ENERGY EFFICIENCY IN EXISTING BUILDINGS: THE ROLE OF BUILDING REGULATIONS

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ABSTRACT

It is widely recognised that making significant reductions in carbon emissions from the building sector will require considerable improvement to the energy efficiency of the existing stock. Both the UK government in its White Paper on energy policy (DTI, 2003) and the European Union (EU Directive, EU 2002) stress the importance of building regulation in helping to bring about the improvements required. Technological solutions are available and well understood but are often not applied. Alteration and renovation works provide an opportunity to carry out improvements at marginal cost and there is a considerable amount of guidance available on how this may be done, particularly for domestic and small non-domestic buildings (EST 2003). Given that building regulations are triggered when building work and/or a change of building use is proposed, they provide a potentially important vehicle for taking opportunities to improve energy and CO_2 performance. However, in their current form the UK regulations are not well suited to taking full advantage of the opportunities provided by renovation and repair works. In seeking to unlock this potential a number of important questions are raised about the role of building regulations and the principle of non-retrospection on which they are based. This paper reviews existing regulatory provision and discusses ways in which it could be modified or new mechanisms developed so as to have a greater impact on the performance of existing buildings.

Key words: Energy efficiency, Building Regulation, Renovation, Repair, Climate Change.

INTRODUCTION

In its review of energy and climate change, the Royal Commission on Environmental Pollution (RCEP) concluded that in order to stabilise atmospheric carbon concentration at a level of 550 ppmv[1] the UK should seek to reduce carbon dioxide (CO_2) emissions by 60% from current levels by around 2050 and by almost 80% by 2100 (RCEP 2000)[2]. This recommendation has been accepted by the UK Government in its Energy White Paper (DTI 2003), a paper that marks a watershed in Government energy and environmental policy. Given that CO_2 emissions associated with the

[1] Parts per million by volume.

[2] The stabilisation target of 550 ppmv is about double the pre industrial level and is a pragmatic consensus figure that seeks to balance the minimisation of adverse effects with the difficulties of achieving global convergence. The UK reduction requirement assumes that all nations would converge on a uniform per capita share of emissions by about 2050 with further contraction in all countries beyond that date (convergence and contraction). It assumes, also, that 2050 would be the population cut-off point for the purposes of national per capita CO_2 quotas.

construction and operation of buildings in Europe account for between 40 and 50% of total emissions, it is not surprising that the building sector has become one of the key areas for emission reductions. This is reflected in both the requirements of the European Parliament Directive on the Energy Performance of Buildings (EC 2003) and the White Paper, both of which require significant developments in building regulation as they impact on new and existing buildings.

As a result of the EU directive and the White Paper the UK government are undertaking a review of the energy efficiency provisions in its building regulations and by the time this paper is delivered (September 2004) it is anticipated that the review will be in its consultation phase (see ODPM in press). This conference paper seeks to contribute to the debate through a review of existing provision and a discussion of ways in which regulation could be modified or new mechanisms developed so as to ensure that regulation is used to maximum effect in the effort to improve the energy performance of existing buildings.

THE IMPORTANCE OF EXISTING BUILDINGS

In the UK and Europe the building stock has a long life and replacement rates are very low. Figure 1 presents data on change in the housing stock for the UK, Denmark,The Netherlands and Germany, which together make up some 41% of the pre 2004 EU total. It is clear that with replacement rates of less than 0.1% and new building rates of over 1% construction activity results in stock growth rather than replacement. Although improving the energy performance standards of new buildings is important it would require a dramatic change in replacement rates[3] for this to make a significant contribution to CO_2 reductions in the next 50 to 100 years. The absence of reliable data on the non-domestic stock makes it difficult to be clear about the precise figures but it is widely accepted that the overall picture is likely to be little different from that in the housing sector.

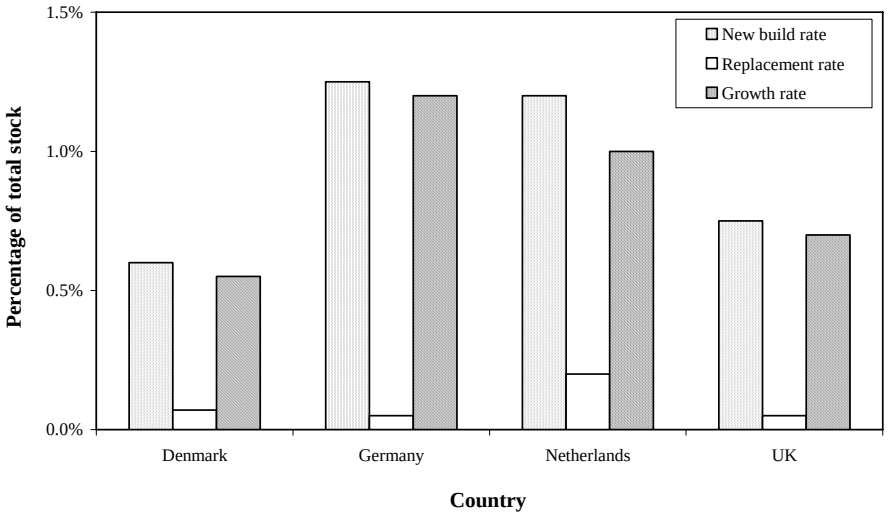

Figure 1 Housing stock change characteristics (Source: Hartless 2004)

[3] This would mean clearance and rebuilding activity the like of which has never been seen, even during the UK's clearance and rebuilding programmes of the 50s and 60s.

Given the evidence on replacement rates, there can be little doubt about the importance of improving the existing stock, however this still leaves two key questions that arise from the RCEP report (RCEP 2000) are; can a 60% reduction be achieved by 2050 and what would be required to achieve it? The evidence presented below, based on modelling work in the housing sector, would suggest that it is achievable using existing technology but that a significant increase is required in the rate at which fabric and end-use efficiency measures are applied to both new and existing dwellings (Johnston et. al., in press). Figure 2 illustrates a series of modelling scenarios that explore possible improvement trajectories. As its name implies, the Business as Usual scenario represents an approach based on current trends in fabric and end-use measures and a steady decline in the carbon intensity of electricity. For example, the penetration of cavity wall insulation is assumed to reach 80% by 2050, an assumption derived from previous work on market penetration S-curves (Shorrock & Uttley 2003 after Shorrock et. al. 2001). It is clear from figure 2 that this approach is unlikely to go much more than half way to the reduction target with a predicted reduction of just over 35%. However a more vigorous approach to reducing demand (the demand side scenario) through efficiency measures (even allowing for such things as growth in the number of households) could meet the target and if the downward trend in the carbon intensity of electricity[4] were accelerated by technological improvement and an increase in the proportion of renewables (the integrated scenario) the reduction could be over 65%.

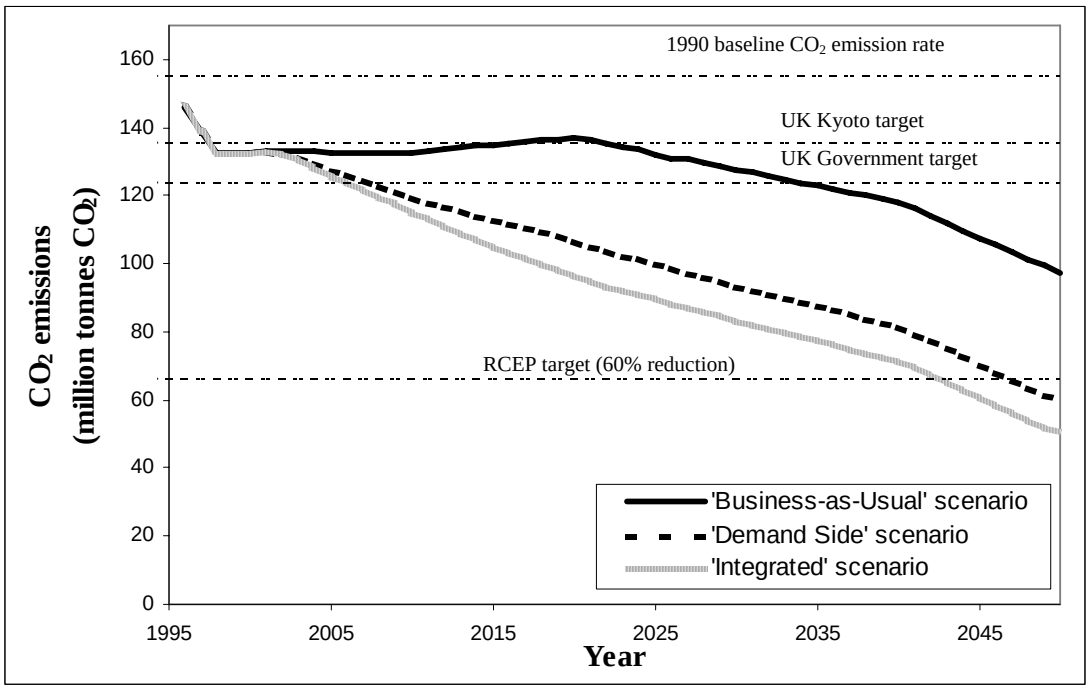

Figure 2 CO_2 emission predictions for modelled scenarios - 1996 to 2050
(source: Johnston et. al., in press)

[4] The carbon intensity of electricity has fallen considerably since the 1950s as efficiencies and fuel mix have improved. In 1950 carbon intensity stood at around 430 kg(CO_2)/GJ reducing to around 110 kg(CO_2)/GJ in 2000. The BaU and Demand Side scenarios assume a steady decline to 92 kg(CO_2)/GJ by 2050 but the integrated scenario assumes that with an acceleration in the application of technology and a significant increase in the use of renewables, the carbon intensity of electricity could match that of gas (51 kg(CO_2)/GJ) by 2050.

Further exploration of the position in 2050 under the various scenarios is presented in figure 3. This reveals that although space heating demand can be reduced significantly, it will remain the dominant contributor to CO_2 emissions from housing in 2050, at around 50% and, as figure 4 illustrates, even in 50 years time, the pre 1996 stock (base case year) will be responsible for almost all of the space heating related emissions across all scenarios. Given the low stock replacement rates in the last 40 or 50 years the importance of improving the existing stock has long been recognised but, for housing at least, what figures 3 and 4 illustrate is just how crucial improvements to the existing stock will be if the target of a 60% reduction in emissions is to be achieved.

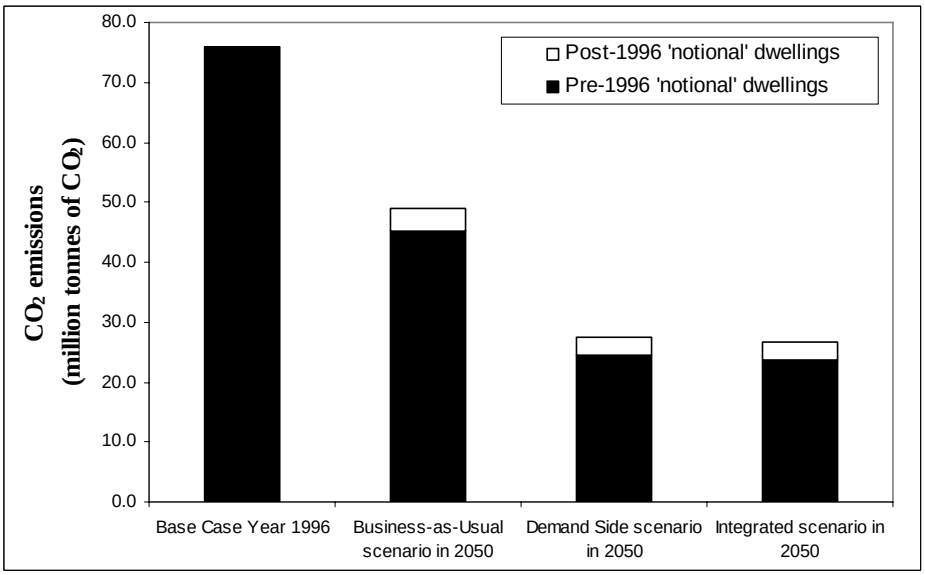

Figure 3 Total CO_2 emission predictions for modelled scenarios in the year 2050. (source: Johnston et. al., in press)

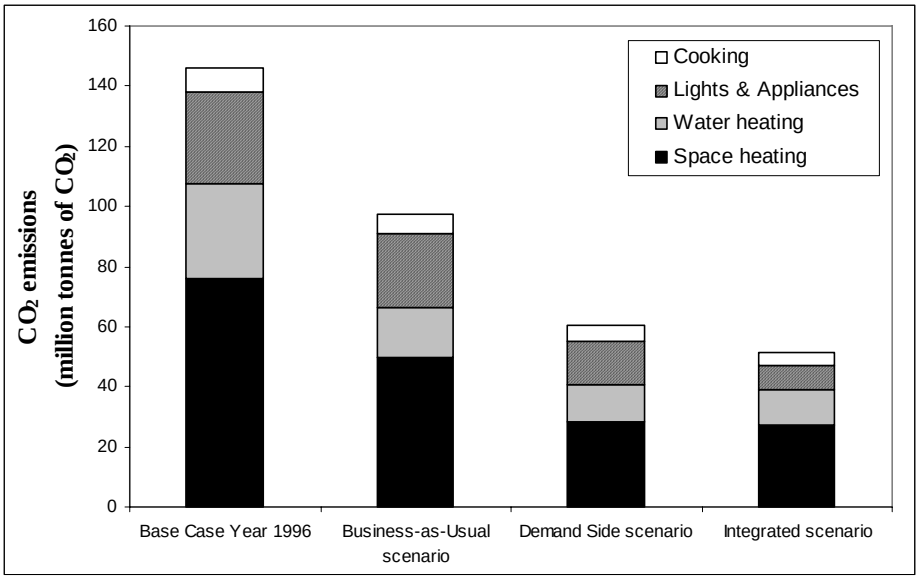

Figure 4 CO_2 emission predictions for 2050 that are attributable to space heating; pre and post 1996 stock. (Source: Johnston et. al., in press)

Both the Energy White Paper (DTI, 2003) and the European Directive (EU 2002) stress the importance of building regulation in helping to bring about significant improvements. Many of the technological solutions are available and well understood but are often not applied. Alteration and renovation works provide an opportunity to carry out improvements at marginal cost and there is a considerable amount of guidance available on how this may be done, particularly for domestic and small non-domestic buildings (EST 2003a). However achieving improvements in existing buildings presents considerable difficulties since so much depends on the actions of individual owners and occupiers for whom the long term problems of climate change have little saliency. This is illustrated clearly by the experience of implementing the Home Energy Conservation Act (1996), which required Local Authorities to embark on plans to achieve a 30% reduction in energy consumption by 2011. It is now widely recognised that the target will not be achieved and, in any case, the lack of publicly available and reliable data from the fuel utilities on energy consumption in each area would prevent local authorities from knowing whether they had achieved it (ECEP 2000). The last 10 years is littered with initiatives aimed at improving the existing housing stock but with, at best, very modest success. Put bluntly, there are very few points of leverage that a local authority can use to encourage improvement and many opportunities are lost. Building regulation provides a crucial intervention point and one that is likely to become of increasing importance over the next 10 years. This paper seeks to explore the role of regulation in capturing such work and in making the most of the opportunities presented.

EXISTING REGULATORY PROVISION

UK Building regulations are made under the Building Act 1984 and consist of a set of requirements under different parts of the regulations dealing with all aspects of construction (parts A-N). The regulations are supported by approved guidance documents that give practical effect to the legal performance requirements. Part L (Conservation of fuel and power) sets out the requirements with respect to the energy efficiency of buildings[5]. The following mechanisms are defined in the regulations and the supporting approved documents in relation to works to existing buildings:

- Extensions
- Material alteration
- Material change of use
- Provision or extension of a controlled service or fitting

It is important to recognise that these mechanisms are not exclusive to part L and that the ramifications for other parts and for the structure of the Regulations in general will need to be accommodated.

In broad terms, the regulations make use of these devices by including them in the definition of building work to which the whole of the regulations apply. For example, window replacements, which were included in the definition of building work in 2002, not only have to comply with part L but also with any other relevant parts of the

[5] Part L is supported by two approved documents Approved Document L1 (ADL1 – DTLR, 2001a) concerns dwellings and Approved Document L2 (ADL2 – DTLR, 2001b) deals with buildings other than dwellings.

regulations such as part N (glazing safety) and, in accordance with regulation 4(2), should not make the building in general any less compliant than it was before the proposed works. The scope of each mechanism is however restricted by its definition and mode of operation. For example, in most cases, the replacement of a flat roof covering would lie outside the definition of a material alteration or the provision or extension of a controlled service or fitting and therefore would not be subject to regulation. The practical effect of the requirements is conditioned by the guidance contained in the approved documents in that they provide guidance on what is considered to be "reasonable provision" and in the case of guidance in part L with respect to existing buildings (see ADL1- DTLR, 2001a and ADL2 – DTLR, 2001b) this is often a much lower standard than would be applied to a new building. In many cases guidance militates against the enforcement of any improvement at all.

One of the key issues in seeking to extend regulation is the potential barrier erected by adherence to the non retrospection principle. Regulation 4 (2) deals with the impact of regulated building work on the building, its services and fittings, in which the works take place. The principle adopted is that the building (or service or fitting) must either comply with applicable parts of the regulations (unlikely in the case of most older buildings) or must not be made any worse than before the works were carried out. This means that any works that take place can be made to comply with current requirements (where reasonable to do so) but there can be no requirement to upgrade the performance of other parts of the building. This is based on the principle that regulation should not be retrospective and that buildings constructed under previous regulatory regimes should not be made to comply with new standards. In general it is hard to criticise such a position but, given the imperatives with respect to reducing CO_2 emissions from the existing stock this principle presents a significant barrier to the effective use of building regulation in this area.

The picture that emerges is a complex one and although such complexity may be unavoidable it is important to recognise that complexity often leaves considerable room for, loopholes, differences of interpretation across the building control community and legal argument, all of which, tend to make the regulations less effective than otherwise. The following sections attempt to unravel the implications of each mechanism.

Extensions and other associated new building works

Works in this category are treated in the same way as for a new building with the application of regulation to the new works only. The junction with the existing building would be regulated under the rules on material alteration (assuming that there are structural or fire protection impacts) but, since in most cases the non retrospection principle will apply, no works would be required to improve the energy efficiency of the existing building. Thus, in a cavity walled dwelling the walls of a small extension would have to have a U value of 0.35 W/m^2K but the unfilled cavities would remain at over 1 W/m^2K. The same would apply to the insulation of other elements.

Figure 5 illustrates an extreme example of the difficulties that can arise. It illustrates a new building under construction but involving the retention of an existing facade. Photograph 1 shows the new structure under construction against an existing façade and, as a new structure, it is required to comply with all regulations, however as indicated in photograph 2 there appears to be little intention to improve the insulation

of the retained wall[6]. In a scheme as extensive as this it is hard to understand why the whole scheme could not be treated as a new building and insulation improvements to the retained walls insisted upon. The problem lies not with the regulations themselves but with the guidance in ADL2 (DTLR, 2001b). Under the definition of material alteration (see below) works to the existing structure would be defined as building work and as such the whole of part L would apply. However, the guidance in ADL2 indicates that wall insulation improvements would only be required when "substantially replacing" a wall. Since the existing wall is not to be "substantially replaced", it would be a brave building control officer to insist on insulation improvements against the wishes of a determined developer.

Photograph 1

Photograph 2
(note the lack of insulation improvement to the retained facade)

Figure 5 The application of regulation in the case of façade retention.

Material alteration

In its current form, the definition of material alteration is restricted to considerations of structure (Part A), fire (Part B) and access to and use of buildings (part M)[7]. Any alterations to an existing building that, if poorly executed, would make its structure less stable, make structural fire protection worse or reduce the efficacy of existing provision for the disabled would be classed as building work under this definition. The classic example is where the owner of a terraced house wishes to create a through-lounge by forming an archway between the front and back room. The implications of this for part L is that once work is defined as a material alteration (building work), part L can be applied to any new work required and the guidance in ADL1 and ADL2 indicates what would be considered "reasonable provision". An example here would

[6] A check with building control indicated that there was no intention on the part of the developer to provide improved insulation in this case.

[7] Part M has recently been amended by the Building (Amendment) regulations 2003, which come into effect in May 2004 under the new title of "Access to and Use of Buildings".

be where an existing house wall is not adequate to take an increased load and needs to be rebuilt. In such a case part L would be applied to the new construction and the guidance in ADL would require a "reasonable thickness of insulation"

Although, on the face of it, this would seem a useful tool, its application is very restrictive. Many works that provide opportunities to improve efficiency standards would not come under the definition at all and even if part L were included within the definition there would be no requirement to improve, only not to make worse. This is akin to the current position on the inclusion of part M since the definition does not require part M compliance where no existing facilities exist. The only obligation would be to ensure that existing facilities are not made any worse.

Material change of use

The definition of material change of use is based on the desire to control only a limited range of changes. The change of use categories relate to the creation of living accommodation (including hotels and boarding houses and institutions) public buildings, shops and bringing into a regulated use, a building that was previously exempt. For building regulations purposes any other change of use, such as from a workshop to an office, is not material. As a result a number of opportunities to include energy efficiency requirements at change of use are lost. Of course any associated works may require regulations approval under other definitions and planning and other legislative requirements may be invoked.

The requirements relating to a material change of use (regulation 6) specifies L1 and L2 in the list of those parts of the regulations that must be complied with and makes it clear that where there is a change of use of the whole building then the entire building will be subject to the specified requirements. In the case of a change of use involving part of a building the regulations would, in most cases, be applicable to that part affected by the change of use only. On the face of it, this would allow for walls, floors, roof, heating systems and the like to be upgraded as if for new buildings. However, schedule 1 refers to "reasonable provision" and in the provision of guidance on what would be considered to be "reasonable provision" for existing buildings, the approved documents L1 and L2 adopt what may be considered to be a very light touch[8]. As in the case of the façade retention project (figure 5) it is the guidance rather than the regulation per-se that restricts application.

In assessing reasonableness of provision the guidance is based on the view that energy efficiency works should only be required when they can be incorporated into other work to an element. For example the guidance would only require insulation improvements in an accessible loft if the insulation was to be upgraded in any case and then goes on to specify an appropriate U value. It is hard to see, in this case, what would be unreasonable about requiring loft insulation improvement whatever works were planned. It could be argued that in the case of a change of use regulatory requirements should be related to the use changes (as would certainly be the case with fire protection where flats were being created in a 4 storey town house) rather than works to an element or component. Looked at in this way there would be a presumption in favour of bringing all elements up to the same standard as required for

[8] It may be thought that section 4(2) (non-retrospection) restricts the room for manoeuvre also but this section does not apply to change of use.

newly built dwellings, relaxing the standard only when it would be grossly impractical and prohibitively expensive to do so.

It has to be recognised that an existing structure imposes constraints that do not exist in the case of new build and, as recognised by the guidance (paragraph 2.8 ADL1), the question of reasonableness is highly context dependent with each case being treated on its own merits. The problem with the existing approach however is that it tends to be very prescriptive and leaves little room for a building control body to insist on the adoption of a more holistic view.

Provision or extension of a controlled service or fitting
This mechanism is reasonably clear in that whenever a service or fitting is provided or extended (whether that is by way of replacement or provision for the first time) the appropriate areas of part L would apply. Dwellings are treated differently from non-dwellings in that the range of services and fittings is more restricted in the case of dwellings (for example it does not include internal or external lighting). The question of whether the wording "provision or extension" can be interpreted to include a modification is not completely clear but whatever the correct interpretation any clarification that made explicit provision for modification would have to tread a reasonable path between a simple repair (there are various qualifications in the guidance in ADL1 & 2 that seek to avoid the inclusion of minor repairs) and a major modification that provides an opportunity for significant improvement. Extreme caution is required here since it would be very easy to clog the enforcement system up with applications that would result in almost no improvements to efficiency at the expense of reduced effectiveness in the enforcement of more significant improvements.

Although this device has considerable power in achieving improvements to services, fittings and equipment it is unlikely that, in its current form, it could be interpreted to include works to the primary elements of the thermal envelope. Fitting is not defined in the Act or the regulations and therefore there must be recourse to its normal meaning. A normal interpretation of the word "fitting" would exclude, almost certainly, a primary element. Given this interpretation, the use of an extended set of rules relating to a controlled service or fitting in order to require the installation of external wall insulation where external render is to be replaced or the inclusion of roof insulation when a flat roof covering is replaced would not be possible without the explicit inclusion of primary elements.

DEVELOPING A MODIFIED REGULATORY STRUCTURE

The development of a regulatory structure designed to capture as many opportunities for efficiency improvements as possible would need to be able to;

- take account of the context in which the works were taking place,
- adopt an approach such that efficiency improvements to the building could be treated holistically,
- enable as wide a range of works as possible to be included in the regulatory definition of building works, in particular renewal and major repair to building sub-system (including works to primary building elements) so that every opportunity is taken to make reasonable efficiency improvements and

- demonstrate a reasonable level of cost effectiveness within the context of the scheme of works as a whole.

Central to the success of energy performance regulations for existing buildings is the requirement for a holistic approach in the way each case is considered. With the possible exception of material change of use, existing mechanisms are designed to operate across a very wide range of works, embracing everything from a minor structural alteration or replacement of a heating boiler to a major renovation and refurbishment scheme. In theory, each item is treated in isolation applying whatever rules existed for the particular mechanism (material alteration and the like) applicable to a particular piece of work. This makes it difficult to focus in a holistic way on the application of energy efficiency measures and results in a piecemeal approach in which questions of reasonableness are limited to the confines of a particular item of work. If, for example, revised regulations were able to pickup an insulation opportunity when a single wall was to be re-rendered this would have only limited effect unless it was possible to include all external walls and could result in some bizarre situations where both internal and external insulation were applied at different times to different walls of the same building just because that was the way the repair works occurred. Even where a full renovation and extension scheme was undertaken it would be difficult for the existing mechanisms to require a holistic approach to improving energy efficiency.

In order to achieve the effective application of regulation to existing buildings it is clear that, rather than considering the problem as an add-on to the regulations for new buildings, the special problems of the existing stock should be considered in their own right. To this end it is argued that there should be a set of requirements and mechanisms tailored to existing buildings with a separate guidance document or documents that pull the various strands together.

Whatever approaches are adopted (see below) a common and holistic approach to the assessment of appropriate improvements, taking into account the context of the scheme, would be required. In all cases, it will be important to require the applicant to demonstrate that they have given adequate consideration to the energy efficiency opportunities presented (both directly and indirectly) by their proposals. In addition to providing a regulatory tool, such a requirement would raise the profile of energy efficiency in general. One way in which this could be done would be to require the submission of an Energy Efficiency Statement, perhaps along the same lines as the Access Statement suggested in the Approved Document for Part M[9]. Such a statement would set out what efficiency works are included in the scheme together with the reductions in energy and CO_2 that are to be expected. Such a statement would make it easier for a building control officer to assess the application and would form the starting point for checking compliance and negotiating a practical solution in each case. In all cases the onus would be on the applicant to show that all reasonable measures have been considered and, where particular measures are omitted, to show why they are considered to be unreasonable.

The nature and complexity required from the Energy Efficiency Statement could be the subject of detailed guidance but it would be possible for a series of different levels

[9] Access to and use of buildings.

to be defined so that statements were appropriate to the nature and scale of the works proposed. At its simplest the Statement could consist of a standardised description of an improvement such as might accompany a replacement window (improvement in U value or window energy rating[10]) or boiler (improvement in SEDBUK[11] efficiency rating). More complex works could involve an improvement package selected from a wide ranging list of common cost effective measures such as cavity and other wall insulation (see Good Practice Guide 171 - EST, 2003b) or, where appropriate, a full energy audit with, in the case of dwellings, a Standard Assessment Procedure[12] (SAP – BRECSU, 2001) or other energy performance calculation (non-dwellings) together with a full cost effectiveness assessment. Subject to an assessment of practicability, a bench mark performance level related to that for new buildings would be used in assessing the required performance of any measure. An indication of how this could be done is summarised in the final report (Bell 2004) of the Industry Advisory Group (Working Party 3 - existing buildings[13]).

The following paragraphs set out the principal mechanisms on which a modified regulatory structure could be based.

Change of use

As already implied, the existing regulation with respect to change of use requires little modification. However the guidance that defines what works would be reasonable is crucial. Revised guidance must ensure that serious consideration is given to improvements, whatever the nature of physical building works. Once the focus shifts from physical works to the change of use itself, it becomes possible to see the change in building use as little different from a change in land-use from open land to land with a building on it. Clearly, in many cases this would be an extreme position but not always. Take for example the conversion of a commercial office block into city centre apartments (an increasing trend as people move back into city centres). Irrespective of the need or otherwise for structural works to the building fabric, the regulatory structure would be letting down prospective occupiers if it did not insist that the fabric was upgraded to meet insulation standards as for new dwellings. Even towards the other end of the scale where a Victorian town house was converted into flats, there is a good case for requiring improved wall insulation even though no works to the walls are proposed. A mere change in use should be sufficient trigger for a requirement for those efficiency improvements that can be shown to be cost effective and feasible. Such an assessment would be done through the Energy Efficiency Statement based on an audit which would include a SAP calculation. This would begin to place energy efficiency on a similar level as the requirement for improvements in such things as structural fire protection and means of escape.

As indicated above, an extension to the range of use changes included in the definition would provide more opportunities to capture works to a building built to an earlier standard. For example a change from a dwelling to an office or from an office to a

[10] An energy rating that takes into account both the whole window heat loss (U Value) and the useful heat gain (solar gain coefficient). See the British Fenestration Rating Council web site www.bfrc.co.uk

[11] Seasonal Efficiency of Domestic Boilers in the UK. A database of efficiency ratings for boilers is available at www.bolilers.org

[12] Standard Assessment Procedure (BRECSU 2001) – a 2 zone steady state energy model. Since 1995 a SAP rating has been required for all new dwellings, however created.

[13] This Working Party was set up in October 2003 as part of the UK Government's current review of part L.

workshop[14]. Although there may be some legal difficulties in extending the definitional range where the change could not be considered to be material to the regulations in a general sense, the benefits could be considerable[15]. The difficulty of establishing whether a defined change is truly material would not apply in all cases. One case has already been identified stemming from a potential loophole in ADL2. (Irving 2003). The case referred to by Irving relates to a building such as a warehouse that is unheated and built to lower insulation and airtightness standards than specified in ADL2. Compliance relies on the exemption provided in paragraph 0.22 of ADL2 for buildings with no or a very low levels of heating. The problem arises when such a building is subsequently used as an office, and a heating system installed. As things stand the regulations could not require an upgrading of insulation standards, however if the change of use were defined as material (and there is a very clear case for this) the regulations could be applied along the lines suggested above.

Improvement, renovation, adaptation and extension schemes.
This mechanism would provide a focus for a considerable amount of work that has, hitherto been considered under a range of different headings (new works, material alterations and replacement of controlled service or fittings). Its purpose would be to ensure that whenever a scheme of works[16] was undertaken, the energy efficiency of the whole building would be assessed. In the example of an extension to a cavity walled house, new build standards would be applied to the extension but, in addition, it is almost certain that cavity wall insulation to the existing property would be required also, unless the wall was insulated already or there was significant technical risk. Under existing regulations such insulation work could not be required.

In any event, the approach envisaged here, or one very similar, would be required to satisfy the European Directive on the Energy Performance of Buildings, which requires member states to introduce mechanisms to ensure efficiency improvements whenever major renovation works are taking place to buildings over 1,000 m^2.[17] It is suggested in this paper that the principle is applied to all buildings that would normally be covered by regulation irrespective of size. In order to develop the use of

[14] The argument leaves aside for the moment the possibility that in any of these cases there may be other reasons, such as material alteration, why building regulations approval would be required.
[15] The legal argument here would be based on the grounds that the change, although defined as material in the regulations, was not, in fact, material to the regulations. In the example of the dwelling to office it could be argued that since the regulations are a little more stringent in the non-domestic case it would be right and proper for the regulations to treat this as material but in the workshop to office case, part L has the same effect on both types of building use and therefore the change is not, in fact, material. Irrespective of whether such an approach could result in a successful legal challenge the move would certainly be open to the criticism that it was an attempt to extend the regulations, by subterfuge.
[16] There are, of course detailed definitional problems but in general, it would be necessary to include extensions to the conditioned space, refits and adaptations to internal arrangement, major renewal schemes involving more than one building sub-system or element and replacement of services systems and plant. Whether existing definitions are subsumed by an all embracing definition (such as "material improvement") or the scope of existing definitions is extended to cover all works that give rise to improvement opportunities, may not be all that important as long as the guidance documents and the Energy Efficiency Statement requirements foster the holistic approach indicated. It is expected that this latter approach is the one most likely to be adopted in the ODPM consultation document, which is due to be published in the Summer of 2004 (ODPM in press).
[17] Paragraph 13 of the preamble to the Directive provides an implicit qualification to the term "major renovation" as used in Article 6, suggesting that this refers to schemes where the value of building or services works exceeds 25% of the building value excluding land value or when more than 25% of the shell undergoes renovation.

energy certificates (a general requirement of the directive where there is a change in tenure or tenancy) it would be possible to include an energy certificate requirement where schemes are large enough to warrant it and as in the case of change of use the energy calculations that underpin such a certificate would help to define the efficiency measures that were appropriate to the scheme in question.

Replacement or major repair works to individual sub-systems[18]
Whenever renewal works take place opportunities often exist to make efficiency improvements and this is the basis of the changes with respect to replacement of windows and heating systems in the 2002 edition of Part L. As already noted, this approach could be extended to primary elements so that such things as the renewal of coverings and finishes could be included in an assessment of efficiency improvements. In seeking to capture opportunities in this class of work, ways would need to be found to streamline the regulatory process and to ensure that minor items of repair were not caught in the net. The latter problem could be addressed by limiting the scale of works that triggered regulatory intervention, the former by exploring appropriate fast track processes based on quality assured self certification schemes.

MAKING IT HAPPEN

Setting up and implementing regulation in this area will not be easy. We worry about forcing an owner to spend money on efficiency improvements when all they want to do is to stop the rain coming through the roof. We worry about the load on already stretched building control resources. We worry about red tape discouraging the normal repair and maintenance of the stock. We worry about whether we are being reasonable or are treading too heavily on property rights. We worry about the level of skill and understanding within the industry. All these, and more, are legitimate concerns but not insurmountable. The key lies in the development of consensus, within the population at large and the construction industry in particular, that radical steps are required.

In order to understand the nature of the consensus building task, it is worth reflecting on the importance of the climate in which regulation is made and enforced. Part L is a relatively new area of regulation and, more importantly, deals with an issue that has not been seen as a matter of health and safety. It was not until the oil crisis in the early 70s that energy efficiency was an issue at all and no significant move to improve the insulation of our buildings was made until 1976. This is in stark contrast to concerns for structural stability, fire protection and sanitation. Structural and fire safety legislation have their roots in events such as the Great Fire of London, and much of our regulation relating to drainage was established during the public health reforms of the 19th century. In these areas there is legislation outside the building regulations that apply to the existing building stock. The power to require the repair of faulty drains has its own section (S 59) in the Building Act and other powers exist in the public health acts, we have the Fire Precautions Act and a body of dangerous structures legislation. In the minds of the majority of the population, measures to reduce CO_2 emissions through better insulation and more efficient systems are not in the same league.

[18] In this context a building sub-system would include parts of or the whole of a primary element such as a wall or floor as well as services systems and secondary elements such as windows and doors.

This is not to say that with enough political will and consensus building the requirements of climate change could not become much more important. The Disability Discrimination Act 1995, which will be fully implemented by October 2004, has the effect of requiring work to a wide range of existing buildings[19] and is a good example of what happens when there is a clear consensus that "something should be done". In this case, concern for the human rights of the disabled was reflected in a political and social consensus that buildings should be made more accessible and usable by disabled people. Although some responsible building operators do not welcome the act and are concerned about the costs involved they accept it as a requirement of society.

The problem faced by any review of Part L is that, although the social and political climate is much more responsive than it used to be to the need for improved standards, the reality of climate change is too far away and the concepts too confused in the minds of many[20] for there to be a significant groundswell of opinion that would support a highly intrusive approach to regulation. It may be possible to agree that much more needs to be done to the existing building stock and in most cases there are solutions that would bring the stock up to the sort of standards that would be set for new buildings but it is often difficult to argue that highly intrusive regulation would be an acceptable way of achieving improvements, particularly in relation to dwellings.

There are fine judgements to be made here and, ultimately, they will be made at a political level. However in exploring the options it is necessary to be aware of the likely impact of the proposals that are made. To seek to push the regulations too far, too fast is to risk bringing the regulations into disrepute, spawn considerable legal and technical argument, bog down the enforcement system and produce a building industry that is very suspicious of the process and its aims. All of these things would be counter productive in the long term.

It is necessary also to be aware of the practical limits of regulation. Even with a strong public consensus it would not be possible to force people with no funds to do works they are not able to afford. In many cases the short-term need for repair may be a higher priority than the longer term requirements for efficiency improvements and regulation could prevent or delay important maintenance work. A home owner who needs to replace a large area of external render could be faced with a situation where a regulation requiring the installation of insulation puts the total cost beyond reach, sound overall cost effectiveness notwithstanding. It is highly likely that policies and programmes other than building regulation will be required to support and compliment the efforts of the regulations. Such things as grants, fuel utility based loan schemes paid for by savings in consumption and various fiscal measures may be required. And in the long term could prove to be crucial to achieving the overall aim of reducing CO_2 emissions from the existing stock.

Building the necessary consensus will not be easy for it will require not only acceptance of the need but also a clear demonstration of how the need can be satisfied

[19] It is important to remember that the DDA is enforceable through a challenge in the civil courts and does not compel owners to do anything. Although the effect is similar this is not the same as a requirement under the Building Regulations.

[20] There remains considerable disagreement and not a little confusion even amongst experts as to the most appropriate policy directions.

without seriously jeopardising all the other goals that we have, both as individuals and as a society. As some theories of human motivation would have it (see for example Ford 1992), if we are to achieve a regulatory structure that will make a significant contribution to carbon reductions we must value the goal (reduced CO_2 emissions), feel committed to it and believe that it can be achieved. Industry and Government need to work together to ensure that the motivation exists, otherwise it is unlikely to happen, at least until it is too late.

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