

# The Environmental Building

**The Building Research Establishment (BRE) Office Building**



<http://www.feildenclegg.com/framepage>

# The Environmental Building

## The Basics

Location: Garston, Watford

Building Type: Office

Client: Building Research Establishment (BRE)

Design Team:

Project Manager: Bernard Williams and Associates

Architect: Feilden Clegg Bradley Architects

Services Engineers: Max Fordham and Partners

Structural Engineers: Buro Happold

Quantity Surveyors: Turner and Townsend

Landscape Architects: Nicholas Pearson Associates

Space Planning: DEGW

## Background

The BRE Building project was designed to be an example of new EoF (Energy Efficient Office of the Future) performance specifications. BRE's is an establishment whose job it is to overlook other architectural projects and their progress in energy-efficient and "Green" building design: they used this building as an opportunity to demonstrate all of the characteristics and attributes of what new "Green" building technologies had to offer. Key foci went beyond just energy consumption and looked at embodied building material energy, the building's CO<sub>2</sub>, SO<sub>2</sub>, NO, methane, and particulate emissions. The project was sited in the core of an old campus on top of old damaged buildings that would be reused in construction.



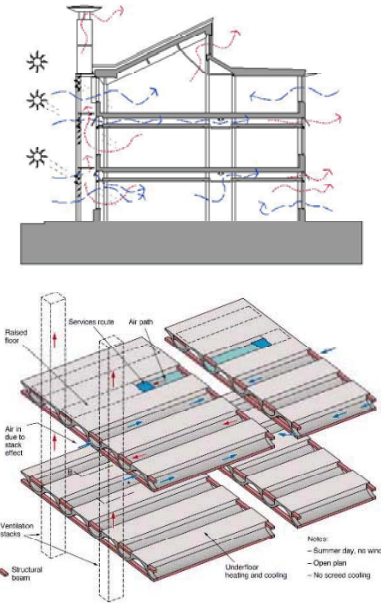
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## Ventilation & Cooling

The most distinguishing feature of the building is its five cooling stacks towering over the south side of the building. While they are the most visually prominent feature they also hint at the building's complex ventilation system that takes advantage of the building's narrow layout for cross-ventilation purposes. The cooling stacks allow for further ventilation on hot, stagnant summer days so the building can always remain well within reasonable temperature levels like that of an air-conditioned building.

The curved, hollow, concrete floor slabs also aid in the building's ventilation by drawing air in through the passages in the floor/ceiling on hot, windy days. Even further cooling can be managed by circulating water through the passages in the curving slab. This cold water is supplied by a

70-meter-deep bore hole where the temperature is a constant 10° Celsius. This cold water is used in heat exchangers to chill circulatory water. The floor can also then use the water to store “coolness” from the night for the next day. In the winter time, the water is heated by condensing gas boilers that are 30% more efficient than traditional boilers by recovering heat lost in flue gases. All heating and cooling systems are managed by the Trend building management system (BMS).



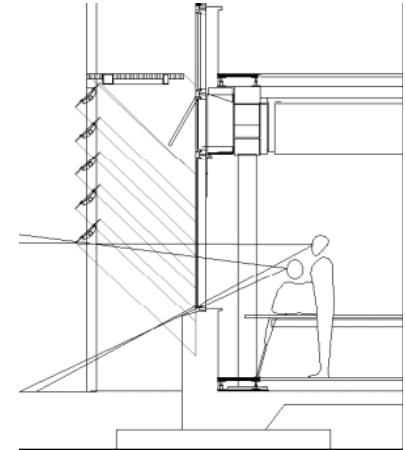
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## Solar Control and Daylighting

The building's glazing is optimized by a louvered exterior shading system that is designed to allow maximum daylighting while minimizing glare. The louvers in the shading system have a translucent ceramic coating on their underside to filter direct sunlight as it reflects off it. The louvers change position corresponding to the time of day and season; they are controlled by the automated functions of the BMS, but can be overridden by occupants via a remote control. The louvers are oriented so the views of the occupants are not obstructed while either seated at desks or standing in circulation spaces.



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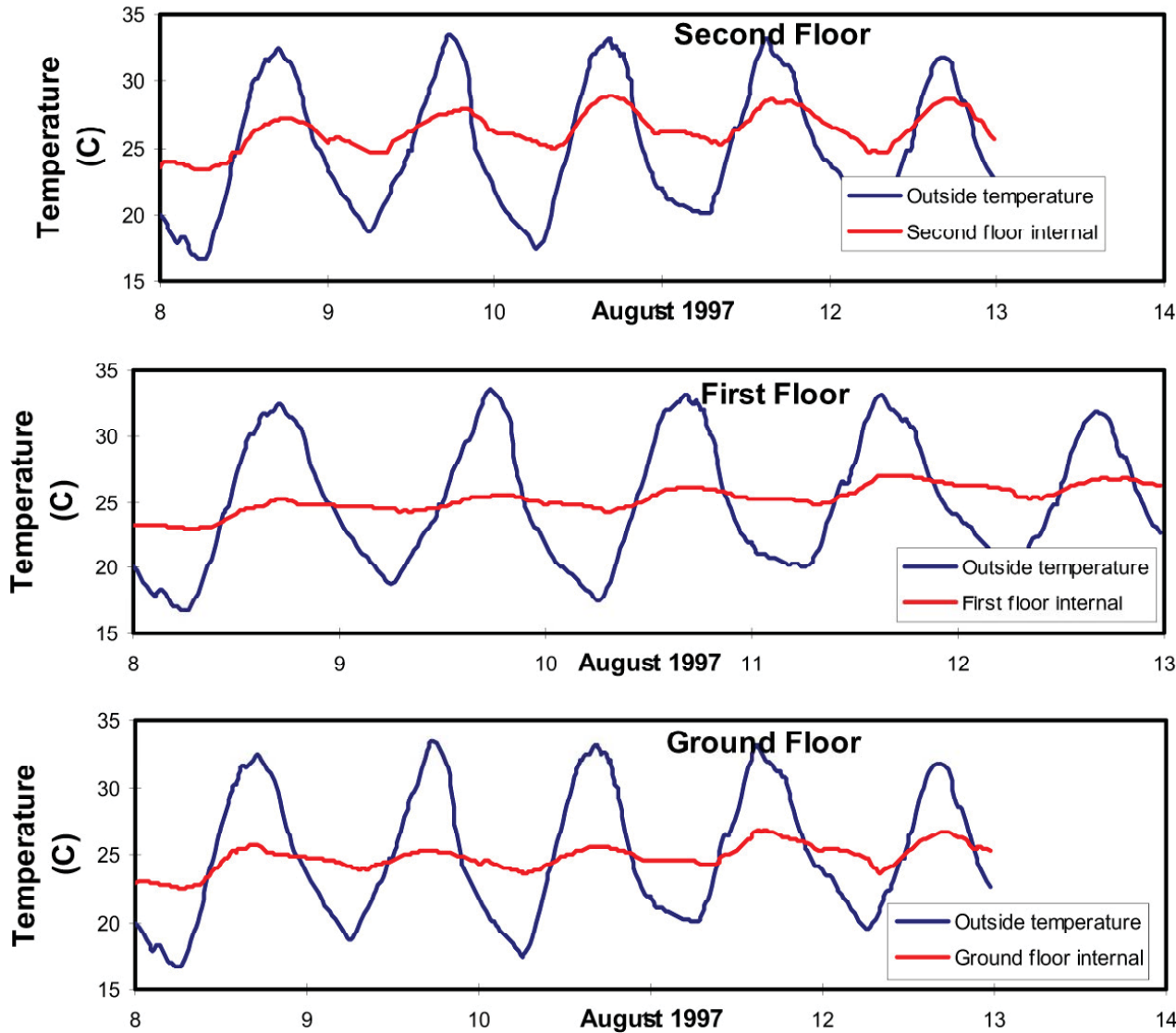
## Electrical and Lighting Systems

Supplementary lighting systems in the building take advantage of TL5 fluorescent lights that consume less energy than traditional tubes and use 1/5 of the mercury. The slim fluorescent light fixtures reflect 40% of their light off the ceiling as diffuse light with the rest creating a bright workplace (300lux). Power for the lights and other systems is supplemented by a building-integrated photovoltaic array (BIPV); the power from the cells is monitored by the building's computer which lets occupants know what percentage of that power is being used relative to the total power consumption.



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## Statistics and Studies



Building Area: 2,200 sq m  
Site Area: 6,400 sq m  
Density: 100 people @ 12 sq m/person  
Energy Use Predicted Total: 83 KWhr/sq m/annum (0.3 GJ/Sq m/annum)  
Heating: 47 kW/h/sq m/annum  
Artificial lighting: 9 kW/h/sq m/annum  
Cooling: 2-3.5 kW/h/sq m/annum  
Mech Vent: .5 kW/h/sq m/annum  
General elec: 23 kW/h/sq m/annum

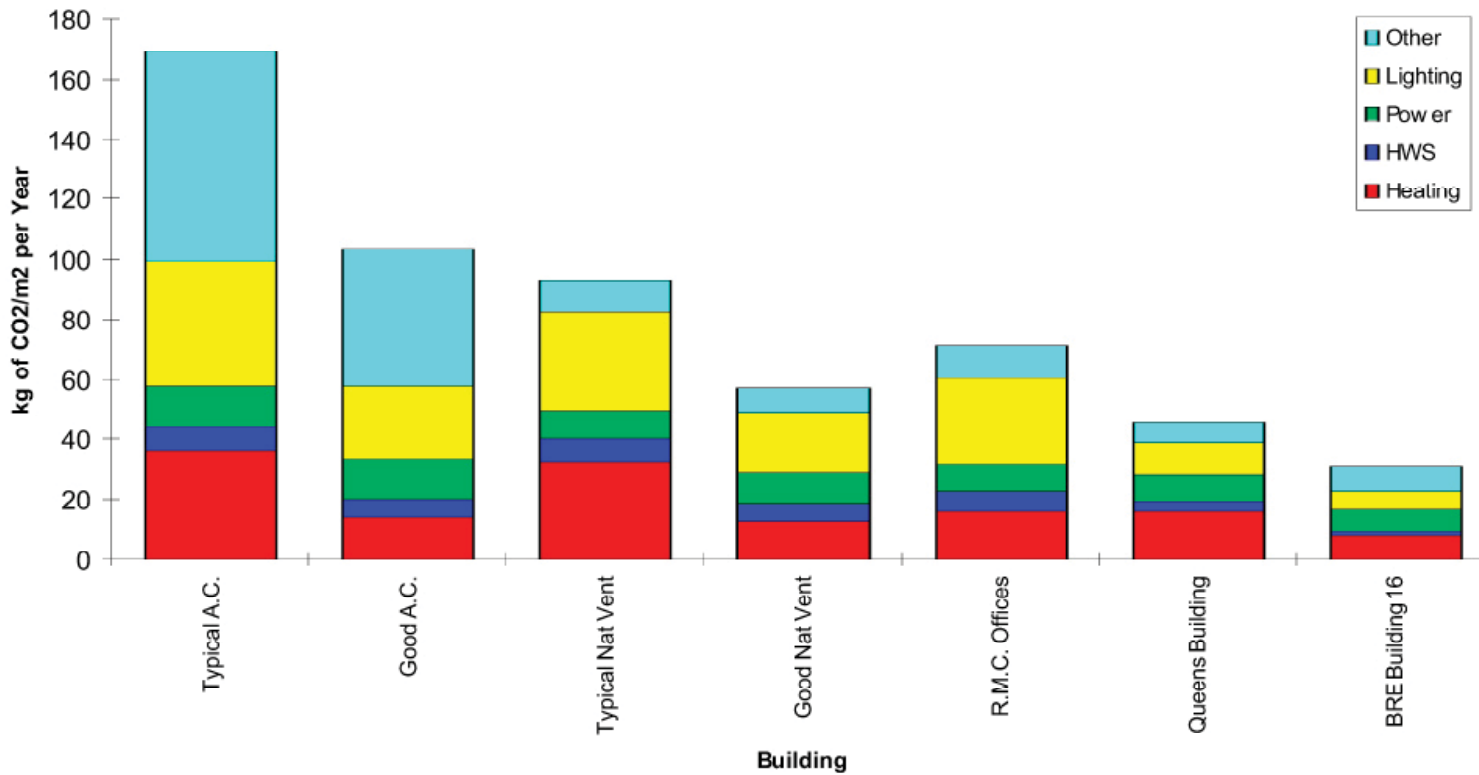


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CO2 Emissions Predicted: 34 Kg/sq m/annum depending on PC use  
Current: 46Kg/sq m/annum prior to improvements in air tightness  
Other Emissions: SO2 0.23 Kg/sq m Methane 0.002 Kg/sq m (predicted)

## CO2 PRODUCTION

### The New Environmental Office compared with Typical Buildings



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## Getting to the BRE Building

### Public transport

#### Travelling by train

The nearest mainline station

to BRE is Watford Junction, on the London (Euston) to Glasgow line.

It is a three-mile taxi ride or bus journey (see below) from the station to BRE. Please note that local trains services through Garston and Bricket Wood do not provide access to BRE. For details of train times and ticket pricing, call National Rail Enquiries on 08457 484950

#### Bus services

Local service 321 from Watford Junction station towards St Albans, and the 724 airport coach service from Heathrow to Harlow, pass close to BRE (alight at St Michael's School). A pedestrian underpass connects across to Bucknalls Lane.





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## References

Brown, G. Z. and Mark Dekay. Sun Wind and Light. 2nd ed. John Wiley & Sons Inc., 2001.

Garston Feilden Clegg and Bradley Architects LLP. Establishment. 2006

White, Peter. The Environmental Building. BRE Internet Services, 2000. <<http://projects.bre.co.uk/>>.

<<http://www.breeam.org/>> The New Environmental Office, Building Research.

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*Case Study by Clayton Harrison, Spring 2006*