Guidance on energy efficiency in industrial buildings

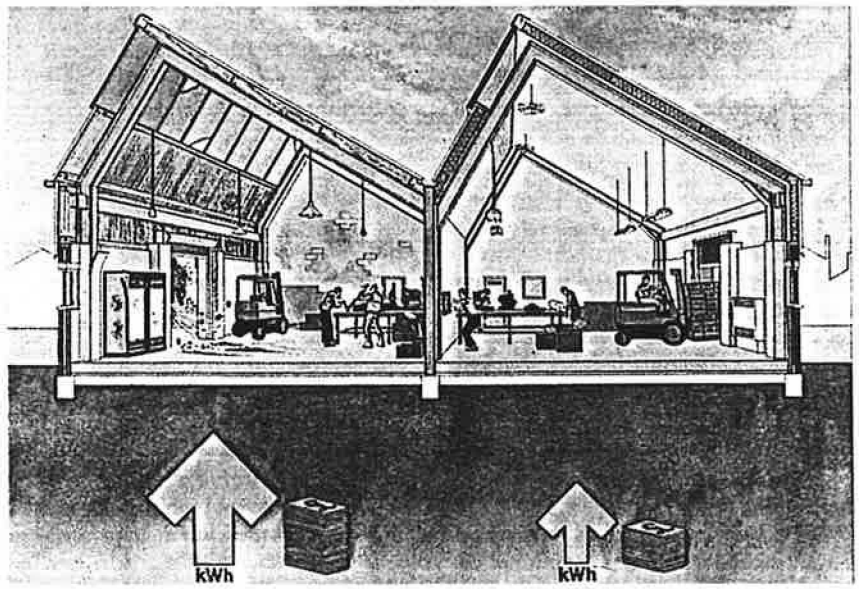
Douglas Haughey, BRECSU, highlights the need for authoritative guidance on improving the performance of industrial buildings

Industrial buildings form the foundation for a significant part of the nation's economy. The following recent views of two leading market players clearly indicate the need for authoritative guidance on improving the performance of these buildings - both old and new. "It is fair to characterise the average UK factory as conceived in stale routine, born into penury, neglected, and possibly abused throughout its brief life. Yet there are great satisfactions to be gained from a successful refurbishment, of which an astonished and delighted client is not the least."[1]

1. "In the years ahead, it is likely that the industrial sector of the economy will be one of the most dynamic and, in property terms, demanding. New legislation and the quest for greater efficiency will require better standards of property than are presently available. Based on anticipated demand therefore, development activity in the industrial market should be high."[2]ww

2. Industrial buildings in the UK account for energy costs of about £1.5 billion/year. If the market needs (above) for old and new buildings can be met in an energy efficient manner there are potential national savings of some £300-400 million/year as well as an important environmental contribution towards fulfilling the UK target for reduction in greenhouse gas emissions of carbon dioxide.

For the building users the direct benefits will be more energy efficient buildings which provide the specified working environment with lower energy consumption relative to those conditions in a cost-effective way. Such improvements will, in turn, result in indirect benefits to the business because they will assist in maintaining more competitive operating costs together with better levels of staff comfort, productivity and product quality. The investment involved is worthwhile in terms of risk and return to provide less environmental pollution. The overall effect will be to foster a 'green' corporate image of responsible care.



Spotting the differences can profit the UK by £400 million each year

This paper outlines the range of guidance literature on energy efficiency in industrial buildings which is readily available, primarily from the EEO's Best Practice programme managed by BRECSU and ETSU, plus some supplementary documents from the European Community's THERMIE programme and the International Energy Agency's CADDET project.

Energy Consumption Guides

ECON 18 is a comprehensive Energy Consumption Guide[3] on energy use and costs in industrial buildings and sites. Categorisation is by industry sector, representative building types and condition, and individual building services. Also covered are the opportunities for reducing energy consumption, including energy management, and the influences of occupancy, weather and process effects. A fuller description is given in a following Focus paper.

ECON 33 is an Energy Consumption Guide for the pharmaceutical industry[4] which includes energy use and costs information for the industry's buildings as well as processes.

Good Practice Guides

Two Good Practice Guides, based on the concept of 'cohesive design' provide comprehensive coverage of energy efficiency in advance factory units (speculatively built) for two different target audiences. Much of the information is also applicable to bespoke factories and also to retrofitting or refurbishment of industrial buildings.

GPG 61 Design Manual[3] is a 150 page reference guide for building specifiers, designers and developers, architects and occupiers with an interest in design. Part A covers the planning, design and construction of the building

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fabric; it also outlines validation building tests on completion (see a following Focus paper). Part B covers the selection of building services (heating, ventilation, lighting) to match the activity and the building fabric; it also includes any fabric fit-out associated with reduction of the heating load. Parts A and B both contain comprehensive references and sources of further detailed guidance information on particular aspects of building construction and services, including relevant CIBSE and BRE publications.

The Design Manual also provides practical supporting guidance (and the basis for credit points) linked to the energy efficiency aspects of the latest version of BREEAM (Building Research Establishment Environmental Assessment Method), BREEAM/New Industrial Units, Version 5/93. This is described in a following Focus paper. BREEAM is being increasingly used to demonstrate the energy and environmental credentials of a range of building types. For further information on BREEAM contact, BREEAM-MDO, Building Research Establishment, Garston, Watford WD2 7JR.

GPG 62 Occupiers Manual[3] is a 73-page summary and reference guide for tenants and owner occupiers. This covers the benefits of achieving energy efficiency, building selection, and environmental specification and systems to assist briefing for fit-out. Detailed information on services options (heating, ventilation, lighting) is included in an appendix for reference.

GPG 87 is a guide for the pharmaceutical industry[4] which includes measures to improve buildings energy efficiency which are relevant to that sector.

Two titles in the recently revised Fuel Efficiency Booklet series are specific to industrial buildings:

(a) FEB 3 Economic Use of Fired Space Heaters for Industry and Commerce[3].

(b) FEB 16 Economic Thickness of Insulation for Industrial Buildings[3].

Other FEB titles provide generally applicable buildings information which is also relevant to industrial buildings[3] for energy audits (FEB 1), electricity use (FEB 9), controls (FEB 10), lighting (FEB 12) and boilers (FEB 14, 15, 17).

Good Practice Case Studies

A series of ten Good Practice Case Studies (eight published to date) on energy efficiency in advance factory units[3] assesses buildings which incorporate a range of energy efficiency measures for fabric and services in varying packages. These studies cover primarily either design and construction with some information on initial operation, or they cover building performance in use with different studies providing a range of different use applications. Each study provides specification information or assessments for the following:

- Development process and costs
- Selection of fabric components and environmental systems
- Performance of fabric and indoor environment
- Energy use and costs
- User reactions and general appraisal.

Similar series of Good Practice Case Studies which are now commencing publication cover the following:

- Energy Efficiency in Mixed Use Business Space[3] (new build office/light industrial buildings).
- Energy Efficiency in Refurbishment of Industrial Buildings[3] (varying packages of measures in older buildings).
- Energy Efficient Lighting of Factories and Warehouses[3] (new build or refurbishment)

THERMIE Maxibrochure on Industrial Lighting[3]

This 20 page Maxibrochure was first prepared and published for the Commission of the European Communities as a THERMIE Programme Action by BRECSU in its role as an Organisation for the Promotion of Energy Technologies. The EEO has funded reprinting for widespread dissemination in the UK. The Maxibrochure provides guidance on assessment of industrial lighting energy consumption, efficiency and economics, energy efficient lighting (including daylighting) and control technology. It also gives information on 12 case studies drawn from across Europe with data on cost savings and paybacks.

CADDET Analysis on Industrial Ventilation[5]

This 117 page CADDET Analyses Series No 10 provides a general technological description of industrial ventilation (and to some extent air conditioning) systems and components, and their impact on energy efficiency. It also gives information on 17 case studies of demonstration projects in different countries, mainly European.

References

1. Nicklin, T. The Architects' Journal 1993, 11 August, 20

2. Healey & Baker. Prospects for commercial property in the 1990s. London, Financial Times Business Information Ltd, 1992, 39

3. EEO publications available from BRECSU Enquiries Bureau, Building Research Establishment, Garston, Watford WD2 7JR. Tel. 0923 664258. Fax 0923 664787.

The THERMIE programme is the Commission of the European Communities programme for promoting energy technologies. Dissemination is principally via the network of OPETs (Organisations for the Promotion of Energy Technologies)

4. EEO publications available from ETSU Energy Efficiency Enquiries. Bureau, ETSU, Harwell, Oxfordshire OX11 0RA. Tel 0235 436747. Fax 0235 432923.

5. CADDET Analyses Series 10: Learning from experiences with industrial ventilation. Available for £17.50 from K Rawlings, ETSU - see Reference 4. CADDET (Centre for the Analysis and Dissemination of Demonstrated Energy Technologies) is an IEA/OECD organisation.

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