

Improving Energy Efficiency - hot air or cold realism?

The following article was written by John Tebbit, Industry Affairs Director of the Construction Products Association and was first published in the Construction Products Magazine.

If the thickness of the consultation documents equated to their importance, Part L (Energy Efficiency) and Part F (Ventilation) would rank as possibly second only to the Budget with a combined total of around 500 pages. Those with the time to read the documents and consider their content might conclude that Part L especially is one of the most important and far reaching revisions to the Building Regulations for a long time and not just because of the proposed changes to performance levels.

The revisions are due to two reasons: firstly, the requirement to implement the Energy Performance of Buildings Directive (EPBD) and secondly, domestic politics and the requirements of the Energy White Paper of April 2003, which brought forward this Part L revision from 2007 to 2005.

So, what does this mean in practice for designers, builders, suppliers and most importantly building owners and occupants? At this stage the views have to be preliminary and are necessarily the author's own. The views of the product manufacturers as a whole may well be different come the end of the consultation period in October.

There are 12 sections to the consultation. Section 1 deals with the Regulatory Impact Assessment (RIA) - what these proposals will achieve and what they will cost. The aim is to save carbon emissions (around a million tonnes of carbon or three million tonnes of CO²) and, to achieve this, the extra annual cost is estimated to be at least £1.2 billion. Over half of this cost is attributable to upgrading existing stock. There are, however, several big blanks in the RIA, notably on costs of upgrading existing dwellings. It is an immutable law of all Government RIAs that they underestimate the costs from industry's point of view, so this is an area where there will be much work over the next few months. The RIA also looks at savings and costs from implementing the EPBD and there the figures are even sketchier but this Directive has to be implemented, irrespective of the cost or benefit, by 1 January 2006.

Sections 2 to 5 are where the draft Approved Documents (ADs) set out guidance on meeting the new requirements of the Building Regulations. The four ADs are:

- ADL1A (Work in new dwellings)
- ADL1B (Work in existing dwellings)
- ADL2A (Work in new buildings other than dwellings)
- ADL2B (Work in existing buildings other than dwellings)

Traditionalists will be disappointed because there is, in fact, very little guidance. Instead, the new slim line ADs show how the carbon emission target for a building is calculated and how the design can be checked to see if it meets that target. They also set out requirements for testing quality of construction on site via air tightness testing for all buildings including dwellings. The ADs for existing buildings do give a bit more guidance than those for new build.

This format is the result of long and at times heated discussions between those that felt that everything needed to design a building should be included in the ADs, giving a one stop shop even if it meant 200 page documents, and those that felt that the ADs should only set requirements and that other documents such as industry publications should offer guidance on particular solutions. The author's personal views tend to the slim line ADs and industry guidance, particularly if the ADs were to be available on-line with hyperlinks to referenced documents - 'smart' ADs. At present, the on-line ADs are 'dumb' PDF downloads.

For new buildings, the ADs propose that a target carbon emission rating in terms of kg of CO² per m² of floor area per year is calculated. For dwellings this would be 18kg CO²

- plus a factor for internal lighting to take daylighting into account
- multiplied by a floor area factor to reflect that it is easier to get lower emissions per m² in larger houses
- multiplied by a shape factor which gives an advantage to efficient shapes
- multiplied by a fuel factor which reduces the burden on houses using higher carbon fuels to an extent. However an electric house would still need to be better insulated or use more renewables e.g. solar hot water than a gas house.



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Once this target has been calculated, the designer then checks the emissions from his design using a compliance methodology, in this case a modified version of the existing Standard Assessment Procedure (SAP). If the SAP calculation gives a figure less than the target, the dwelling passes. If not, improvements have to be made. Overall, 2005 Part L dwellings should be about 25% to 30% more efficient than 2002 Part L dwellings.

For non domestic buildings, measurement is similar in that a target is derived for the building based on various criteria and then the building design is checked using a compliance methodology to see if it meets the target. However, there are a number of differences and problems. Non domestic buildings are much more varied than dwellings ranging from small offices to major hospitals, from simple warehouses to shopping malls and city offices such as Swiss Re's gherkin. It was therefore impossible to come up with a base CO² emission figure.

However, in the existing Part L a notional building is used i.e. the designer takes his design and gives all the elements notional performance values taken from the AD in order to calculate a target. This is well understood so it is proposed that the designer will continue to calculate the CO² emissions from the notional building using the 2002 Part L values. The 2005 Part L emissions target will be calculated by reducing this number by between 25% and 30% depending on the type of building. Up to 10% out of the 25% to 30% can be from using renewables as an alternative to fabric or services improvements.

The major problem is that the compliance methodology, to check that the actual design meets the target emissions figure, is not ready. ODPM is proposing a web based system but there is significant technical risk and shortage of time to get such a system up and running by the 2005 deadlines. There are, however, many advantages of such a system including more consistent interpretation of Part L, production of automated checklists for building control's site visits and possibly a national database of building performance.

Many designers will not want to battle with target emissions and notional buildings. The ADs recognise this and suggest that 'model designs' could be developed by industry to ease designers' burdens. It is expected that groups of manufacturers or trade associations will need to collaborate to produce these 'model designs' for a range of building types e.g. masonry houses, timber frame apartments, and clad industrial buildings. These will allow designers to quickly design a building by choosing from a limited range of options of wall, glazing and roof elements, together with services, ventilation performance and building dimensions. The 'model designs' would be virtually certain to pass the compliance checking. There are, however, questions of how to co-ordinate the development of these designs and keep them up to date.

For existing buildings, the ADs set out performance requirements for small scale replacements and improvements e.g. replacement windows, and roofs. In addition the ADs propose setting a cost threshold of £8,000 beyond which all projects would need to consider cost effective upgrades to the whole building. This is likely to be supported by industry but prove challenging to sell to individual building owners. Significantly more work than before will fall within the scope of Part L and there will be close scrutiny given as to how this extra work is going to be policed. ODPM is putting its faith in 'Authorised Persons' schemes. One thing is certain, and that is that work on existing buildings is going to become more expensive.

Section 6 looks at future performance standards for the next few revisions of Part L. This is very much a discussion document rather than a proposal. However, a marker is laid down for 20% to 30% improvements in CO² emissions every five years. In the author's view, the savings will increasingly come from improvements in services (heating, ventilation and hot water) rather than fabric, with the exception of glazing where new technologies offer significant opportunities for the future. It will also become increasingly difficult to achieve compliance without using some renewables in buildings. Hopefully ODPM will look at the proposed Sustainable Buildings Code for Government and other publicly funded buildings as a way of piloting future Part L requirements.

Sections 7 and 8 deal with implementation issues for the EPBD. Section 9 looks at climate change predictions for the rest of this century and what they mean for changes to buildings. Given the uncertainties, only broad conclusions can be reached. These suggest that improving insulation, efficiency of heating and hot water services, air tightness and resistance to overheating would be sensible. It notes that by looking at whole building performance rather than individual elements, designers and manufacturers will be best placed to react to particular changes.

Section 10 reproduces the report from one of the industry expert panels that helped inform ODPM's thinking on Part L. This particular panel looked at the dissemination strategy needed to make all parties aware of the changes to Part L. It is to be hoped that ODPM will take notice of the report as well as reproduce it. Finally sections 11 and 12 deal with the mechanics of the consultation process.

In summary, these two documents (Parts L and F) consolidate a change in the way that Building Regulations operate. Both focus on 'whole building methodologies' so rather than regulate at the level of an element e.g. a wall, a window or a boiler, the requirements are generally set at building level. In Part L we see joined up thinking from the Government as it uses carbon dioxide (CO²) emissions from the energy used in buildings as the measure for compliance rather than the amount of



energy. This ties in with, amongst other Government goals, the Kyoto treaty, the Energy White Paper and the drive to increase the use of renewable and low carbon technologies. It is good to see ventilation being considered at the same time with the more detailed and focussed Part F.

There is a very significant extension of the scope of Part L into existing buildings, both dwellings and other buildings such as factories, offices and shops. Many have argued for a long time that the existing stock has to be improved to meet CO₂ targets and this is now proposed, mainly to comply with the requirements of the EPBD. In addition, a private member's bill on security and sustainability (often known as the Stunell Bill) will give new powers to act on existing buildings.

The performance improvements for buildings will be around 25% to 30% over existing buildings. With the whole building methodology there will be many ways to achieve this and the development of model designs by trade associations and others will be crucial for this to happen in a cost effective manner.

The final big change is the move to an IT based system of checking designs. If well implemented, this will give a huge boost to moving all checking of designs away from paper drawings and onto the web via electronic drawings. It opens up possibilities for buildings to have all requirements checked at the design stages with targeted advice to building control on what aspects to check on site.

Overall this is a major change to the Building Regulations. The performance levels are challenging but achievable. It will boost renewable technologies such as solar hot water and will change the process of building design, making designers and manufacturers concentrate on the building performance as well as individual elements. Suppliers prepared to work with designers to look at the whole building should prosper and show that well designed energy efficient buildings really are more than the sum of their parts.

John can be contacted at the Construction Products Association Phone 020 7323 3770, web site www.constprod.org.uk



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