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EDGE DEBATE
29 OCTOBER 1997

SUSTAINABILITY AND ENERGY CONSUMPTION IN BUILDINGS

Committed to Energy Efficiency

BG plc (formerly British Gas) is the UK's largest energy company. In fact, it is one of the largest energy companies in the world. You would therefore rightly expect its Property Division to be concerned about the use of energy in its buildings.

BG recognise the importance of efficient energy use and have since 1992 played an active part in the Government's "Making a Corporate Commitment" campaign.

The case for energy efficiency is clear and as forest fires rage through Indonesia and Malaysia and hurricane storms whip the American pacific seaboard, so the case for climate change becomes more apparent. Like the climate, the political debate is hotting up and the forthcoming environmental summit in Kyoto should go a long way to establishing the framework for a protocol to reduce greenhouse gases.

To live with the concept of Sustainability it is necessary that when dealing with a finite natural resource such as fossil fuels, companies maximise the benefits to be derived.

It is therefore both timely and important that progressive nations and companies take the lead in addressing the international issue of global warming by applying the local principle of energy efficiency.

There are two significant opportunities:

- First a shift to cleaner more environmentally acceptable forms of energy such as natural gas. This is not only good economic sense for BG plc, it is good environmental sense for UK plc. Indeed UK plc's success at reducing emissions by 10% has been based on the so called "Dash for Gas".

- Second, a concerted effort by all concerned - governments, businesses, even energy companies - to reduce overall energy use. Progressive, incremental action now will avoid the need for more drastic measures later on, so energy efficiency also makes good economic sense for BG plc.

Low Energy Buildings

BG's Property Division has the opportunity to play a small role in encouraging energy efficiency, as an occupier of buildings, as a manager of BG's property portfolio and as an occasional owner and developer of buildings for use by others.

From BG's perspective, as an occupier and manager of property, the advantages of low energy buildings are obvious. They are:-

- Substantial energy cost savings, both now and in the future as fuel charges and taxes are bound to rise.

- Lower "churn" costs and reduced maintenance charges.

- A modern, quiet and healthy working environment.

- An enhanced reputation by demonstrating awareness of environmental issues.

With such transparent benefits it is sometimes hard to see why any company choosing a new building would not opt to make energy conservation a priority. As ever, however, in business it's never quite that simple.

- Sometimes the location is unsuitable to meet the requirements of a low energy building.

- Sometimes, a business' culture may not be ready to build energy consumption into its decision-making process.

- Sometimes, the business equivalent of "keeping up with the Jones's" means style is put before substance.

- And on other occasions, plain old-fashioned prejudice prevails.

And, of course, as with any new high technology solution, or should we say a solution different from the norm, there are always teething problems which may serve to discourage would-be occupants of low energy buildings, who are all too ready to say "I told you so".

Over the past four years, I have been involved in the development of five low energy buildings. Two of these buildings were for occupancy by BG, a further two (on the same site and substantially to the same design) were pre-let to a high-tech computer company and the last one was speculative. Two of the buildings have yet to be fully occupied.

My experiences in each cases illustrate the practical difficulties of developing and occupying a low energy building.

Changing Business Attitudes

The first of BG's own low energy buildings is to be occupied by its Exploration & Production Division. Located at Thames Valley Park outside Reading and designed to high specification by Sir Norman Foster, the building offers a pleasant, efficient and largely open-plan working environment.

The culture of the oil and gas exploration industry is, however, to expect accommodation to be constructed of air-conditioned, marbled, cellular halls. Indeed, this is the sort of accommodation widely used throughout the industry. Our Exploration & Production Division felt an understandable commercial pressure to reflect in their building - at least in part - conditions elsewhere in the industry.

It has proved possible to meet their concerns, but only at an energy cost. For example, the design team (Roger Preston, Mechanical & Electrical Consultants) has introduced a mixed mode design, still allowing operable windows without wasting chilling capacity on the outside world. I remain confident that we will be able to integrate Exploration & Production's requirements into the existing building design, but they are yet to move in and there may still be some way to go.

Meeting Difficult Specifications

BG's low energy building at Leeds City Office Park, was a speculative development which has now been let to an enlightened occupier. Cellnet's rigorous building specifications show the difficulties inherent in such speculative developments, but also the flexibility possible within low energy accommodation, which is probably greater than a sealed air conditioned office.

Cellnet want to use Leeds as a call centre and hence require the capability within the building for 24 hour working, dense occupation and consequently large "small power" requirements. With the help of Foggo Associates we have managed to meet these requirements during the fitting out of the building through a number of alterations to the original plans; the main amendment being provision of a chilled ceiling incorporated in the original acoustic panels. The location of the building adjacent to a busy route to the motorway required the thickening of glass to combat the consequent noise pollution and the adjacent occupier can decide if he wants the window open or to keep out the noise. All of this has been successfully incorporated within what may no longer be a minimum energy solution but still a low energy solution for a heavily used building.

Hitting a Moving Target

The challenge presented by the requirements of the high-tech computer company was different. The innovative approach of the company's founders naturally meant they wanted an innovative building design. This, in turn, led them to commission (with the support of their staff) a low energy building.

Part-way through design (by Nicholas Hare Architects) however, a change in personnel at the computer company resulted in significant alterations to the building specifications. Specifically, the building was suddenly required to cope with a 40% increase in occupation density, which, in turn, created a considerable heat load from the corresponding small power increase. Whilst the design was flexible enough to incorporate the changes, the subsequent loss by the computer company of key personnel who understood how to use the building efficiently meant that it failed to perform to expectations. BG has, however, now been able to rectify the problem by up-rating the chillers on construction of a second building for them.

Six Principles for Designers

These are just three examples of ways in which prevailing business attitudes and difficult and changing specifications can be incorporated into a low energy design without abandoning the base philosophy.

The lessons I draw from these experiences are six-fold. For low energy design to be successful and desirable for business occupancy, design teams must:-

1. Incorporate the occupier's desire for image and comfort, for example by providing comfortable working conditions whatever the prevailing external temperature, treat creatively the exposed thermal mass and provide individual flexibility within lighting control systems.

2. Ensure that design criteria are robust and flexible enough to meet changing user demands, for example by providing for both open plan and cellular use, and for easy transformation back and forth between the two, without specials.

3. Provide for both 24 hour working and night-time security (night venting windows must maintain security).

4. Take into account other issues which may arise as a result of the low energy design, for example noise levels, external air pollution and even insect and pollen ingress.

5. Notwithstanding any of the above, avoid the over-design of environmental conditions.

6. Finally, and most importantly, explain adequately and frequently to the occupier (and their facilities manager) how to use the building efficiently and cost-effectively.

None of these criteria are unique to buildings designed on a low energy principle. Any building, whether high or low energy, air conditioned glass tower block or 1930s art deco office needs to take fully into account the needs, desire and aspirations of the people who use it, who must live with the consequences of designers' decisions everyday.

So long as we do not forget that we are still designing buildings for people, we will be able to surmount the other challenges and issues which low energy design raises.

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