CRITIQUE OF THE GREEN GUIDE TO SPECIFICATION

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Prepared for

The Good Homes Alliance

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EXECUTIVE SUMMARY

This report is a critical review of the BRE Green Guide to Specification (Green Guide).

Due to cost and time constraints, this report is not a comprehensive review and it is not as rigorous as a full technical review of the Green Guide needs to be.

The report has been prepared because its authors consider that the Green Guide is so flawed that it:

- Will undermine good building design
- Will very likely worsen the overall environmental impact of buildings
- Will discourage innovation in environmental building products and systems
- Is providing a barrier to SME's in the environmental building sector
- Is providing a barrier to the import of green building materials

In addition to these the lack of transparency and the methodology adopted by BRE are actually preventing understanding of environmental impact of building materials and positively inhibiting the feedback of knowledge necessary to the transformation of the construction sector.

Consequently the authors are calling for an immediate review of the Green Guide in legislation (such as the Code for Sustainable Homes), in OGC and as a planning instrument in national and local planning policy.

A full, independent and rigorous review not only of the Green Guide, but also of the concept and content of environmental assessment of building materials and systems is suggested.

This review has focused on the following major issues and provides technical examples where appropriate:

- The **critical lack of transparency** in both methodology and data, which contravenes good practice in Life Cycle Assessment as set out in ISO 14040.
- The **flawed methodology** in relation to the use of Generic Profiles, Elemental Profiles, the A+ to E rating system, the selection of building types and categories, and the omission of elements and categories (in particular carbon sequestration).
- The **unintended negative consequences** of the many and compounded flaws in methodology, particularly for good design, for overall environmental impact of buildings, and for innovation in environmental products and systems.
- The potentially serious **legal issues** of prejudice, trade restriction, competition and redress.

The authors consider that it is not possible to address all these problems by minor technical adjustments. Some of the flaws are so considerable that an entirely new approach is likely to be required. In particular it is considered that the Elemental Profile approach (whereby construction build ups for different applications are rated) is not viable as a method of environmental assessment at present and should be abandoned until the science of environmental assessment and the data available are considerably more advanced.

The authors would be willing to assist in the development of this new approach in order to ensure that the development and use of genuinely environmental building materials is driven forward, and that the UK plays a leading role in the development of ecological building not only in theory but in reality

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1. Introduction to this report

The Building Research Establishment's (the "BRE") Green Guide to Specification (the "Green Guide") is increasingly used as a statutory and planning tool in regard to the specification of building materials and systems. It is, however, so flawed in methodology and data that it will have the effect of undermining good building design and will very likely worsen the overall environmental impact of buildings. Furthermore, it is a barrier to environmental and innovative products, to SME's and imported building materials and systems. It is also a tool which reduces understanding about environmental impact and continues to de-skill and de-motivate both designers and product manufactures in relation to environmental building practice.

This technical Critique of the Green Guide is a brief assessment of some of the major issues raised by the Green Guide that substantiates these claims. It is not comprehensive and it does not claim to be as rigorous as a full technical review of the Green Guide should be. This is partly because the amount of work in a full technical review is considerable (and requires considerable funding and time), and partly because the lack of transparency in the Green Guide makes a full technical review very difficult. However, we believe that this Critique is sufficiently detailed and accurate to justify our call for an immediate review of the use of the Green Guide.

This report provides a brief introduction to the Green Guide before addressing issues of transparency, which affect both this report and also the use and impact of the Green Guide. This leads to a critique of the methodology of the Green Guide and of the selection and omission of various factors. We illustrate how the Green Guide could lead to considerable negative consequences in its application. We also look briefly at the potential legal and other issues raised by the use of the Green Guide. The authors conclude by calling for an immediate review of the use of the Green Guide in legislation (such as the Code for Sustainable Homes), in OGC and as a planning instrument in national and local planning policy, and suggest a full, independent and rigorous review not only of the Green Guide, but also of the concept and content of environmental assessment of building materials and systems, looking particularly at other national and international methods and outcomes.

2. Introduction to the BRE Green Guide

The assessment of the environmental impact of buildings has become an essential consideration in the building, planning and design process. Environmental impact may be divided into **the impact of buildings through use** (in particular the energy use and carbon emissions dealt with in Building Regulations Part L, the Energy/ Carbon sections of the Code for Sustainable Homes and elsewhere) and **the impact of the building materials in themselves** throughout the life cycle of production, manufacture, application, and disposal. It is this second aspect of environmental impact which is covered by the Green Guide.

As the impact of building materials in themselves has been elevated in importance by Government, concepts and standards relating to it have been integrated into legislation and planning guidance. This makes the availability of environmental data that is accurate, transparent and independent vitally important. The Green Guide has been developed by the (BRE) with the aim of providing credible information and easy-to-use assessment tools for the environmental impact of building materials and building elements, such as whole wall, roof or floor build-ups. The information on building materials and building elements contained in the Green Guide is then used in any subsequent assessment of the overall environmental impact of a project, such as the BRE Environmental Assessment Method ("BREEAM") or in the Code for Sustainable Homes.

The Green Guide employs a Life Cycle Assessment ("LCA") methodology to determine the environmental impact of construction materials. LCA is a method to measure and evaluate the environmental burdens associated with a product, system or activity, by describing and assessing the energy and materials used and released to the environment over the entire life cycle. The system used by the BRE organises this LCA data into 13 environmental impact categories based on factors developed by the UN's Intergovernmental Panel on Climate Change ("IPCC"). These impact categories are:

- climate change
- water extraction
- mineral resource extraction
- stratospheric ozone depletion
- human toxicity
- ecotoxicity to freshwater
- ecotoxicity to land
- nuclear waste
- waste disposal
- fossil fuel depletion
- eutrophication
- photochemical ozone creation
- acidification.

The environmental impact data of different materials is organised in a database of Generic Profiles and Product Profiles. Generic Profiles are meant to be averaged impacts of particular materials, using information taken from the public domain and as provided by Trade Associations. Product Profiles are impacts for specific products from specific manufacturers.

By combining such material profiles (Generic Profiles and/or Product Profiles) into building elements, the overall impact of different specifications can be calculated. The effect of each of the parts of a specification (for example in a cavity wall construction, the blocks, insulation, wall ties, bricks, mortars, plaster and paint) is decided on the basis of the relative weight of the products in the standard figure (typically 1m2) of the building element. These are called Elemental Profiles and have a particular Element Number allocated to them. It is only the Generic Profiles however which are used to generate the Elemental Profiles which are listed in the main sections of the Green Guide. Product specific Elemental Profiles are available in specialist areas of the Green Guide, but are not visible in the main text.

The Elemental Profiles are listed under particular building Element Types, which are then brought together under a Sub-category and Category of Building Element, which are then divided by Building Types. The Building Types are

- Domestic
- Health
- Industrial
- Commercial
- Retail
- Education

There are 12 different types of Building Element Categories, though not all apply to all of the Building Types. These are

- Upper Floors
- Ground Floors
- External Wall Construction
- Internal Walls
- Separating Walls
- Classroom Walls
- Separating Floors
- Insulation
- Roof Construction
- Commercial Windows
- Domestic Windows
- Landscaping

Within each of these Types (also called Categories) there are Elements (also called Subcategories). The number of Elements varies from 1 to 10, so for example the Building Type of Health has 7 Building Element Categories. If you choose External Wall Construction there are 10 Elements (Categories) laid out in the following order:

- Blockwork Cavity Wall
- Rendered
- Brickwork on Framed Construction
- Rendered or Fairfaced Blockwork
- Cladding on Framed Construction
- Cladding on Masonry

- Rainscreen Cladding
- Insulated Render systems
- Curtainwalling
- Loadbearing Pre-cast Concrete

Whereas under the Building Type of Health in the Category of Upper Floor construction there is only one Element (Category) which is

- Upper Floor Construction

Under the Categories there can also be Sub Categories, also called Elements. In Health, External Wall Construction Categories, some of these (such as Insulated Render Systems) have one Sub Category (ie Loadbearing Single Leaf Blockwork Wall), and some (such as Rainscreen Cladding) have up to 8 Sub Categories which are:

- Steel Frame with Block
- Steel Frame with Timber Stud Infill
- Steel Frame with Metal Stud Infill
- Concrete Frame with Timber Stud Infill
- Concrete Frame with Metal Stud Infill
- Loadbearing Single Leaf Blockwork with Timber Stud Infill
- Loadbearing Single Leaf Blockwork with Metal Stud Infill

In each of these final Sub Categories of Categories will appear a list of the Elements with a description of the Element, Element number, and rating (A+ to E). The number of Elements ranges from 4 to over 20. The ratings can be A+ to E or a lesser fraction. It is noticeable however that in many Sub Category sections every Element gets an A+ or A rating and there are no elements with ratings below A.

If you click on the Element number you can then see the ratings (A+ to E) for that Elemental Profile in the 13 categories of environmental impact.

The BRE presents the environmental output data in the Elemental Profiles by means of an overall rating, from A+ to E. This rating is generated by creating the environmental impact score for a specification by first aggregating the data for each of the materials described within that specification, then converting this aggregated data into a single environmental score by applying weighting factors to each of the 13 impact categories. Finally, within each element group the environmental impact score of each specification is arranged from best to worst. The best specification achieves an A+ and the worst an E. By dividing the range in between the best and the worst into 6 equal segments it then becomes possible to score the remaining specifications.

The following sections detail some of the fundamental problems associated with the Green Guide. These problems relate to the critical issues of transparency and assessment methodology, as well as to some wider legal and commercial issues. Whilst some of these issues relate to technical detail, others call into question the credibility and legitimacy of the Green Guide.

3. Transparency

An essential tenet of environmental assessment is that credibility depends on transparency and the use of logical assumptions. This transparency should be for both the data and the methodology. Where data is not presented (e.g. where it is deemed to be commercially sensitive) the user is assured of data quality and proper methodology through the process of peer review. The principles of peer review and transparency are a central theme of the international LCA standard as described by ISO 14040. The LCA based system used by the BRE lacks transparency to such an extent that it is not possible to ascertain whether a proper peer review process has been adopted.

- **Transparency with respect to input data**

  The validity of environmental assessment will depend on the quality of the input data and on the methodology. As the environmental assessment process established by the BRE is not transparent it is not possible to check for errors. It is claimed that much of the data used is sensitive commercial information and cannot therefore be released. However it is common LCA practice to 'black box' sensitive information in a way that still allows for independent scrutiny (i.e. a peer review). Additionally, no formal process has been established to make it possible to challenge the results. When it is considered that LCA is a hugely subjective and rapidly evolving area of science the lack of a formal process of redress is particularly concerning.

  An example of this problem is sheep's wool insulation. The summary rating for sheep's wool insulation in the Green Guide is A, whereas many mineral fibre, and expanded polystyrene products score a summary rating of A+. Scrutiny of the rating for each impact category reveals a possible reason for the relatively poor summary rating. Impacts that stand out are Climate change: B, Ecotoxicity to Land: E and Acidification: E. These poor ratings would appear to indicate that carbon sequestration has not been considered and that the wool is being considered incorrectly as a co-product alongside meat production rather than as a waste product, thereby allowing for the inclusion of farming activity in the analysis. The results presented in the Green Guide for the impact of sheep's wool insulation contradict findings in other studies (such as NNFCC report). However the key point being made here is that the lack of transparency means that it is impossible to determine what has and has not been included in the analysis.

  Another example which has raised concerns is the rating of PVC, Aluminium and Aluminium Clad Timber windows. It is known and documented that PVC windows had a C rating one week prior to the release of the Green Guide. At the release of the Guide, PVC windows had an A rating. Furthermore Aluminium windows achieve a C rating, while Aluminium Clad Timber windows achieve a D rating. It has generally been considered until now that Aluminium Clad Timber windows were the most environmental of all window options, certainly better than both PVC and pure Aluminium Windows. This is because they are high performance, highly durable and made from relatively benign materials

It is not possible to understand how these ratings have been arrived at because the process is not transparent and it is now not possible to analyse the data sets that have been used. While it is perfectly possible that there was a rational and independent reassessment of all windows and that PVC window assessment was only undertaken in this very last period it is also not surprising if some people suspect that pressure was put upon BRE by PVC lobby groups in order to improve the rating (particularly as there is now a strong marketing push by PVC window manufacturers into mass social housing on the basis of the A grade). It is also not surprising if people believe that there has been an error of sorts in relation to the fact that solid Aluminium Windows get a better rating than Aluminium Clad Timber windows.

The lack of transparency of data in this case means that the reputation of the Green Guide is undermined both in terms of accuracy of data and the impartiality of the organisation.

- **Transparency with respect to methodology**

  The same problems occur with the lack of transparency in regard to methodology as they do with data. Even if the data was transparent, it would be necessary to understand how the methodology operated in order to be able to assess results and have confidence in the whole system of assessment.

  The results of LCA analysis will greatly depend upon the scope of the analysis. As a result of the lack of transparency of methodology it is unclear where system boundaries are drawn in terms of raw material supply. It is unclear how co-products are accounted for. It is unclear whether the ability of natural materials to sequester carbon is acknowledged (though we strongly suspect that it is not). The normalisation procedure that is used to aggregate the 13 impacts into one environmental rating is unclear and appears to be unconventional.

  All of these mean that the assessment of the methodology is extremely difficult, as will become apparent in the section on methodology below. Not only is this confusing for anyone using the Green Guide, but it also means that it is impossible for specifiers and designers to make their own assessment of the relative environmental impact of a Product or Building Element.

4. Critique of the Green Guide Methodology

The methodology used in the Green Guide to provide an environmental impact score to a building material or construction element is deeply flawed. Such a methodology can only lead to the presentation of ambiguous and highly misleading information. The desire to provide a simple method of assessing a product's environmental credentials is understandable, but the over-simplification of a highly complex area of rapidly evolving science has led to the creation of a system that is subjective and misleading, and one which will damage building performance and environmental product development.

The principal problems with the Green Guide methodology as identified in this critique are as follows:

- **The Use of Generic Environmental Profiles**

  Largely due to the lack of transparency, it is a unclear how the data for Generic Environmental Profiles is gathered. Nevertheless, it is immediately obvious that similar products can have widely different LCA data depending on factors such as, for example, the origin of the raw materials, the production method, and factory location.

  The Generic Environmental Profile provides no means of distinguishing between best practice and worst practice and therefore provides little incentive to manufacturers to innovate.

- **The relationship between Generic Environmental Profiles and Brand Specific Material Environmental Profiles (Product Profiles)**

  To enable a product manufacturer to differentiate their product, it is possible to contract BRE to undertake an LCA of a specific product (under their Environmental Profiles Certification Scheme) to enable brand specific information to be presented. Typically this will cost around £10,000 - £20,000 per product.

  The relationship between brand specific and generic ratings is complex. Where brand specific ratings are worse than a generic rating there will be no commercial advantage to inclusion in the Green Guide. Where brand specific ratings are better than generic ratings it is up to the manufacturer to promote this information to the public as it will not appear within the main sections of the Green Guide where only Generic Profiles are used. Most specifiers will only use the specifications from the Generic Data, and in this way the Green Guide effectively becomes a barrier to the take up of better environmental products.

  There is very little incentive for producers of mainstream products to apply for ratings, whereby they can understand their particular environmental impacts and how to improve them.

This is because:-

a) the high cost for the assessment of each specific product
b) the fact that Product Profiles do not (usually) affect the Generic Profiles and the Elemental Profiles as publicly accessible in the main part of the Green Guide, and
c) the fact that most mainstream products get acceptable or even high ratings

Furthermore it is almost impossible for environmental product or innovative product companies to use this process to penetrate the market, or even to achieve equal standing on the "level playing field". For SMEs the cost is also a major barrier.

The proof of the failure of this system is that in the past 7 years only 35 products have been assessed under the specific Product Profiles.

It is therefore likely that the BRE Green Guide system is hindering rather than assisting the environmental improvement of products in the UK.

- **The use of ratings rather than absolute data**

  Whilst ratings are acceptable under LCA protocol, it is important that the data behind these ratings is always accessible (see Transparency above). The Green Guide, however, provides no way to access any quantifiable data or any sort.

  Every category of environmental impact both in the Elemental ratings and also in the Generic and specific Product profiles is expressed in terms of an A+ to E rating. The problem of using a rating system without making the data available is made far worse when the rating system aggregates all the ratings into a single rating (such as the Generic Profile), and then aggregates this again with other ratings into a Elemental Profile. It is obvious that at this point no one will be able to see what the impact of a particular environmental category is within in this, and it is impossible to quantify any impacts relatively.

  For example, if anyone wants to know within a building form what the relative importance of energy in use is in comparison to the embodied energy, it is impossible to get any clue of this from the use of single ratings or even the environmental impact categories either in Generic Profiles or Elemental Profiles.

  This is this very bad for the environmental design of buildings where quantifiable information is vitally important in decision making, particularly when balancing up different types of impact.

Furthermore, it also undermines Government and industry standards which require fully co-ordinated project information.[1]

The use of "easy-to-use" but completely unquantifiable ratings in the Green Guide encourages the continuing tick box approach to design which is de-skilling the industry by depriving it of learning tools, and proper information and clear guidance.

- **The Use of a Single Rating to Describe Environmental Performance**

The amalgamation of the 13 environmental impact categories into a single rating requires a weighting system that rates the relative importance of impacts. It is clear that the weightings given to the different environmental impacts will have a dramatic impact on the final rating. Whilst this normalising of data is accepted LCA practice, it is normally done against a benchmark - such as the environmental impact of an average West European citizen.

It is not clear how the BRE developed the weighting system as neither the weighting nor the processes used to determine the weighting are published on the web site. But it appears that the BRE has not adopted a conventional normalisation procedure.

- **The Use of Element based Environmental Profiles.**

Generic environmental profiles for materials have been aggregated into building elements (see list above). Each is meant to be comparable in terms of basic functionality and usually has one functional criteria (such as U Value or loadbearing requirement), or at the most, two criteria. This simplification in some ways makes the assessment process easier for specifiers , but there are many flaws to the approach which hinder the progress of environmental building practice.

There are in particular, five very basic flaws to this particular approach.

1. Users are unable to differentiate the best and worst materials within a specification.

For example, in the Element Profiles for Blockwork Cavity Walls under External Wall Construction in all building types, every single specification achieves an A+, even though different materials are used in each specification.

It is impossible to distinguish which materials within these constructions are better and there is no incentive at all for any manufacturer to improve their products within these specifications.

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[1] See NEDO 1987 report on Quality on Building Sites, the Latham report on Design Team integration and the Egan Report on Rethinking Construction.

On the other hand a very good environmental product within a poorly rated specification may be made to look poor and effectively be penalised.

2. Single (or at most dual) functional criteria as the basis of comparison is highly problematic in many ways, particularly in regard to **thermal performance** of buildings. The selection of U values is inadequate to characterise the thermal performance of a building system. This is acknowledged in the 2006 Building Regulations Part L, which now incorporate y values (to take into account non-repeating thermal bridging), mandatory air permeability measurement (to account for heat loss through infiltration) and overheating control as key elements in overall thermal performance. Together non-repeating thermal bridging and air leakage can easily make up over 50% of the total designed heat loss of a building, while overheating can lead to excessive energy use through the retro-fitting of airconditioning. Cooling of buildings has been forecast to be as much as 25% of building energy use by 2020 according to some analyses. Yet none of these issues are taken into account in the functional criteria of the Green Guide.

    a) y values: U values are measures (in W/m2K) of the thermal resistance of a building system in the element that is repeated, whereas y values are the sum of all non repeating linear thermal bridges (known as ψ values) averaged over the whole building. There will typically be much more heat loss through the non-repeating thermal bridging than through the repeating element. For example a standard timber frame system will have a repeating thermal bridge of around 8% whereas if non repeating bridges (multiple studs at corners, openings, sole and wall plates, intermediary floors etc) are included the total thermal bridging in a typical house will be around 30%. However certain building systems will have much better y values than others by nature of their design. For example frame solutions with continuous external insulation have much less thermal bridging than frame solutions with insulation between the studs only. Not all systems can achieve low y values even in design terms (let alone in reality on site). This is absolutely critical to the overall energy performance of a building.

       An example of how this will affect different building systems:
       In Part L 2006, non-accredited systems are assumed to have y values of 0.15W/m2K, while accredited systems are assumed to have y values of 0.08W/m2K. However there are now systems (such as systems with continuous external insulation) with proven y values as low as 0.02W/m2K. The difference means that an unaccredited system with a U value of 0.30W/m2K (as required in the Green Guide for external walls) will have the same overall thermal performance of an accredited system with a U value of 0.37W/m2K, or a system with y values of 0.02 with a U value of 0.43W/m2K. Alternatively it could be said that an unaccredited system would have to achieve a U value of 0.17W/m2K to be comparable to a system with a y value of 0.02W/m2K and a U value of 0.30W/m2K. At this level of course the non-accredited system would have to include more materials and as

such the environmental impact would increase, thereby changing the rating (see point 4 below).

This may seem highly complex to the non-specialist. The point however is that the use of U values alone as a functional criteria for thermal performance is inadequate, because even in design terms, and even more in reality, the thermal performance of building systems must include all parts of the system to be properly comparable .

b) Airtightness: airtightness is less easy to quantify in terms of building systems, but according to many experts on low energy buildings (such as the Passivhaus institute, the AECB, Leeds Met University) in some building forms airtightness is much easier to achieve than others. In fact at Passivhaus standards of air permeability (under 1m2/m3@50 pascals) the building system becomes critical to the success or failure of the building energy systems.
For example, it is almost impossible to achieve good levels of airtightness in buildings using "dot and dab" construction in masonry walls. Wet plaster systems or parge coats behind the dot and dab are much preferable. However this is not taken into account at all in the ratings, and a parge coat behind dot and dab will penalise that element as there is additional environmental impact due to the addition of extra material. However the functionality of the systems in regard to airtightness (and therefore thermal performance) is completely different. Solid floors in masonry construction are also proven to be much better in regard to airtightness than timber floors, yet solid floors have low ratings in the Green Guide (see below).

c) Overheating: the Green Guide completely misses out the importance of thermal mass in buildings This is crucial to the thermal performance of buildings, and is a key element in preventing overheating as well as storing heat in certain building types. Thermal mass is a function of specific heat capacity and density. Materials with low density score well in the guide on the whole because they use less material and therefore have less environmental impact (if the impacts are all bad, which they usually are). However in terms of overall performance of buildings in use the specification of light materials in certain designs may lead to higher energy use because of the need for additional cooling (or even heating depending on the use of thermal mass in overall design). One of the key areas where advanced energy designs utilise dense materials is in internal floors. For example in many leading energy efficient designs for housing, schools and offices heavy concrete floors are used store heat and to preserve coolth in the summer, thereby avoiding airconditioning (with its very high energy and carbon impact) and discomfort. However in the Green Guide the functional criteria for Upper Floors is loadbearing and acoustic and does not include the issue of thermal mass. Consequently in Domestic buildings no heavy floor achieves better than a B rating, whereas all lightweight timber floors get A or A+ ratings.

The same principles can be applied to external elements, particularly roofs where roofs with the same U values might have very different thermal mass. One measure of thermal mass is decrement delay, which is the time for heat flux to be established from the outside to the inside of a structure. A light weight roof using timber and lightweight glass wool or plastic foam insulations will typically have a decrement delay of less than 2 hours, whereas a roof using high density insulation with a high specific heat capacity (such as woodfibre boards or cellulose fibre) will have a decrement delay of over 10 hours, all for the same U value. The consequence will be a lower internal peak temperature in rooms directly below the roof of up to 4º C in the summer which will lead to much less space cooling energy in average building use.

Thermal mass is not useful in every building type or situation. However the fact that it can be so important in some situations raises questions about the viability of using functional criteria in this way and of the use of Elemental Profiles as a method of comparison.

3. Other non-thermal criteria, such as acoustics and moisture control are not included in many of the specifications. While these may seem to be optional extras, they can be critical elements in over all building performance. If a system (such as for external walls or roofs) with poor acoustic performance is specified because it has a better Green Guide rating, additional materials may have to be used to deal with acoustic issues, thereby increasing environmental impact (if the additional materials have a negative impact). Systems which have good acoustic performance but have a worse impact (and rating) according to the Green Guide may give a much better overall building performance and ultimately require less additional materials. This should ultimately be taken into account in the Green Guide method, but it is very difficult to see how the design process will accommodate these other factors in a logical way, particularly where the tick box approach is being followed. For example, in the Elemental Profiles of Insulation, all the acoustic insulations score badly because they are more dense (and therefore contain more material which leads to more impact). This will encourage designers to skimp on acoustic protection where possible. It is even more complicated in roof or wall build ups where it is not possible to distinguish which materials account for what part of the environmental impact or building performance.

   In terms of moisture control, the science is relatively new, but there is strong evidence from research and case studies to show that the use of vapour open, capillary open and hygroscopic materials in certain situations can reduce service requirements for moisture control partially or even completely. For example there are good case studies of museums and archives where the use of hygroscopic buffering has outperformed airconditioning.[2] While this is a developing science, the issue of moisture control within buildings will become increasingly important as airtightness standards are increased in buildings due to the requirement for increased energy efficiency.

[2] See N May Breathability: the key to building performance at www.natural-building.co,uk

There is also considerable evidence that vapour open, and hygroscopic insulations can be used in timber frame construction to protect the timber frame and thereby reduce the need for chemical preservative treatment while providing a more durable product. This approach is now formalised in German Building Regulations, where the “breathability” of timber frame systems determines whether or not timber treatment is required. This of course will have a considerable environmental impact on the whole system.

To ignore these areas of functionality at present means that innovative product development and design work will be suppressed, particularly if the “breathing” materials have higher mass, or higher environmental impact in other ways.

4. The levels set within the functional criteria are those of current Building Regulations, (although this has not been followed exactly in the case of external thermal performance since the methodology of Part L has changed considerably and there are no elemental standards now). The assumption behind the setting of a single functional criteria at a certain level is that at different levels (for example much better thermal resistance or acoustic insulation) the comparisons between systems will still be accurate. There is, however, absolutely no reason why this should be so, and this is not the case in reality.

   For example, if we consider external walling systems, the difference between a U value of 0.30W/m2K (the functional unit in the Green Guide) and 0.15W/m2K (which is a level that will commonly be required at Code for Sustainable Homes Level 4), let alone the 0.10 W/m2K needed for some detached houses to reach the Passivhaus Standard would mean that certain systems would need new products (such as insulation boards or even windposts) to be added to the system, some would simply need thicker materials (or perhaps just one material) already in the specification, and some would not be able to achieve the specification at all. Potentially this could completely change the rating of different systems. It is not therefore possible for specifiers setting higher U value requirements to be sure that the Green Guide assessments have any relevance at these different levels. The same applies for the acoustic or loadbearing criteria.

5. The use of partial parts of the whole building element in the Elemental Profile criteria. Again, in the external building elements use has been made of the pre 2006 Building Regulations methodology for thermal assessment, which is the U value of 1m2 of External Wall or Roof, where the thermal bridging is repeated. So non-repeating thermal bridges are not included. This is the problem of the y values as per point 2a) above. However, this is not only a problem for thermal performance comparison, but for the other necessary components of systems for them to work.

   For example, in cavity walling the elements assessed under the Green Guide are, brick, block, insulation, wall ties, plaster and paint. However cavity walls also always include damp proof courses and trays, cavity closures and lintels.

Additionally they can include wind posts and other structural elements in certain structural situations and particularly where the cavity is wider because of additional thermal performance requirements (see point 3 above). Even wall ties become considerably thicker or more frequent in wider cavities. All the elements listed here have high embodied energy and environmental impact, yet none of them are included in the assessment of cavity walls. If these cavity walls were then compared with solid masonry walls (aircrete or fired clay, with or without external insulation) in standard house types these additional elements would be far more in mass and area and have far greater environmental impact in the cavity walls than in the solid wall systems.

- **The creation of the A+ to E rating**

  As stated above, the Green Guide condenses all the environmental data for materials into a single rating for a building element - from the best A+ to the worst E. These Elements and also the Generic Profiles for each material element are also broken down and rated on an A+ to E basis for each category of environmental impact such as toxicity and stratospheric ozone depletion. It is not entirely clear how this division of ratings work, but we are assuming that having converted each specification or category of environmental impact into a single metric of points, the highest and lowest scoring systems are taken as the parameters of the scale and the scale then divided equally into 6 portions.

  It is also not clear whether the scales are applied across all types of systems for a particularly building element (ie all external wall systems for Domestic) or whether each group has its own scale (ie within external wall systems one scale for Blockwork Cavity Wall, one for Insulated Cladding etc).

  However it quickly becomes apparent that the methodology of the division into the 6 ratings (A+ to E) is fraught with problems, which include the following:-.

1. The range of specification scores from which the limits of the scale for a particular element are determined depend entirely on those specifications selected for initial analysis. The inclusion of very ‘good’ or very ‘bad’ specifications in the initial analysis would have a huge influence on the ratings.

2. An example of how this scoring system is open to abuse would be to allow the inclusion of a specification with a very poor rating that would then increase the rating for the remaining specifications. It is only on this basis that we can begin to understand how every single listed cavity wall construction achieves an A+, unless the ratings for Blockwork Cavity Walls are part of the larger set of External Wall Construction. There are other categories such as Timber Framed Construction and Light Steel Framed Construction under the Rendered or Fairface Blockwork Construction category which also achieve A+ throughout.

3. If the range includes all different construction types within a building element (say External Wall Construction for Domestic buildings, or even External Wall Construction for all Building Types, as claimed by the Green Guide) this is also problematic, because if one type is way off one or other end of the scale it will mean that within other construction types, all specifications may be grouped together. This may be an alternative reason why every rating for Blockwork Cavity Walls is the same.

   The result, either way, is that no means of differentiation is available to the specifier and no incentive is given to manufacturers to change their products in relation to their direct competitors..

4. It is not possible, as it is unclear how the different types relate, to compare different building types for a similar application, which is important. For example how does Timber Frame compare to Blockwork Cavity Walls or Light Steel Frame?

5. This rating system is problematic for the subsequent inclusion of new detail at either end of the extremes, as this should require an upgrading or a downgrading of existing specifications. It is unclear whether there is a feedback mechanism that would allow for new specifications to force the downgrading or indeed upgrading of existing specifications.

This process by which the final Elemental rating is determined represents one of the worst aspect of the guide. The compounding of so many assumptions and mistakes into this process can only lead to a hugely subjective and thus practically meaningless result.

- **The selection of building types and construction elements:**

  The selection and division of the various categories within the Green Guide is highly subjective. This is not so much a transparency or a methodological problem as a problem of the scope of the Green Guide. However it has considerable effects on ratings as well as on design, manufacture and innovation. It further compounds the problems of methodology identified above.

  For example within the Building Type of External Wall Construction there are separate subcategories for Cladding on Framed Construction, Rainscreen Cladding and Curtain Walling as well as Insulated Cladding, all of which relate to framed construction of various types. Under Rainscreen Cladding there are 9 separate categories of heavy framed construction. Apart from being highly confusing, most of these divisions seem highly subjective. The division could more logically have been into timber framed walls, light steel construction, heavy steel construction and concrete frame construction, with a variety of finishes on each (ie cladding, render and curtain walling). Alternatively there should be separate categories for low, medium and high rise buildings either as Building Types or within the Building Element Categories. If the A+ to E ratings operate within each sub category or even category, the way that these are selected will determine both comparisons and ratings scales.

It should also be noted that some products score differently in different Building Types. This seems to be explained in the text at the top of the various elemental sections, but again there is no logic to the system adopted.

For example, the Green Guide states that External Wall ratings are the same for all Building Types (ie Domestic, Health, Education etc), whereas this is not the same for Upper Floors, which are rated differently according to the Building Type. Thus, element no. 807280059 refers to a power floated concrete upper floor with 50% GGBS and 20% RCA. This identical build-up with the same unique element number scores a B-rating when used in a Health building, a C-rating when used in a Domestic building and an A-rating when used in an Commercial building. One is left assuming that the BRE have taken the view that whilst concrete floors are reasonable for a health building, their use in unreasonable in domestic buildings when compared to say timber floors (even though they may be a high-rise apartment block in which timber is unsuitable). This subjective and unrealistic view of the world when appearing in an apparently scientific assessment methodology is unhelpful, unworkable and unacceptable.

It is also highly questionable why certain element ratings are applied across all building types and others are not. The variation in suitability of different types of External Wall systems in different Building Types is at least as great if not greater than the variation of suitability in Upper Floors. For example Steel Frame is obviously more suitable for Commercial which is often high rise, than Timber Frame or Blockwork Cavity Walls.

It is also clear that the Insulation category of the Elemental Profiles is not properly a building element as it does not include any other parts of the building structure. The functional criteria relate to a certain thermal resistance which solely relates to the insulation itself. Of course insulation is always a part of some building element not the whole part. It seems that the category was created with loft insulation in mind where possibly the only quality that is required of a material is its thermal resistance (though this in itself is debatable – acoustics, moisture control, fire protection etc may also be important). However the Elemental Profile does not define itself as a loft insulation element. Consequently board insulation materials, quilt and batt insulations are all lumped together. However, according to their different applications these insulations will have a different thermal effect, both in theory and in practice. For example quilt insulations cannot be used over structural elements such as wall or roof timbers, or over masonry, but only either as infill insulation between studs or joists, or over joists in roof spaces where there is no use of the attic space. If a board insulation is used over rafters or external wall frames, it will reduce cold bridging and have a far greater impact on reducing heat loss (and thereby the elemental U value, let alone the y values) than if it was between rafters or studs.

The consequence of pretending that the Insulation category is a building Element however is that the category is now being used by planners and other specifiers as a criteria for use of all insulations in a building (typically A+ or A ratings are required). This means that not only will good thermal design be compromised in some situations (because the use of some board or dense batt insulations over structures will not be possible), but also that insulations will be inappropriately specified. For example the use of light weight quilt as infill in stud walling is inappropriate, because the material usually fails to fill the cavity fully and can very easily slump over time leaving cold spaces at the top of walls. Dense batts are the best solution for these situations, but dense batts on the whole do not achieve the best ratings in the Green Guide, just because they are denser.

- **Missing elements and materials (Scope)**

  There are several large gaps in the scope of the Green Guide, in terms of environmental categories, building elements and the specific material types assessed.

  In terms of the environmental categories, one of the most obvious omissions is that of toxicity in use. This should really come under Human Toxicity. However as it clearly states on the Green Guide introduction: “Indoor air quality and its effect on human health is not covered by this category”.

  This is a major omission, particularly in the light of other European assessment systems.[3] It is a particularly shocking omission in the light of real concern about the effect of materials on human health in relation to asthma and other auto-immune diseases.[4]Furthermore as airtightness increases in buildings, and we create completely new internal environments these issues may become of greater concern.

  As for building elements the two most obvious omissions are footings and attic roofs. The issue of footings has possibly been omitted because it provides a clear instance of how dependent one building element is upon another. For example if all masonry constructions require wider and deeper footings than timber frame, then it is highly likely that all most masonry footings will get worse ratings than timber frame footings. At its worst this means that some people would end up specifying the wrong kind of footing structurally for a building. What the issue of footings shows is how dependent buildings are on different elements. Even partition wall systems and roof systems can affect the footings. As elements are only considered in themselves and not in terms of other elements, the overall impact of such specifications is not being fully taken into account. If for example a partition system required a separate footing or a deeper footing, this might be a considerable part of the environmental impact of this system, which would never be apparent from the Green Guide.

[3] Natureplus, the DIBT AGBB scheme, the M1 scheme in Finland (now with over 1200 products tested), Danish Standard DICL and the French AFSSET system.
[4] See the CIBSE report TM40 and Housing and Asthma by Stirling Howieson publ 2005 Spon Press

Interestingly some categories are present in some building categories and not in others. For example Ground Floors only apply to Domestic types and seem to be entirely absent from other building types. There seems to be no real logic to these decisions and this undermines confidence and confuses the user.

In terms of materials it is very obvious that the Green Guide deals mainly with mainstream products. It is believed that the Construction Products Association (CPA) assisted the provision of much of the original data used to develop the environmental profiles. As the CPA membership is made up of trade associations, many new, innovative and green products have not been included in the Green Guide. Examples of missing materials include, unfired clay plasters, boards, blocks and finishes, hemp and lime construction, lime and sand screeds, fired clay insulation blocks, calcium silicate blocks, and many vapour permeable natural materials and renewable insulation materials.

The omission of such materials could hugely affect the ratings in the green guide. For example it is highly probable that unfired clay blocks would be considerably better than all the other specifications in the masonry internal walls. If this was so it is feasible that every other specification would be down rated, possibly all to E. This itself however would be ridiculous because unfired clay blocks are non-loadbearing, so would only be appropriate in certain buildings. Furthermore there is no mainstream supply of these yet. Of course in this instance a solitary A+ rating would lead to changes in manufacturing and the encouragement to innovate. However this opportunity to encourage innovation has once again been lost.

In addition to the above there may be many other aspects missing from the Green Guide for Specification if it is to be used as the major legislative and planning tool for environmental material specification. In particular the issues of waste, re-use and recyclability is complex and requires more thought, particularly in relation to actual practice. It may also be important to look at knock on effects of production in terms of social and then environmental impact, through CSR mechanisms.

- **Carbon Sequestration**

One issue which it appears is not fully considered is carbon sequestration. This has been put in a separate section because of its potential importance. In the Green Guide the Climate Change environmental impact category refers to the change in global temperature caused via the greenhouse effect by the release of "greenhouse gases" such as carbon dioxide by human activity. Factors are expressed as Global Warming Potential over the time horizon of 100 years (GWP100), measured in the reference unit, kg CO_2 equivalent. It is believed that the ability of natural materials to sequester carbon during growth has not been accounted for in the Green Guide.

Carbon sequestration can have a profound impact on the climate change rating for a product. It is important to note that even if eventual disposal of a natural product is through composting only a proportion of the carbon will be released. Carbon sequestration is a complex issue and because of this has sometimes been ignored in LCA analysis. However, guidance in the form of publicly available standard (PAS) on the best practice method for the consideration of carbon sequestration is soon to be published by the Carbon Trust.

The following example illustrates the importance of carbon sequestration on the climate change rating for insulation products. The principles of this example can be applied to any product that is made wholly or partly from natural plant-based raw materials. This particular example uses data produced on a brand of hemp insulation (Isonat) in an independent LCA study commissioned by DEFRA referenced against data produced on a mineral fibre product (Rockwool) contained in a report commissioned by Rockwool themselves (Schmidt et al.). The carbon required for the production and transportation of Isonat hemp insulation is 1.344 (kg CO2 eq. / kg of insulation produced). The carbon sequestered during plant growth that can be allocated to the insulation product is 0.997 (kg CO2 eq. / kg of insulation produced). Thus, if carbon sequestration is considered the GWP100 figure is 0.347. Alternatively if carbon sequestration is not considered then the GWP100 figure is 1.344. The critical importance of this issue can be seen when it is considered that the GWP100 figure for an equivalent Rockwool product is 1.220 (kg CO2 eq. / kg insulation).

Other examples, particularly involving dense timber materials will show negative GWP and total environmental impact figures. Under the BREEAM assessment (no 228560) of Pavatex Woodfibre Sarking boards (which have a density of 240kg/m3), the product achieves negative Ecopoints of -0.79 in a Cradle to Gate analysis and +4.3 ecopoints in the Cradle to Grave analysis, because the assumption is that all sequestered carbon is released. If a solid timber walling system, as produced by Lenotec or Merck, were to be analysed the ecopoints score from Cradle to Gate would be considerably more negative as there is probably 5 times as much mass per m2 and much less energy used in production.

However the idea that all the carbon will be released after 60 years is also very dubious. This is not actually true scientifically, unless there is 100% pointless incineration. If the product were to be re-used, recycled, used as a substitute for fossil fuels, or composted the carbon released would be far less, if any at all. Furthermore the assumption of 60 year life span is unjustifiable, and even if this were justifiable the importance of locking up carbon over the next 60 years is considerable.

This is an important issue. There is a growing understanding of the critical importance of carbon sequestration of all types for combating climate change. This has recently been subject of a major initiative by government.[5] None of

[5] See PAS 2050 as launched on 29/10/08 by the BSI British Standards Carbon Trust and Defra http://www.defra.gov.uk/news/latest/2008/climate-1029.htm

this seems to be acknowledged by the Green Guide. For example, if a material is more dense at the moment, in virtually every category of environmental impact this will mean it has a worse rating, because nearly every material quality has a negative impact. If however carbon sequestration is taken into account then for many materials which lock up carbon, the greater the density the better the Climate Change rating will be. If the Climate Change impact category is weighted highly, or there is a lot of carbon sequestration, then this would completely change the ratings of dense renewable materials and consequently drive manufacture and innovation in a completely different direction to that pointed at by the Green Guide at present.

5. Consequences of the Green Guide's Methodology

There are many unintended and often negative consequences of the methodology of the BRE Green Guide to Specification. Many of these should now be apparent from the foregoing assessment. However it is perhaps important to re-emphasise and illustrate two particular points: the impact on design and overall performance, and the effect on innovation.

- **Unintended consequences for design and overall environmental performance in use**

  Although it seems to be part of the BREEAM approach to try to separate the environmental impact of buildings through use and in the materials themselves, this approach is not completely carried through in the Green Guide because of the use of Elemental Profiles based on functionality. In our opinion the separation of impact of buildings in use from the impact of materials in themselves is undesirable. It is widely acknowledged that performance in use must be prioritised, because of the much greater lifetime impacts of buildings, particularly of poorly designed buildings. Good design for low impact in use must come first and must not be compromised by other impact assessments.

  However the Green Guide compromise is worse than a complete separation of impact in use and in materials in themselves, for the reasons given above about functionality. It means that neither are materials assessed properly for their environmental impact, nor is the performance properly taken into account. The consequences for design and overall environmental performance are considerable.

  For example, it is quite well understood now that to achieve a good low energy building the insulation and air barrier layer must both be coherent and continuous. Disjunctions will cause heat loss, condensation, discomfort from draughts and possible damage to fabric and human health. It is also vital that the whole building form takes into account thermal storage and moisture control. Of course it is also vital that the building performs structurally and in terms of acoustic and fire protection. To base design on ratings which not only do not account for most of these factors, but which are actually working against them is potentially disastrous for building performance. We have already given several examples of this in the analysis above. It is worth re-iterating the point with a couple of examples:-

1. For example, the Green Guide promotes use of timber floors rather than heavy mass concrete floors in domestic masonry buildings, because timber floors get A+ ratings and concrete floors get C ratings. This could destroy the overheating control, acoustic performance and structural and airtightness requirements (particularly in buildings of over 4 stories where timber floors are unviable anyway in most cases). The issue may be posed in this way: Is it preferable to have:

a) a heavyweight block of flats which utilises winter passive solar gains to the full, and stays cool in summer, but scores C, or
b) a lightweight block of flats which cannot utilise so much passive gain for fear of causing overheating, has smaller windows, uses somewhat more energy for a given insulation standard, but is rated A?

2. In using the Green Guide, in order to achieve maximum ratings (necessary for example under the Code for Sustainable Homes to achieve points under the materials section) it would be easy to specify 3 different external wall or wall and roof elements abutting each other where the insulation layer and airtightness layer cannot be linked. This will not be picked up necessarily by the energy calculations, but will certainly lead to failures on site and in performance of the building. Alternatively it may lead to extensive, costly and high impact solutions on site to overcome the problems.

   Whilst not elsewhere emphasised in this report, it is vital to point out that the theory of buildings and the reality of buildings is quite different and unless these are brought together by real building monitoring and assessment, we will never know exactly what the impact of environmental schemes such as the Green Guide are. What we can be certain of is that the real impact will be considerably greater than that identified by the theoretical analysis.

- **Impact on overall environmental impact of materials**

  It is not possible to understand the actual impact of the specifications in the Green Guide because of the lack of transparency in relation to data and methodology and also because of the seriously flawed methodology. As a result it is not possible to understand what the environmental impact of an Building Element is either within itself, or in relation to other Building Elements or Types (Categories of construction). Neither is there any reason to think that the Green Guide, as it now stands, will improve in any way the environmental impact of building materials in themselves overall in the UK.

  For example it is not possible to distinguish between blockwork cavity construction and timber frame constructions in terms of environmental impact. No quantification of impact is provided, and no clue is given of how different systems relate in terms of the ratings. It may be that in reality timber frame construction has a much better or worse impact than blockwork cavity construction, but because there are A+ ratings in both sections it will seem to specifiers that both are comparable. Furthermore because the information is generic and not product based there is no guarantee that the actual materials in a rating will relate to the generic profiles in the first instance.

  Finally, because so many standard methods of construction achieve an A+ rating, there will of course be no improvement in environmental performance. It is business as usual.

- **Discouraging innovation**

  Overall the environmental impact of products in the early stages of product development process will almost always be higher than mature products. This is due to the lack of production optimisation and the lack of economies of scale. As the higher impact of early stage production is not taken into account in the Green Guide, new green products may effectively be discouraged, thereby creating a further barrier to innovation.

  It is also evident that providing data sets and evidence for new product types is expensive and time consuming. For SMEs developing innovative products and systems in the UK the cost of certification (itself a high cost) will only be a small part of the cost of getting products approved into the Guide.

  Furthermore in order to develop and prove the market it is important that new products do not have excessive barriers in the early stages. The Green Guide which ideally should stimulate innovation and the entry of new environmental products to the UK construction market will present just such a barrier, as high ratings are now insisted upon by specifiers, planners and legislative tools such as the Code for Sustainable Homes. This means that for "environmental" buildings, it will only be possible to be specified if products are already rated in the Green Guide. New products will be prevented from achieving sales unless they have high investment and long term support from outside sources.

  The same applies to the import of ecological building materials from outside the UK. In the early stages of developing a market for a product, it is usually not feasible to set up manufacturing or find manufacturing partners in the UK. Importing products is therefore a good way to prove the products in the market place. The Green Guide insists on including the transport of product as a product quality, whether or not the product could be made in the UK or not. This is extremely prejudicial to new products which are made elsewhere, but which could be made in the UK with sufficient market demand.

  For example, woodfibre insulation boards are made in several places in Europe. However in the Generic Profile in the Green Guide (now removed under protest from the suppliers), the product was rated C as an insulation element. The reason given by BRE for this was partly that there were high environmental impacts from the transport of the product from Switzerland, which was the only data set available to BRE, even though there are other manufacturers in other locations. In addition the product was penalised under the category of nuclear waste, because 40% of electricity in Switzerland is from Nuclear Power. The product however has approval under the European WWF standards called natureplus, which is a rigorous LCA method according to ISO 14040. Products such as expanded polystyrene and glass wool, which in the Green Guide section of insulation achieve an A+, cannot achieve this standard. If the product were to be made in the UK, no doubt it would get a much better rating. However the way that the Green Guide assesses imported products means that such products will not be specified because of poor ratings, the market will therefore not develop and manufacture will not be viable.

In this way the Green Guide is highly prejudicial against imported ecological products and is a barrier to UK manufacture of products.

6. Other Concerns

- **Legal Status of the BRE and funding of the Green Guide**

  The BRE was formerly a government agency, but is now a self financing commercial enterprise. The BRE receives income from numerous sources, which include government funded research projects and direct contracts with industry. In the development of the Green Guide, the BRE has received funding from a number of government and private sector sources. One source of income is for the provision of brand specific environmental ratings under the BRE's Environmental Profiles Certification Scheme, which can cost companies between £10,000 and £30,000 per product depending on complexity. It is clear that there is a potential conflict of interest between the requirement for the Green Guide to be both authoritative and independent and the need to attract clients to the scheme to fund its maintenance and further development.

  Furthermore as BRE get paid to undertake product assessment directly and also receive money from project assessment through their own trained assessors and other bodies, it is very much in their interest to protect the IPR of the Green Guide. There is no incentive for them to be transparent with data or methodology, as this could allow another organisation to either use it to produce their own rival assessment process, or to criticise it as inadequate and flawed.

  It seems strange that something which is of very significant national interest in terms of the impact on building performance and the environment, and which could have such a major impact upon national and individual industries and businesses is held by an effectively private monopoly.

- **Lobbying**

  There is a suspicion that the BRE is highly influenced by powerful lobby groups. The fact that the summary rating of many conventional products is A or A+ seems to back this assertion. It is however impossible to prove or disprove this assertion as the lack of transparency and the lack of any formal regulatory process makes independent scrutiny extremely difficult. The example of the ratings of windows has been given in this regard in the section on Transparency (above)

- **Lack of an alternative assessment process**

  The Green Guide is the only construction material environmental profiling system recognised by the Code for Sustainable Homes. As this Code is progressively becoming mandatory for all homes it effectively secures an unhealthy dominance for the BRE. The Green Guide is also being increasingly used in Planning Guidance and by OGC in government purchasing policy.

- **Lack of formal process of redress**

There are very many problems with the Green Guide, but no means of redress. To help counter this problem, the Green Guide should have incorporated a formal system that would allow stakeholders to query the data. It is therefore essential that whatever system is developed to replace the Green Guide it should be truly independent, transparent, extremely dynamic, and must incorporate a feedback process that both encourages and is able to assimilate new information.

Without such a process of redress we believe that many manufacturers will be subject to prejudice in their business. Under the Green Guide as it currently stands, we believe that many manufacturers, particularly of innovative, ecological and imported materials have legitimate cause to argue that they are being unfairly prejudiced by the Green Guide.

7. Conclusions

This review has identified the following major problems in the BRE Green Guide:

1. The critical lack of transparency in both methodology and data, which contravenes good practice in Life Cycle Assessment as set out in ISO 14040
2. Methodology: in relation to the use of Generic Profiles, Elemental Profiles, the A+ to E rating system, the selection of building types and categories, and the omission of elements and categories (in particular carbon sequestration)
3. The consequences of the many and compounded flaws in methodology, particularly for good design, for overall environmental impact of buildings, and for innovation in environmental products and systems
4. Potential serious legal issues of prejudice, trade restriction, competition and redress.

In our opinion it is not possible to address all these issues by technical adjustments. While some of the flaws could be addressed technically, some of them are so considerable that only an entirely new approach will be able to correct the problems. Indeed we are convinced that the attempt to create a Green Guide to Specification by Generic Profiles and particularly in the use of Elemental Profiles (building elements), is fundamentally misconceived. It is the wrong approach to driving the overall environmental improvement of buildings and at the present time it is technically impossible to generate a system that works in any meaningful way.

This approach has not been adopted or developed elsewhere in Europe for these very reasons. All the more well-established systems of environmental assessment of building materials are specifically product based (rather than based on Generic Profiles or Elemental Profiles) and are transparent. This may be as much as can be achieved at present with the current state of the science.

Consequently we are calling for the immediate review of the use of the Green Guide for specification in legislation (such as the Code for Sustainable Homes), in OGC and as a planning instrument in national and local planning policy. We suggest a full, independent and rigorous review not only of the Green Guide, but also of the concept and content of environmental assessment of building materials and systems, looking particularly at other national and international methods and outcomes.

We would be very happy to assist in this work in order to ensure that the development and use of properly environmental building materials is driven forward in the construction industry and in product manufacturing, and that the UK plays a leading role in the development of ecological building not only in theory but also in reality.

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It has been endorsed by a number of leading experts in Universities and major national and international construction companies and consultancies.