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Planning barriers to the Government agreements for reducing carbon emission in existing houses

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ABSTRACT

The UK government has agreed to decrease its greenhouse gas emissions at least by 80% below base year 1990 levels by 2050.

The residential sector is one of the major contributors to the greenhouse effect and the Department for Environment, Food and Rural Affairs predicted that 70% of the house stock of 2050 is likely to have already been built. This study analyses the revision to Part L of the Building Regulations regarding strategies to deliver carbon emissions reductions in the existing house stock.

Data collection using a questionnaire directed at architects involved in house retrofitting has identified that strategies adopted to reduce CO_2 emissions are likely to be refused by Planning Departments on the grounds of appearance. This constitutes a major barrier for upgrades in existing houses.

A case study exposes the necessity to accept new technologies and eventual changes to the character of Victorian and Georgian Houses, if the proposed environmental commitments are to be achieved.

INTRODUCTION

The UK government has agreed to decrease its carbon emission rates by 80% by 2050 compared to 1990. Part of the UK plan of action is to reduce CO_2 emissions in the residential sector, a major contributor to the total carbon emission of the country. Legislative framework for the management and delivery of policies to tackle climate change has been put forward. (CCA, 2008)

New domestic buildings are required to be zero carbon by 2016. (CarbonHub, 2012),

However, 70% of the housing stock of 2050 are likely to have already been built. Moreover, most of the dwellings built before 2016 will unlikely be build to zero carbon requirements and are therefore to represent a major contribution to the greenhouse effect. (Pullen, 2008)

Victorian, Georgian and early 20th century houses were built in a time when no attention was given to CO_2 emissions or energy use. If not upgraded, they will have a poor energy performance with high levels of energy waste, mainly due to thermal losses through the envelope and infiltrations. However, cooling loads should not be underestimated in particular in line with global warming. Also living standards have been rising as well as the use of new technological energy consuming devices.

Part of the process of improvements in those houses may involve changing their appearance, which requires planning permission to be granted by the local Planning Department. However, this department may not be prepared to accept that strategies to reduce CO_2 emissions in existing houses may require changes to their envelope and consequently to their appearance. A major problem in existing houses is the fact that Planning Department can act as a barrier to approval of their upgrades, by not granting permission. Moreover, the refusal to certain upgrades could also represent a barrier to implementing sustainable features.

Planning Departments need to address at this point if their strategies are sufficient to achieve the UK commitments set to decrease Britain's carbon emissions by 80% targets and more broadly tackle climate change. Since Georgian and Victorian houses are major contributors to the CO_2 emissions associated with building, suggestions for improvement their energy performance must be carefully analysed in order not to represent an impediment to reducing an important amount of greenhouse gasses emissions.

Building Regulation Part L 2010

The recent Part L 2010 (conservation of Fuel and Power) of the Building Regulation proposes technical guidance for compliance with the energy efficiency requirements in buildings. It is now under consultation. (Consultation section two Part L, 2012)

In order to understand the effect of this legislation for existing Victorian and Georgian Houses, the energy efficient mandatory requirements, which are Part L of Schedule 1, Regulations 4A, 17D and 17E, will be analysed. (Part L1B, 2010).

Part L of Schedule 1 deals with conservation of fuel and power, by limiting heating gains and losses, providing fixed building services and information to occupiers. It addresses the building as a whole, suggesting limits to the heat gains and losses and requiring the system to be as insulated and energy efficient as possible. It suggests educating the occupants with information to utilize and use effectively the building characteristics.

This regulation requires heat gains and losses to be limited through thermal elements and other parts of the building fabric. This has a major impact in Georgian and Victorian Houses, which are frequently not insulated. In a typical uninsulated 3 bedroom Victorian house, 25% of heat is lost through the roof, 15% through the floors, 25% windows and doors, and 35% through walls. (Pullen, 2008)

Conversely, no clear call is made to adopt passive strategies to reduce the energy consumption and consequent CO_2 emissions. The regulation is prioritising the efficiency

of the building against the use of clean energy. This implies a more efficient building but still relies on fuels which contributes to the greenhouse effect. This may not be enough to achieve the zero Carbon home targets. The use of clean energy sources such as renewables and passive strategies to replace active systems using fossil fuels constitute a much more effective solution for the global warming problem.

The Regulation also targets provision for the building system, requiring efficient fixed building services with efficient control. Once again, more emphases should be given for the use of clean energies, which is always better than any other energy used in its most efficient way.

Another target is the provision of sufficient information about the building services and their maintenance requirements so that the building can be operated in so as to use no more fuel and power than is reasonable in the circumstances. Nevertheless, this regulation should go further by educating homeowners on reasons why the systems must be used efficiently, in order for them to have a more efficient lifestyle. Further education might show that before purchasing the most efficient appliance it is time to first analyse if it really necessary or an impulse only. It is not rare to find kitchens which have more than one of the same appliance (i.e. four ovens) where the only reason to give symmetry to the room. To these homeowners for whom money is not an issue, education on the current levels of CO_2 emission and its impact on the environment could be a way to decrease their footprint.

Regulation 4A deals with the requirement relating to thermal elements. It establishes the basics principles of conservation of energy in buildings. The provisions to reduce heat losses through thermal elements ensure that the heat produced inside the buildings such as by radiators will not be easily lost to the exterior. At the same time heat gains should be avoided in summer days. These sorts of measures (passive strategies such as insulation or shading) represent a direct impact in reducing the need or even annulling additional active systems, i.e. the use of air conditioners to compensate excess of heat gained during hot days. It may also decrease the energy consumed by the heating system or reduce its peak demand, since reduced heat losses mean a house will stay warmer for longer periods in the winter.

Consequential improvements to energy regulation 17D is currently only compulsory to buildings with an area above $1000m^2$. Fortunately, it is now under revision and is extremely necessary for it to be changed, since Georgian and Victorian houses are unlikely to be greater than $1000m^2$. Since they represent a major part of the existing houses, it is likely that cases where this regulation applies will constitute of just a small percentage of existing dwellings. This reality contradicts the real necessity to reduce the CO_2 emissions in all dwellings, not just a minority.

Regulation 17E deals with energy performance certificates (EPC). It represents a good initiative, but is still insufficient. This is because the list of improvements to reduce the energy consumption in the dwelling provided by the EPC is currently a suggestion only. Fortunately, this is now under revision and it is now time to consider whether some or all

of these items should be mandatory. However financial mechanisms and incentives need to be addressed in particular for low income owners.

The exemption to conservatories that have a floor area not greater than $30m^2$ must be reconsidered and it is not proposed to be changed under the current revision. The removal of this exemption would be an important improvement in reducing CO_2 emissions in the housing sector, since it is likely that the majority of the conservatories to residences to be within those measures.

Requirements for the fabric standard do not take in to account that heat can also be gained from the environment through solar gains. Architects can take advantage of this fact by using passive solar building design techniques aiming to maximise solar gains in the winter and to control them in summer. This is extremely important to reduce the heat input in the space, which is complemented with the clean energy gained. In a space with high inertia, it also minimises the daily temperature fluctuation, reducing the peak emissions of active systems and their capital and running costs.

The omission in the Approved Document of any reference to passive solar building design technique to demonstrate compliance with the Regulation neglects a strategy which uses clean and free energy source. More emphasis should be put on these well-known strategies which have proven results in terms of energy savings and improved comfort to the occupants.

The regulation also requires the building fabric to be constructed in such a way to avoid as far as possible unwanted air leakage through the new building envelope and thermal bridges. It is important to mention these since a significant part of the effort to reduce heat losses by insulating the envelope could be wasted via draughts and thermal bridges. An interesting debate could be had to discuss the advantages / disadvantages of the new tendencies to utilize mechanical ventilation with heat recovery against natural ventilation.

According to the Approved Document L1B, the total area of windows, rooflights and doors of extensions must not be greater than “25% of the floor area of the extension plus the total area of any windows or doors which, as a result of the extension works, no longer exist or are no longer exposed”. (Part L1B 2010)

It is not good practice to reduce the glazing area in such a way that it represents less than 20% of the total floor area, as this may compromise the access of daylight levels, and consequently increase the necessity of artificial lights.

Insulated cavity closers should also be installed along with the windows, rooflights or doors and reasonable provision should be made to provide draught-proofed units in which the thermal transmittance U-value performance is not worse than the specified in the regulation. This guidance suggests all renovations and retained thermal elements be subject to a change of use to have their U-values improved to a minimal standard or as close to it as possible, which is now under revision to change from ‘band C or better’ to ‘band B or better’.

For cases where it is not practical to follow the U-values established the space will not achieve the expected performance and heat losses will not be minimised to the standard required. Since this will mean additional energy necessary to offset the heat losses, the guidance could also have proposed for the difference of U-value achieved and the U-value in column to be compensated elsewhere in the house. By reducing further heat losses in another existing room, this additional energy saved would be a way to offset the heat losses to the newly converted space.

It is suggested that when an existing appliance is being replaced, the new one should not have a performance significantly inferior to the previous appliance. Equally, if a renewable energy generator requires a fuel switch, the new system should not be allowed to have an electrical output with a performance lower than the original installation as it will result in consumption of conventional fuels to compensate the difference of performances.

CASE STUDY: SOLAR THERMAL PANEL PROJECT APPLICATION

To better understand how Planning Departments are dealing with proposals which aim to reduce building CO_2 emission but are visible from a public street, a professional specializing in residential retrofitting was consulted.

Figure 1: nos 12 and 10 Laneway

The case study selected demonstrates an example where the Planning Department have refused the use of solar panels to fully cover the rear roof of two houses on a conservation area.

The project consisted of a two storey terraced houses located in no. 10 Laneway, SW15, and aimed to integrate next door, no. 12, purchased to expand the family house. The homeowner wished to combine the two properties, re-arranging the internal layout to provide four bedrooms at the first floor, and a family space at the ground floor with an extra bathroom. A full Planning Application for this was submitted to Wandsworth Borough Council Planning Department.

The houses are part of Dover house Estate Conservation Area, but neither these houses nor its immediate neighbours are listed buildings. Figure 01 shows no. 12 Laneway to the left, followed by no. 10.

Figure 2: view from Putney

Laneway Road is located between Putney Park Lane and Sunnymead Road. Figure 02 indicates that at some points of Putney Park Lane it is possible to view parts of the rear houses located in Laneway Road. The same happens in Sunnymead Road, and views in both cases are obstructed by trees.

The proposal consisted of the removal of the existing tiles to the rear façade of Laneway Road as per figure 4 to be fully substituted by solar panels. This however, was rejected by Planning Department on the grounds of appearance, because the panels were considered to be intrusive for the area. This refusal was extremely disappointing as the panels were proposed to two houses matching each other, initiating a process that would facilitate the implementation of this system to other properties on the area. Also, the panels were located on the rear of the houses, which are just visible from side roads, between trees.

Figures 3 and 4 - initial survey and proposal for solar panels to fully cover the rear roof to nos 10 and 12 Laneway - Rear elevation

After the rejection, a new proposal was submitted. Amendments made to the initial plans were based on conversations with planning officers, aiming to find a point of contact between the architect's proposal to introduce a clean energy system to heat the water of these houses and their visual impact, considered to be an issue by the Planning Department.

The new proposal consisted of a partial removal of the existing tiled roof to be substituted by only four panels to each property. Figure 05 illustrates the amended drawing showing a reduced number of panels on each house. This proposal was considered less intrusive and therefore was approved by Planning Department. From this case it is possible to identify that Planning Departments apparently have no defined criteria for the use of solar panels. It has granted permission to only part of the panels required by the energy demand of the houses, yet does not solve the visual impact considered to be an issue. However, the Planning Department did not permit these houses to make further cuts to their CO2 emissions, despite the government requirement to reduce greenhouse gases emissions.

Figure 5 - Proposal to partially cover the rear roof of nos 10 and 12 laneway

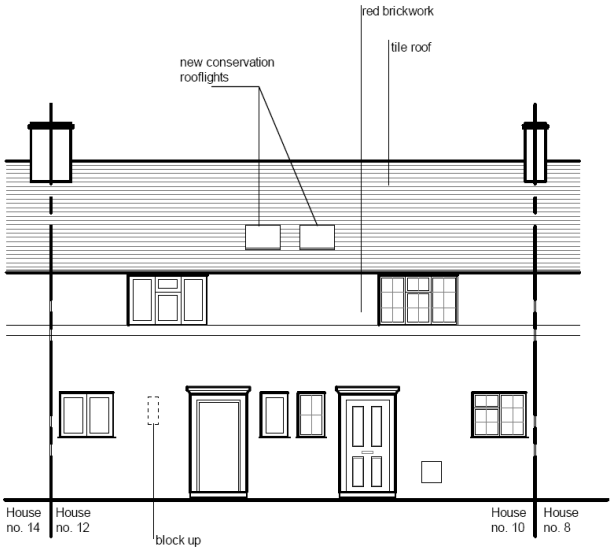

Figure 6 - approved rooflights to nos 10 and 12 laneway font façade

It is also important to measure the visual impact of the additional solar panels refused to these houses. To this particular case the proposal was to occur to the rear façade, visible with obstructions and in certain points of transverse roads only. This minor impact to the appearance will equate to a major impact to the environment, as a limited and pollutant fuel will be used instead of clean and unlimited energy. It is also important to notice that two new rooflights were approved to the front façade of this house, which could lead to the conclusion that these were considered to have little visual impact to the main façade, as illustrated by figure 06 .

Most of the existing houses were built in a time of no awareness of the greenhouse effect, and their constructions reflect this fact. However, Planning Department seems not to be following the changes to this reality, which unfortunately impact the houses and their appearance. What has to be made clear is to what extent the building appearance is to be maintained in detriment of the reduction of CO_2 emission rates to those constructions. Solar thermal and photovoltaic panels are sources of clean energy and should not be refused planning as it will improve the performance of the dwelling and reduce its carbon footprint.

QUESTIONNAIRE OF PLANNING APPLICATIONS

The previous case study analysed a proposal to add solar panels to the rear façade of an existing house, which was refused on the bases of appearance.

In order to quantify and understand to what extent this is happening a questionnaire was created and addressed to architects. The area of focus is London, and the questions were sent by e-mail directly by the researcher and within the Green Registry of Construction Professionals electronic newsletter. (Barreto, 2010)

The questionnaire consisted of four questions only. It aimed to recognise if architects consider the Planning Department a barrier to the approval of visible proposals to reduce CO_2 emissions in the existing residential sector. It also intended to identify in which councils this situation has occurred and which ones were promoting initiatives to reduce greenhouse gases rates.

From approximately 800 architects consulted, 106 have replied. Results are analysed individually for each question.

Question 1: When carrying out works to an existing dwelling, have you ever made a proposal which would reduce the building carbon emission (such as proposal of solar panels) which was refused by Planning Department on the ground of appearance?

Answer: 37.50% = yes 62.50% = no

Approximately 40% of the architects who replied to this survey have a history of refusals for their green proposals. These numbers are a clear indicator that the impact of appearances for these proposals needs to be urgently reviewed, as they are preventing buildings to reduce their CO2 emissions.

Question 2: Please mark which of the elements below were refused for being visible from a public road

Answer:
A= Green roof 0.0%
B = Photovoltaic and/or solar panels ……..……...20%
C= Rooflights……..……....10%
D= Shadings……..……..0.0%
E= External insulation to the building envelope…….....20%
F= Double glazed windows to listed buildings……...10%
G= Other……...40%

Other responses collected are listed below:

- Also double glazed windows to a non-listed building within a conservation area.
- I have not had photovoltaic refused but have had a requirement that they are not visible from the street
- N/a-
- Double glazing to listed buildings
- External insulation
- roof windows

This highlights the importance of the visual impact of these elements on buildings. The questionnaire indicated that 20% of the refusals relate to external insulation of the building envelope. As mentioned before, this could represent a major visual impact as

this method requires the finish material to be rendered or cladded. In cases where the external finish specification differs the appearance of the building could change significantly. However, the seriousness of the problem opens the debate about the impact on the energy performance of the building and to the environment if this upgrade is refused, versus the visual impact caused when this permission is granted.

Visible photovoltaic and solar thermal panels also obtained 20% of the votes. It may be argued that the integration of solar panes to the roof have a lower impact on the building appearance. This may not be the case when they are positioned without a clear integration. It is the author's opinion their visual impact may be minor when compared to the advantages that it brings to the environment. (Barreto, 2010)

Rooflights and double glazed windows to listed buildings both represented 10% of the votes. These elements can be very advantageous to the performance of a building. Rooflights promote daylight and reduce the use of artificial light during daylight hours. Double glazing also reduces heat losses in the heating season. Both have a positive impact to the comfort of the occupants and are likely to reduce building energy loads. However, it is reasonable to assume that applications proposing rooflights and/or additions/replacement of a double glazing unit to listed buildings are much more common than applications proposing solar panels. In this context 10% refusals are considered lower than initially envisaged. This may acknowledge the importance of daylight and the impact of windows in buildings. However, scenarios as the one presented in the case study are still a reality and contrast with the government promise to decrease CO_2 emissions and move towards zero carbon homes.

Question 3: In relation to the previous question, please name the Local Authority concerned.

The most voted London boroughs were Islington and Kensington and Chelsea, each with 28% of the votes. These were followed by Wandsworth, counting 18% of the answers and London Borough of Haringey and Camden, representing 14% and 12% of the votes respectively. No mention was made to the remaining 27 London boroughs. This question was important to identify which Planning Departments are considered a barrier to visible proposals to reduce buildings CO2 emissions rate.

Question 4: What are Authorities which in your experience have agreed to those works?

Kensington and Chelsea, Wandworth Council and South Gloucestershire Council.

The architects surveyed have had at least one approval by the councils listed above to strategies to reduce CO2 emissions that were visible from a public road. Kensington and Chelsea and Wandsworth Councils were listed also by architects who had experienced refusals to these proposals.

Although the number of responses to the questionnaire is not significant to the universe of registered architects it still raises awareness to this problem.

A major part of the London Boroughs is not included in the replies. It is not clear whereas this is a result of a reduced interest in applying proposalS that move towards zero carbon buildings or if the respondents are not working with these boroughs. It is certainly surprising that the borough of Merton is not mentioned given its pioneering strategies to implement a minimum of 10% renewable energies in new buildings.

The list of boroughs mentioned by architects on the previous questions are likely to indicate which Planning Departments may need to address a discussion on the visual impact of proposals against the benefits this is bringing for the environment, as part of their Local Agenda 21 Plan.

The majority of the existing house stock was built before requirements for conservation of fuel and power were in place. If not upgraded, it is unlikely that new houses are sufficient to provide the required reductions of CO_2 emissions.

CONCLUSIONS

This study raises some issues contrary to the London commitment to reduce greenhouse gasses, especially CO_2 emissions. Attempts to upgrade existing houses are frequently being refused by Planning Departments on the grounds of appearance. This represents around 40% of the 106 architects surveyed.

Conversely, the population strongly supports the use of renewable energy. A study realised in London consulting 502 adults has identified that 81% of the population surveyed considers the use of renewable energy to be a good idea, against only 1% who disagreed. (MORI Environment Research Bulletin, 2003)

This problem must be addressed seriously. The existing house stock is a major contributor to the greenhouse effect, and barriers to its upgrade are likely to represent a failure to honour government commitments.

Requirements for new buildings, in particular in Part L – Conservation of Fuel and Power- Building regulations under consultation demand much more efficient constructions, aiming to minimise the additional impact that they could cause to the environment. While much effort is addressed to new constructions, a major part of existing buildings were built without any awareness of finite resources or non-clean energies and they require urgent upgrades to reduce their energy consumption while maintaining comfortable and healthy spaces for the occupants.

The necessity to decrease CO_2 emissions needs to be disseminated to all stakeholders. Consequential improvements ought to be implemented by major renovations independent of the building size (1000m2 threshold removed). The regulation has already identified a way to reduce CO_2 emissions to existing houses and the seriousness of the problem does not allow this to apply for a small percentage of buildings.

Financial, fiscal and capital incentives to upgrade existing buildings are imperative. Likewise Planning Departments need to clearly address their commitments and promote a well defined policy in these matters. Zero Carbon House strategies need to be in agreement with building regulations and codes. Clean energies must be mechanisms promoted by local Authorities as "business as Usual". A clear instruction to Local Planning to promote renewables and good energy performance of buildings should include quicker approvals to energy efficient buildings and tax incentives.

Conversely, before 1990's house stock requiring upgrades face technical barriers in the government to do so. New buildings correspond to just a small percentage of the problem, and adding more efficient houses to the massive existing stock will not solve but worsen the situation.

Refusals to strategies aiming to reduce existing buildings CO_2 emissions can represent an impediment to their upgrade as the rejected strategy may be the only one available to certain constructions. It may also postpone for a long time the required improvements.

The questionnaire developed identified visible elements being refused by Planning Department on the ground of appearance. From 106 architects surveyed, 30% had history of refusals to solar thermal/photovoltaic panels, or to proposals for external insulation. This information indicated the seriousness of the problem, as both strategies are important measures to reduce buildings CO_2 emissions.

The questionnaire also identified boroughs likely to refuse visible strategies to improve a building performance and which are being considered as a barrier to those proposals.

Another important conclusion refers to the legislation related to the conservation of fuel and power to existing buildings. This study has identified that much effort is given in order to minimise heat losses to buildings as well as for their systems to work efficiently. This minimises but may not be sufficient to address the greenhouse effect. Only a clean energy such as renewables will consistently tackle the problem, and only few references are made to this strategy in the current legislation. By neglecting renewable energy strategies, Approved Documents are discouraging its adoption by architects, in particular given the lack of guidance to demonstrate compliance with the regulation.

The study also emphasises the necessity of a new planning policy to be formulated addressing specifically the upgrade of the existing house sector, which would provide a better guide for architects and planning authorities related to more closely defined criteria.

REFERENCES

Barreto R. *Planning barriers to the Government agreements for reducing carbon emission in existing houses*, MSc Thesis, London Metropolitan University, January 2010.

Consultation section two Part L (2012). *2012 consultation on changes to the Building Regulations in England - Section two Part L (Conservation of fuel and power),* Department for Communities and Local Government, January 2012.

DEFRA (2009). *Department for Environment, Food and Rural Affairs*. (2009). http://www.defra.gov.uk/environment/climate/index.htm [acessed 19th Setember 2009]

Maunsell, F. (2004). *Integrating renewable energy into new developments: toolkit for planners, developers and consultants.* London: Greater London Authority.

MORI Environment Research Bulletin. (2003). London.

Part L1B (2010). The Building Regulations 2000. Approved document *Conservation of fuel and power in existing buildings* . London: NMS.

Pullen, T. (2008). *Simply Sustainable Homes.* Ovolo Publishing Ltd.

Zero Carbon Hub (2012). http://www.zerocarbonhub.org/ [acessed 20th February 2012]