

# Mapping Out an Integrated Policy Approach for Energy Savings in Europe's High-Rise Residential Buildings

P. Guertler and W. Smith

*Association for the Conservation of Energy, London, N1 8PT, UK*

## **ABSTRACT**

In the context of pressing and frequently conflicting environmental, economic and social policy objectives, energy efficiency investment is repeatedly found to be a cost-effective and reconcilable component of energy policies. High-rise residential buildings are a particularly salient issue in this regard as their poor energy efficiency is regarded as a “moderate” to “major” problem by 18 out of 27 housing ministries respondent to a Europe-wide survey. Yet no research exists on the European picture of the potential for energy efficiency improvement in high-rise buildings, nor on ways to achieve this potential.

Taking into account the present EU25 plus Bulgaria, Romania and Turkey, this paper – based on research funded by the IEA and the EuroACE – very briefly illustrates the scope for increased energy efficiency in high-rise buildings and the benefits investment in energy efficiency in these buildings can provide, including the cost-effectiveness and CO<sub>2</sub> mitigation cost of this investment. Following this assessment of current potential, and based on a map of the political, economic, social and legal opportunities for and barriers to financing and implementing the necessary energy efficiency investment, policy steps are identified and proposed which form the integrated policy approach needed to exploit the energy-saving potential in this sector.

## **KEYWORDS**

high-rise buildings, residential energy efficiency, European strategy, integrated policy, refurbishment

## **INTRODUCTION: ENERGY EFFICIENCY POTENTIAL IN THE HIGH-RISE STOCK**

Buildings in general suffer from a variety of barriers that tend to prevent their occupants from maintaining and refurbishing them to the levels of comfort and energy performance that would be justified over the longer term, but collective housing is particularly susceptible to market failures. Many occupants do not own the property while their landlords usually have little motivation to finance improvements. Refurbishment requires collective agreement on a capital investment, which is difficult to establish especially when some occupants expect to live in the building over the longer-term but others only for the short-term. Furthermore, in most cases the occupants of high-rise residences are not among the wealthier members of society and they find it difficult to raise capital for longer term investments. It is not surprising, then, to find that this section of the building stock is the most neglected and that there remain significant cost-effective opportunities for it to be refurbished in a way that improves comfort, saves energy, reduces CO<sub>2</sub> emissions and significantly improves the urban environment.

This paper is based on a research project funded by the International Energy Agency and EuroACE (the European Alliance of Companies for Energy Efficiency in Buildings) (Guertler & Smith 2006), which investigated the potential for energy savings in high-rise residential buildings in Europe – defined by the 3rd European Housing Ministers' Conference on Sustainable Housing, in Genval, Belgium in 2002, as multi-family buildings with more than four storeys (Ministry of Walloon 2002). The paper maps out an integrated policy approach for the incorporation of energy efficiency improvements into widely needed overall refurbishment as a central element of sustainable refurbishment. In the research project, the 28 countries covered were organised into eight groups, according to socioeconomic category ('old' EU members (EU15), 'new' (EU10) and accession (AS3) states) and climate (using three heating degree day bands: warm, moderate and cold).

Not all possible energy efficiency improvements were considered quantitatively. The quantitative modelling assessment incorporated wall, roof and floor insulation, window replacement, and improvements to the heating system – all in terms of their effect on reducing heating demand. Many other measures, including external solar shading and the effect of insulation on reducing cooling energy demand (potentially significant in reducing energy demand in hot, humid climates), passive solar design, ventilation strategies, the reduction of internal heat loads and lighting play an important role in reducing energy demand in high-rise buildings, but fell outside of the scope of the quantitative assessment examining the cost-effectiveness and amount of energy and CO<sub>2</sub> savings.

Some 36 million European households are in high-rise residences, one in six of all households (PRC Bouwcentrum International 2005), and yet many of the buildings are in urgent need of refurbishment. The research project highlighted a Europe-wide cost-effective energy saving potential of 28% from energy-efficient refurbishment of the high-rise residential building stock. Attainment of this potential would imply a 1.5% reduction of Europe's total final energy demand and CO<sub>2</sub> emissions savings of 35Mt. In practice only the less efficient buildings need to be refurbished to realise these stock-average savings and for these buildings typical savings in heating energy from refurbishment of between 70% and 80% were identified. See Guertler and Smith (2006) for the full detail of these findings.

## **MAPPING OPPORTUNITIES FOR AND BARRIERS TO AN INTEGRATED POLICY APPROACH**

Having identified that there are substantial benefits associated with improving the energy efficiency of high-rise residential buildings, in practice the realisation of the significant energy and emissions saving potential is faced with a number of institutional, economic, legal and social barriers, but also opportunities. A comprehensive assessment identified the following opportunities and barriers as significant, needing to be exploited or addressed collectively in order to develop an integrated policy approach.

### **Politically and institutionally,**

The capacity to gain an accurate picture of the state of high-rise buildings, to administer financial instruments and ensure best practice is applied in the refurbishment of the high-rise stock is crucial. A number of important European projects, notably Opet Building (Opet Network 2006), SUREURO, LOCOSOC and the project underlying this paper can contribute to filling gaps in knowledge and know-how.

Rapid privatisation and the much higher proportion of privately owned housing in EU10 and AS3 countries (Guertler & Smith 2006) poses specific (but not exclusively) institutional challenges to refurbishment, requiring new approaches and partnerships. Public-private partnership approaches to refurbishment could hold much promise, though experience is thin on the ground.

### **Financially and economically,**

Energy prices are a key determinant of the attractiveness of energy efficiency investment. With the lowest European prices likely to rise more rapidly than others, the incentive to save energy should strengthen and the target groups of new and existing financial instruments to promote energy efficiency in high-rise buildings would become more receptive to them. In this context, there is an important opportunity in the extensive European body of knowledge surrounding the design and implementation of effective financial instruments.

Flat-rate tariffs associated with district heating provision in EU10 and AS3 countries in particular, so common in the high-rise stock, pose a significant barrier in that they do not create any incentive on the part of the householder to save energy and thus undermine the effectiveness of financial instruments. In these cases, incentivising district heating suppliers to save their customers' energy by providing a full energy service or third-party financing agreements may supply another means by which to improve high-rise energy efficiency.

Financial incentives designed to link to the Energy Performance of Buildings Directive's (EPBD) certification requirements – and to the Energy End-use Efficiency and Energy Services Directive (ESD) – present a powerful opportunity to strengthen the case for incorporating energy efficiency improvement into refurbishment.

The effect of the economic cycle and interest rates on housing expenditure and competing priorities for investment (Davis & Heathcote 2005) – in particular for public funds – serve to highlight the fact that most investment in high-rise buildings is needed where the least is forthcoming, mainly in EU10 and AS3 countries (PRC Bouwcentrum International 2005), as illustrated in Figure 1.

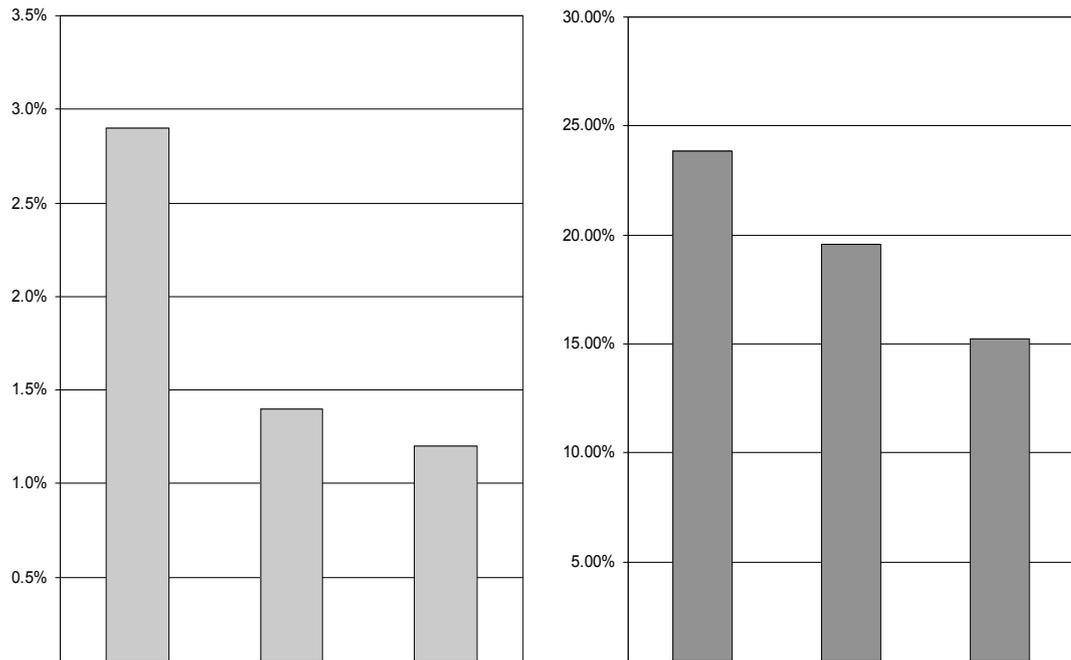


Figure 1: Percentage of state budget and percentage of household budget spent on housing

### **Legally,**

The EPBD's transposition into Member States' legislation offers a central legal opportunity to drive the improvement of high-rise energy efficiency as part of the refurbishment cycle. The Directive stipulates that whenever a building with a total useful floor area of over 1000m<sup>2</sup> undergoes major renovation, its energy performance must be upgraded to meet minimum requirements. This fits the profile of high-rise buildings and matches the argument for integration of energy efficiency into refurbishment: the chance must be taken to ensure the transposition of the Directive interprets it this way.

The ESD addresses a wide range of barriers, including the removal of competing incentives in the interests of saving energy, the creation of a market for energy services and the requirement to introduce individual metering and billing for each end-user. Potential synergies with the EPBD exist, and the opportunities these present must be investigated further.

Widespread inadequate legislation or procedures governing the collective ownership of, and decision-making about high-rise buildings or estates pose a significant barrier to implementing energy efficient refurbishments (Guertler & Smith 2006). Effective laws or codes of conduct are essential, particularly in EU10 and AS3 countries where inadequate governance structures are widespread (Guertler & Smith 2006, PRC Bouwcentrum International 2005).

### **Socially,**

Marketing and energy advice appropriate to the energy use culture and tailored to the individual to ensure energy efficient systems are used effectively is an essential

opportunity to be taken with any refurbishment, in particular to counter the barrier of entrenched energy use practices, such as opening windows and/or using secondary heating systems in response to the widespread problem in high-rise buildings of over- and/or under-heating.

The potentially collective nature of living in high-rise buildings should be harnessed to get residents to support each others' energy-saving behaviour, especially in lieu of the requirements for individual metering and billing.

Employing tried and tested methods of holistic stakeholder involvement with both pre-refurbishment consultation and post-refurbishment evaluation of stakeholders' views, helps strengthen communities, helps eliminate potential problems before they arise and contributes to the body of good energy efficient refurbishment experiences (Guertler & Smith 2006), in turn helping to improve the often negative perception of high-rise living (Land 2002).

## **MOVING TOWARDS AN INTEGRATED POLICY FOR HIGH-RISE BUILDINGS**

In recognition of the cost-effective and very substantial CO<sub>2</sub> emissions reductions that can be achieved, especially in EU10 and AS3 countries but also in EU15 countries with the existing pattern of energy prices, it is proposed – on the basis of the mapping of the significant opportunities and barriers surrounding high-rise residential buildings – that policy makers:

- Recognise the inherent market failures and barriers to energy efficiency refurbishment that apply in the building sector as a whole, but most acutely in multi-tenanted residences, and devise and implement policies to remedy them.
- Incorporate energy efficiency improvement as a legal requirement whenever refurbishment is undertaken in high-rise buildings to maximise the cost-effectiveness of investment, in line with the spirit of the Energy Performance of Buildings Directive.
- Close gaps in building or estate level condominium legislation and collective decision-making rules to facilitate refurbishment.
- Prepare for energy market liberalisation, in particular in EU10 and AS3 countries, and ensure that individual metering and billing replaces the existing energy consumption infrastructure, in line with the spirit of the Energy End-Use Efficiency and Energy Services Directive.
- Consider implementation of framework energy efficiency delivery mechanisms – such as the UK Energy Efficiency Commitment or the Italian and French white certificate schemes – that could be used, amongst other purposes, to fund energy-efficient refurbishment activities.
- Facilitate and support the creation of new European funds to accelerate sustainable, energy efficient refurbishment – especially for EU10 and AS3 countries where it is most needed, and because no structural funds for housing or energy demand management exist as yet. Moreover, on a national level, consider:
  - Adopting Danish-style requirements for condominium dwellers to contribute a small monthly payment to a refurbishment fund;

- Introducing fiscal incentives for refurbishment such as tax-deductions for refurbishments that improve the overall energy performance of the building or lower rates of tax on the rental income of landlords that improve the energy performance of their rental stock;
- Developing specific additional funds and obligations for energy-efficient refurbishment in the case where high-rise residences are publicly owned.
- Link all of the above actions to the implementation of the Energy Performance of Buildings and Energy End-use Efficiency and Energy Services Directives, to exploit as well as inform the legal and institutional infrastructure being put into place to support them.

Taking the opportunities and overcoming the barriers outlined in this paper will require work to synchronise the objectives of various government departments and other authorities involved in the delivery of sustainable housing and energy. To this end there is a need to employ consistent methodologies across government to quantify the wider benefits of energy efficiency improvement and to commission further research to identify the most innovative forms of financing.

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