The Fundamental Importance of Buildings in Future EU Energy Saving Policies

A Paper Prepared by a Taskforce of Actors and Stakeholders from the
European Construction Sector
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Executive Summary

The wide acknowledgement that there is an imperative need to improve energy efficiency in the European Union is very welcome although it comes at the eleventh hour in the challenge of keeping global temperature rises to below 2°C as compared to pre-industrial levels. The way of life enjoyed by Europeans is considered to be the most desirable on the planet with many developing regions aspiring to achieve the same quality of life for their citizens. It is therefore imperative that Europe leads the way to a sustainable, smart and inclusive future showing, by example, that the European way of life does not have to be unsustainably energy intensive. The recently adopted EU2020 Strategy is one good example of how the EU can lead in this field.

In the specific field of energy efficiency, the EU has set an indicative target of achieving 20% energy savings by 2020. The construction sector does not believe that the setting of indicative targets in such an important matter is adequate as past experience shows that binding targets, both overall and sectoral, are necessary to move all Member States to action.

The construction sector points out that the best, most cost effective and reliable way to achieve this 2020 target is to motivate and to establish the framework necessary for a total transformation in the way that the energy efficiency of existing buildings is addressed. It calls for future EU energy saving strategies and policies to place the deep energy renovation of existing buildings as the centrepiece of action and to bring into force the necessary accompanying measures in associated fields such as increased research, education and training, manufacturing and renovation capacity, high quality building certification schemes, balanced, progressive fiscal and financial incentives and effective compliance schemes.

This paper points out that there is a need to set binding targets for the deep energy renovation of existing buildings that are complementary to the strengthened requirements for new buildings set out in the recently recast Energy Performance of Buildings Directive (2010/31/EU). All renovations of buildings must ensure that the energy performance of the building after renovation is significantly better than it was beforehand and that the extent of increased energy performance must, in some way, be tied to the building regulations for new buildings in force in the relevant country. However, these must be viewed as minimum requirements. Additional requirements and progressively increasing fiscal and financial incentives are necessary to ensure that deeper renovations become clearly cost-optimal.

It will be necessary to increase the rate of deep energy renovation (of buildings) by a factor of two to three times the current rate of between 1.2% and 1.4% in the decades up to 2050 in order to reach the short and long term EU targets of reducing CO_2 emissions by 80-95% by 2050[1] as compared to 1990 levels.

The construction sector is ready to meet this challenge, but it needs the right policy and regulatory framework to be designed and implemented at national, regional and local levels in order to ensure that the realistic ambitions set out herein are achieved. Moreover, the challenge of boosting the energy performance of existing buildings can only be met if sufficient financial means are made available and are accessible. Here both the public and private sectors have significant roles to play in providing capital to ensure the viability of renovation projects on the required scale.

[1] See Council document at:
http://ec.europa.eu/energy/strategies/consultations/doc/2010_07_02/2010_07_02_energy_strategy.pdf

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The achievement of the objectives set out in this paper will require that Member States accept, at EU level, legally binding obligations to develop pertinent policy and regulatory frameworks and support mechanisms.

In this context it is important to ensure that national policy and detailed goal setting are based on sound knowledge of the building sector and that the public sector leads the way, followed shortly thereafter by the private sector.

It will also be necessary to introduce mandatory quantified savings requirements achieved by upgrading buildings to a certain level within a given timeframe (2020 and 2050) in sectors where this is deemed, technically and economically feasible. This means beginning with industrial, commercial, public sector, and public (social) housing, which represents more than 50% of the existing buildings stock (see Table 1). The age and condition of individual buildings will determine the extent of the renovations required.

When Energy Service Companies (ESCOs) and Energy Performance Contracts (EPCs) are used in both public and other buildings undergoing energy renovations, they shall always include an offer for a deep renovation solution, whenever this is technically feasible. The ESCO or EPC shall include information on progressive incentive schemes whenever these are available, as well as removal of administrative barriers, to encourage greater uptake of this innovative approach.

All financial support mechanisms should be designed to proportionately support renovations where the energy demand will be reduced by 50%, 75%, 84% or 90% over pre-renovation performance, depending on the condition of the building. It should be an overall aim that the fiscal and financial incentives will eventually lead to a situation where, by 2050, the stock of existing buildings will be improved by an average of 84% (factor 6) over existing levels of performance. In fact, the level of financial, fiscal or other support should be strongly linked to the level of improvement. No financial support should be provided if only minimum requirements are achieved.

To be able to implement such a comprehensive and deep renovation programme, Member States must ensure that industry and the rest of the building chain is provided with high quality, standardised, investment grade audits for residential, commercial and industrial buildings and associated industrial energy uses.

Finally, Member States will also have to ensure that there is an adequate number of qualified and certified experts to carry out comprehensive energy audits and to provide recommendations for measures for improving energy performance as needed, and to verify and control the quality of the measures undertaken.

1.0 Introduction

1.1 The European Commission has embarked on a series of inter-related policy and legislative initiatives that arise out of its overall goal to reduce CO_2 emissions by 80-95% by 2050. Key elements include the 2006 Energy Efficiency Action Plan (EEAP) and the 20-20-20 targets for 2020 on renewable energy, greenhouse gas emissions and energy saving adopted in March 2007.

1.2 An evaluation of the 2006 EEAP and a proposal for its revision are currently (July 2010) in preparation and there are indications that the revised policy will be adopted by the Commission in late 2010 or early 2011. The construction sector notes with concern that there seems to be a reduced focus on the significant contribution that the deep energy renovation of existing buildings can make to the achievement of the environmental and other ambitions of the EU. Only with a clear strategy, action plan and guidelines at EU level, and with subsequent implementation and clear roadmaps at national, regional and local level, will the financial sector as well as the building chain be able to mount and effectively carry out such a wide and deep renovation plan.

1.3 To address this concern, this paper outlines the main issues that the construction sector believes must be included in the new Energy Efficiency Strategy and in any associated policy and legislative measures that will address energy efficiency. The paper will also be made available to decision-makers and institutions at all levels of governance in the EU and Member States so as to bring the message of the construction sector regarding existing buildings to all persons who can influence the speed and level of ambition at which its recommendations can be put into action.

2.0 The E²APT Initiative

2.1 This initiative seeks first to bring together the actors and stakeholders in the construction sector at European level in order to devise a broadly accepted paper containing proposals that will be submitted to the European Commission, the European Parliament and other decision makers as an input to their deliberations on what should be included in any policies on energy saving with regard to buildings, in particular the existing building stock. These other decision makers include actors such as regional, local and city authorities that are in a position to consider adopting the recommendations and measures set out in this document in their own constituency. However, action at EU level is deemed vital to ensure rapid and co-ordinated implementation, with positive effects on access to financing and other resources, including trained personnel, improved technology and other factors.

2.2 The participants in this initiative are convinced that the proposals in this paper will have a stimulus effect in assisting the EU in achieving its major political objectives of ensuring a smooth exit from the global financial crisis, creating new, sustainable green jobs and contributing to a smart, inclusive economy. The technologies, processes and expertise required to achieve the targets set out in this document exist today, but there are not enough trained and skilled workers in the market at the present time to carry out the necessary work. Addressing this gap is a critical element of the required actions that must accompany the recommendations of this document. There exist a lot of other barriers, all of which must be addressed – lack of prioritisation, lack of up front money, or at least to prepare the project for financing and adapt the financing instruments to deep renovations and longer Life Cycle Costing (LCC) analysis. Also of importance is the issue of how to handle “hard to treat homes”, architectural heritage, etc. Such programmes as obligations to save energy placed on energy suppliers who focus on the cheapest and easiest way to carry out measures to fulfil targets must be tempered with quality control systems to ensure real and persistent savings. Alternatively, income from energy-related charges can be placed in national energy efficiency funds and managed by independent third parties in an open bidding process.

2.3 There has been a conscious effort made to include in this work all of the key players from the construction sector and several players not usually associated with such actions (see list of those consulted in Annexe 1). This unique coming together of civil society gives credibility to the recommendations and measures proposed in this paper and demonstrates that the construction sector, being aware of the opportunity being presented and of its responsibility to society, can come together behind a set of key issues that are of crucial importance to the EU and all of its citizens.

2.4 The work of the E²APT Initiative commenced in January 2010 with a first brainstorm meeting at which most of the participating organisations were present. This was followed by the setting up of a small Taskforce within which a three-person drafting panel was formed in order to prepare the various versions of this paper. The Taskforce has kept all involved organisations informed of its work by regular e-mail consultation. At all times during the process, the initiative has been kept open and transparent.

3.0 The Importance of Buildings to European Objectives

3.1 It is widely acknowledged that the use of buildings is the largest consumer of energy and the largest contributor to greenhouse gas emissions in the European Union. In fact buildings are responsible for about 40%[2] of energy consumption and about 36% of all greenhouse gas emissions. As a result buildings have a significant impact on the environment and on climate change.

3.2 It is estimated that there are about 210 million buildings in the European Union providing approximately 53 billion square metres of usable indoor space for our activities. These buildings are divided into the following types[3]:

Type	Number constructed before 1973	Number constructed after 1973	Overall percentage of total stock
Individual Private Residences	42,840,000	28,560,000	34
Private Apartment Buildings	17,640,000	11,760,000	14
Public (Social) Housing	16,800,000	8,400,000	12
Commercial Buildings	18,900,000	44,100,000	30
Public Buildings	5,040,000	11,760,000	8
Other (Leisure, Industrial…)	1,890,000	2,310,000	2
Totals:	**103,110,000**	**106,890,000**	**100**

Note:
The table above seeks to establish a baseline for the quantum of buildings in the European Union. The division into sub-sections of building types follows a generally accepted sub-division of the building stock and it is further broken down to reflect construction before the first major oil crisis in 1973 as the buildings built before that time were built in an era where there was little or no consciousness of the need to design for energy efficient performance.

3.3 The construction sector is one of the most important industrial and economic sectors in the European Union. Its annual turnover was estimated at €1.2 trillion in 2009, providing 7.1% of all employment and 29% of industrial employment in the European Union. Furthermore,

[2] Recital 3 of the Recast of the Directive on the Energy Performance of Buildings.
[3] Figures extrapolated from an analysis of the text of the report of the World Business Council for Sustainable Develoment entitled *Energy Efficiency in Buildings – Transforming the Market* and available at: http://www.wbcsd.org/includes/getTarget.asp?type=d&id=MzQyMDU

investment in construction represented over 51% of all fixed capital investments in that year[4]. The sector therefore plays an essential role in renewed economic growth for the European Union. Policy measures should help to foster growth in this key industry whilst reducing the sectors environmental footprint and helping to improve energy security.

3.4 Technological advances and new construction methods and techniques mean that in the very near future all new buildings in Europe can (and in the view of the E²APT should) be nearly zero energy buildings[5] that demand very little, or no, primary energy input in order to make them habitable and very comfortable. The estimated rate of new buildings per year in the European Union is slightly more than 1%, meaning that about 2.1 million new buildings are built each year. It is suggested that there is no need for the upcoming Energy Efficiency Strategy, or any other new policy instruments, to target these new buildings specifically, as the recast of the Energy Performance of Buildings Directive (2010/31/EU) already addresses this need. However, there is a strong need to ensure that the recast is effectively and rapidly implemented in all Member States and that compliance with its requirements is assured.

3.5 The big challenge for the European Union is therefore existing buildings as these represent such a high proportion of EU energy consumption and they will be with us for many decades to come. They will either behave as energy wasters or as energy savers – its our choice. It is estimated that the current annual renovation rate of buildings is about 1.2%, meaning that about 2.52 million buildings are renovated each year, but there is only limited knowledge about the nature and extent of these renovations. It is supposed that many of them are superficial with energy savings of around 20% instead of cost achievable savings potentials that are often in the range 70-90%. How significant the impact of current practices and approaches on the energy performance of renovated buildings has not been well established although it is evident that the risk of locking in savings potentials during the normal 30-year renovation cycle of a building is quite high.

3.6 It is to be noted that the recast Directive on the Energy Performance of Buildings (2010/31/EU) reinforces the requirements of the original Directive in this domain by requiring that buildings of all sizes undergoing renovation must comply with the requirements of the Directive once they are to be the subject of a major renovation. This provision allows Member States to choose to apply the requirement to buildings where either 25% of the surface of the building envelope undergoes renovation or where the total cost of the renovation works related to the building envelope or of the technical systems in the building exceeds 25% of the value of the building (excluding the land value).

3.7 Finally, the annual demolition rate of buildings is also not well recorded, but it is estimated at 0.1% per annum, meaning that only about 210,000 buildings are demolished each year.

3.8 From the above, we can see that a ***business as usual*** scenario where there are no binding requirements as to the share of buildings undergoing significant energy improvement renovations and where all new buildings are nearly zero energy buildings, means that it will still take around 90 years before all existing buildings are renovated – a period of time that is too long if the European Union is to reach its long-term goal of reducing CO_2 emissions by 80-95% by 2050. Achieving this long-term goal is essential if the EU is to make the necessary contribution to keeping the global increase in temperature below 2°C.

3.9 It is therefore necessary to set out a strategy and action plan at EU level and to set out national roadmaps or renovation action plans with clear guidelines on renovation of the existing building stock, taking into account the cost-optimal levels of renovation for different sectors of the building stock, as well as nearly zero energy aspirations. Technical and material needs, skills, financing and other requirements must also be included and clarified,

[4] Source: FIEC leaflet: Construction Sector in Figures, published 2010

[5] Source: Recast of the Energy Performance of Buildings Directive in which the definition of *nearly zero energy building* reads: "…a building that has a very high energy performance, determined in accordance with Annexe 1. The nearly zero or very low amount of energy required should, to a very significant extent, be covered by energy from renewable sources, including renewable energy produced on-site or nearby."

as well as establishing trigger criteria for when to initiate an energy performance-related renovation. One of the most important concepts for triggering renovations will be established by setting down a definition of what a *Deep Energy Renovation* of a building actually is and the way in which the energy performance dimension is thoroughly and systematically integrated into the renovation and thus to require, through binding measures, that all buildings undergoing renovation meet the standard of energy performance set down in the definition.

3.10 Another element in such a roadmap will be an overall EU-wide renovation target, most appropriately expressed as an increase in the current rate of renovation, combined with requirements for cost-optimal and deeper levels of renovation. A methodology for the weighted allocation of this target to each of the Member States in the EU is another important step that needs to be proposed and developed.

3.11 To meet the challenge of renovating Europe's existing stock of buildings and properly implementing any roadmap, innovative, equitable fiscal and financial incentives for building owners should be devised in each Member State or Region. Such financial support should be tailored to the needs of the building owner concerned, whether they are a landlord of a rented property, an owner-occupier or an owner of a commercial property. The E²APT notes with interest the development of *pay as you save* schemes that allow home-owners to pay for renovation works through savings in their energy bills. Other measures such as asset-based mortgages that follow the building rather than the owner of the building are another area of considerable interest being increasingly used, often linked to the property tax as a mode of payment. Reduced VAT on building works and tax incentives can also stimulate the market for renovation of existing buildings.

3.12 The aspect of affordability of energy saving measures for residents of renovated buildings must also be considered as a central issue of all future energy saving strategies and policies at EU and national level. This is particularly true in relation to the design of any fiscal or financial incentives as in most European countries the costs of a deep energy renovation could be passed to the occupants or tenants of the renovated building making monthly rents non-affordable. Such negative effects should be avoided in the drive to increased energy savings in buildings.

3.13 Furthermore, dynamic and participative communication campaigns are required to allow building owners, tenants and occupants to understand the importance of energy efficient buildings and, ultimately, to be linked to the overall objectives of improving the energy performance of buildings in Europe and thus to stimulate a higher renovation rate.

4.0 Definition of *Deep Energy Renovation of a Building*

4.1 As discussed above, it is considered essential to set down a definition of what a *deep energy renovation of a building* means in the context of the setting of targets for energy saving. Any definition should be devised in such a way that it can be tied to existing European Legislation, especially the recast of the Energy Performance of Buildings Directive, and to the relevant regulations that are in force at national or regional level. It is considered critical that the energy efficiency improvement measures proposed can have a strong impact on the consumption of primary energy sources. It is easier and, from a statistical point of view, more manageable to express targets in terms of end use consumption and to rely on established methods (at national and regional level and additionally by using the standards developed by CEN and those used by EuroStat in its work) for converting these to primary energy consumption figures.

4.2 The definition of a deep energy renovation should also acknowledge that overall energy performance could include an aspect of energy generation in, on or near the building itself from renewable sources, as reflected in the definition of nearly zero energy building included in the recast of the Energy Performance of Buildings Directive (2010/31/EU). In fact for buildings of historical or architectural merit, this aspect may be of considerable importance.

4.3 Detailed discussions in the E²APT indicate that devising a definition for *deep energy renovation* that takes close account of the approach adopted in the recast Energy Performance of Buildings Directive (2010/31/EU) for existing buildings, is the most appropriate way to ensure that the definition is widely adopted, while still maintaining a focus on energy performance. The E²APT believes that wherever possible all buildings undergoing a cyclical or major renovation should meet the improvements set out in the definition and it acknowledges the difficulty that is faced if the requirement is to fully match the requirement to have nearly zero energy buildings from 2021. Therefore, the following definition is proposed:

Deep Energy Renovation of a Building:
Means extensive works to a building in accordance with the definition in the recast Energy Performance of Buildings Directive (2010/31/EU) set out at 3.6 above that, while preserving any noteworthy architectural character, significantly improves the energy performance of the building such that it achieves a level of performance equivalent to factor 2 (50%), factor 4 (75%), factor 6 (84%) or factor 10 (90%) improvement in its energy performance as compared to its pre-renovation performance. The choice of factor will depend on the age and nature of the building and will have a direct effect on the extent to which it will be permissible to grant financial or fiscal incentives for the execution of works to the building.

These works may include the integration of appropriate renewable energy supply technologies in the building or from its immediate vicinity, but only after all cost-optimal energy demand reduction and passive energy efficiency measures have been incorporated.

4.4 The logic of tying the definition to a series of factored improvements in energy performance is that it will permit Member States or Regions to modulate their requirements depending on the age and technology of its existing buildings. Also, tying the factored improvements to the amount of financial incentives made available should ensure a greater incentive for building owners or occupiers to go further than they would otherwise have done as they will receive more support for achieving higher factor improvements to the energy performance of their buildings.

5.0 Binding Renovation Targets

5.1 In order to achieve the necessary levels of energy efficiency in buildings and thus the ambitious reductions in greenhouse gas emissions in the EU, it is suggested that targets are needed as a means of encouraging the rollout of large scale, systematic and quality-controlled renovation programmes. Such targets need to be well formulated, related to a common understanding of the level of improved performance needed, connected to financing and incentive systems and be fully co-ordinated. They also need to be supported by effective energy performance certificate schemes that allow investors and fiscal authorities to make a fair appraisal of the energy performance and savings potential of a building. To be effective, any targets, whether binding or voluntary, should be integrated into strong and coherent frameworks of definitions, incentives, certification schemes, inspections, compliance controls and other conditions, all as part of a negotiated package.

5.2 The E²APT recalls that the EU has already emphasised the fact that the improvement of the energy efficiency of buildings holds the potential to be one of the main drivers of the much-needed economic recovery in the EU. This assertion is fully supported by the actors and stakeholders in the construction sector who confirm that investment in the deep energy renovation of existing buildings can bring sustainable, smart growth and can create millions of new “green” jobs. Once an agreed target is set heavy investment in capacity building within the sector will be required, but these investments will be worthwhile and will bring quick, substantial returns. The targets and roadmaps will also help industries and other actors in the building chain to prepare for and gear up to meet this new challenge. It is estimated that for every euro invested in the construction sector a return of three euro accrues to gross domestic product. These investments will have to cover diverse elements such as training, technological development, research, new manufacturing processes and

facilities and ancillary services. In fact, it will be necessary to carefully plan the roll-out of the increased activity in the construction sector by the establishment of linked, integrated targets for other sectors such as education, production facilities, machinery production, transport, financing etc.

5.3 The nature of the targets for the quantum of buildings that should undergo deep energy renovations will have to be carefully considered so that they do not engender perverse or unintended effects in the future. For example, the E²APT wishes to emphasise the need to ensure that renovation work is undertaken by skilled tradespersons with training in the required techniques needed to deliver a more energy efficient building envelope and to assure the appropriate quality of the works undertaken. Indeed, targets for renovation cannot be achieved at the expense of quality workmanship.

5.4 The E²APT firmly believes that the long-term target should be that all existing buildings (about 210 million) should be renovated to the definition set out above before 2050. This gives a period of 40 years in which to carry out all of these renovations. This means that it will be necessary to ensure that an average of about 5 million buildings a year over the entire 40-year period are renovated to the prescribed levels. Bringing this into line with the new EU 2020 Strategy means that the target for the coming decade should be to aim to deeply **renovate about 50 million buildings by 2020** – this represents more than a twofold increase in renovation activity over and above the *business as usual* scenario set out in more detail further above.

6.0 Conclusions, recommendations and way forward

6.1 In conclusion, the E²APT calls on the EU and on national, regional and city authorities to introduce more stringent measures and mandatory requirements in their legislative and policy work on the deep energy renovation of existing buildings. It believes that it is urgent to build the necessary frameworks that will permit at least a doubling of the capacity of the construction sector so that it can undertake the deep energy renovation of all existing buildings by 2050. The provision of adequate training in the skills linked to energy efficiency to practitioners and tradespersons across the sector will be key to this, as will a financing framework.

6.2 The essential interim target is that **50 million buildings** must be given a deep energy renovation (at an average factor 6), in accordance with the definition provided in this paper, by 2020 and to achieve this a transformational approach is needed at EU and Member State levels on how the sector is structured and how it operates. For this purpose a **high-level taskforce** consisting of persons that can, by their position in their company or institution, effect real change in the market should be established in order to devise the necessary roadmap and fiscal and financial framework with milestones for the achievement of the recommendations in this paper.

End

The attached Annexe lists organisations consulted by the E²APT initiative.

Annexe 1

List of organisations involved and/or consulted under the E²APT Initiative:

Acronym	Name	Website
ACE	Architects' Council of Europe	www.ace-cae.eu
BPIE	Building Performance Institute Europe	http://www.bpie.eu/
CECED	European Committee of Domestic Equipment Manufacturers	www.ceced.eu
CECODHAS	Comité Européen de Coordination de l'Habitat Social	http://www.cecodhas.org/
CEMR	Council of European Municipalities and Regions	http://www.ccre.org/
CEPMC	Council of European Producers of Materials for Construction	www.cepmc.org
E2BA	Energy Efficient Buildings Association	www.e2b-ei.eu
EEB	European Environmental Bureau	http://www.eeb.org/
ECCREDI	European Council for Construction Research, Development and Innovation	www.eccredi.org
ECEEE	European Council for an Energy Efficient Economy	http://www.eceee.org/
ECF	European Climate Foundation	www.europeanclimate.org
ECN	European Climate Network	www.climnet.org
ECP	European Concrete Platform	http://www.europeanconcrete.eu/
ECTP	European Construction Technology Platform	www.ectp.org
EFCA	European Federation of Engineering Consultancy Associations	www.efcanet.org
EIB	European Investment Bank	http://www.eib.org
EPE	European Partners for the Environment	http://www.epe.be/
ES-SO	European Solar-Shading Organisation	http://www.es-so.eu
EURIMA	The European Insulation Manufacturers Association	http://www.eurima.org
EuroACE	The European Alliance of Companies for Energy Efficiency in Buildings	http://www.euroace.org/
EUROCITIES	EUROCITIES	http://www.eurocities.eu/main.php
FIEC	The European Construction Industry Federation	www.fiec.org
IUT	International Union of Tenants	http://www.iut.nu/
PU-Europe	PU-Europe	http://www.pu-europe.eu
RAP	Regulatory Assistance Project	http://www.raponline.org/

REHVA	Federation of European Heating, Ventilation and Air-conditioning Associations	http://www.rehva.eu/
RICS	Royal Institution of Chartered Surveyors	http://www.rics.org/
TBE	Tiles and Bricks Europe	http://www.tiles-bricks.eu
UEPC	European Union of Developers and House Builders	http://www.uepc.org
WWF EPO	WWF European Policy Office	http://www.panda.org/eu
-	Energy Cities	http://www.energy-cities.eu/
-	The Centre	http://www.thecentre.eu/place
-	Glass for Europe	www.glassforeurope.com

End of list