be addressed carefully. They also suggested that in terms of communicating with a broad audience, the concept had to frame the initiative from the consumer's perspective. The two market drivers considered by the Task Force define quite clearly the ambition and the limits of the Lead Market initiative in the field of sustainable construction.

Regulations

The idea of an independent panel of stakeholders to assess the innovation potential and cumulative legislative effects was welcome by most industry federations. It was outlined that there was a scope for more transparent and simple administrative procedures and not especially for less regulation. The cross-border dimension of several regulations should be tackled in a better way.

Standards

There were comments about the difficulties of creating a European standard soon enough to support market needs. Moreover, sometimes standards are not developed to support the integration of different technologies. A standard on PV elements, for example, might not be sufficient to regulate how this element is integrated in construction – a standard for glass integrating PV, for example, would be more effective.

The role of insurance companies was welcome provided that independent technical assessment of the innovative products/services provides the required reassurance. The coherence between technical regulations and insurance practices should be taken into account. For instance, insurance sometimes does not cover a home owner who integrated a PV panel in his roof unless this was done when building the house, for example.

Public procurement

It was emphasized that public procurement was key in achieving market uptake of new technologies and materials in the construction sector. Some industry representatives stated that the EMAT procedure was more appropriate in a number of cases to assess the sustainability of different solutions. Life-Cycle Costing and the effective use of proposed variants should become a good practice in public procurement.

Others

Few stakeholders were of the opinion that a high level of awareness is not reached yet for sustainable construction, especially because many key decisions are taken on the basis of the lowest costs. The increased convenience and welfare should lead to a more natural uptake of new products, but the higher prices of innovative products/technologies remain a main barrier for their acceptance. The challenge is to move from a cost-driven market to a value-driven one. Communication should receive a higher priority within the mix of policy recommendations, together with the implementation of appropriate incentive schemes.

As regards the setting of voluntary targets to achieve sustainable construction and the monitoring of realistic indicators, many stakeholders confirmed the complexity of this exercise because of the insufficient scientific basis in this field. Further socio-economic research is needed.

7. ROADMAP

Policy Instruments	Objectives	Actions	Timetable	Actors
Legislation	Encourage the adoption of a performance based approach in national building regulations.	Screening of national building regulations to identify domains in which to integrate a performance based approach, based on individual reports from each Member State.	2008-2009	EC Member States
	Expand the scope of the Energy Building Performance Directive in accordance with the Energy Efficiency Action Plan.	Take advantage of the 2008 review of the Energy Building Performance Directive to extend its applicability and inclusion of Union-wide performance targets and evolving standards for new construction.	2008-2009	EC Member States Industry
	Analyse and assess the innovation potential and cumulative effects of EU and national legislations on innovative approaches in construction.	Industrial leader panel to carry out case studies on construction companies and related industries/services.	2008-2010	EC Industry
Public procurement	Develop guidance for the choice between EMAT and the Lowest Price and for the use of Life Cycle Costs in construction works - Promote Life Cycle Assessment for construction products (“Environmental Product Declaration”) and for buildings (standardisation work in progress).	Promote networking between public procurers and construction practitioners to develop such guidance and relevant pilot schemes. Test and validate these pilot schemes notably in cluster initiatives.	2008–2009	EC Member States Industry

Policy Instruments	Objectives	Actions	Timetable	Actors
Standardisation, Labelling, Certification	Develop voluntary performance targets to enable the implementation of incentives and other policy measures to promote sustainable buildings and construction practices	Define a framework, assessment method and benchmarks for assessing the sustainability performance of buildings and of the construction value chain	2008-2011	EC, Member States Industry, Research
	Develop European standards that allow taking into account sustainability aspects in construction design.	Expand the scope of Eurocodes in order to integrate other sustainability aspects in construction design, such as energy and environmental aspects.	2008-2011	EC Member States Industry
	Define the framework for technical assessment adapted to a rapid certification of innovative products to sustainability criteria.	Adopt the Construction Products Regulation, providing for better procedures to obtain European Technical Approvals and for better recognition in Member States for sustainability issues.	2008	EC, EP, Council
Complementary Actions	Show the business case for an effective supply chain and identify relevant contractual, management, financial and insurance arrangements.	Publish a guide on how to establish collaborative working schemes in construction projects, general provision of contractual, management and insurance rules as well as good practice for SMEs - Disseminate this guide to public and private investors, contractors and other market operators.	2008	EC Industry
		Analysis of the national liability and insurance regimes and assessment of the feasibility for the insurance sector to promote alternative warranty/label schemes.	2008-2009	EC Industry Insurance sector
	Anticipate the future qualifications and skills needs to uptake innovation in construction.	Propose scenarios for future qualification needs and develop an EU-wide strategy to facilitate the up-grading of skills and competencies in the construction sector.	2008	EC Industry Education systems

