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## Materials for Energy Efficiency and Thermal Comfort in Buildings

Routledge

With more and more concern being expressed over the Earth's dwindling energy resources as well as rising pollution levels, the subject of energy management and conservation is becoming increasingly important. Over half of all energy consumed is used in buildings so effective management of buildings whether commercial or domestic is vital. This book is a comprehensive text dealing with the theory and practice of the supply of energy to consumers, energy management and auditing and energy saving technology. It will be a core text on courses on energy management and building services, as well as updating professionals in the building sector.

*Microbiomes of the Built Environment* Routledge

This new edition of *A Guide to Energy Management in Buildings* begins by asking why we need to control energy use in buildings and proceeds to discuss how the energy consumption of a building can be assessed or estimated through an energy audit. It then details a range of interventions to reduce energy use and outlines methods of assessing the cost-effectiveness of such measures. Topics covered include: where and how energy is used in buildings energy audits measuring and monitoring energy use techniques for reducing energy use in buildings legislative issues. And new in this edition: the cooling of buildings fuel costs and smart metering and education and professional recognition. It provides a template for instigating the energy-management process within an organization, as well as guidance on management issues such as employee motivation, and gives practical details on how to carry the process through. This book should appeal to building and facilities managers and also to students of energy management modules in FE and HE courses.

*The Architects' Journal* Elsevier

Beginning with an overview of the benefits of the modern building control system, the authors go on to describe the different controls

and their applications and include advice on their set-up and tuning for stable operation. *Plant Engineer's Reference Book* CRC Press

*Aeroform: Designing for Wind and Air Movement* provides a comprehensive introduction to applying aerodynamic principles to architectural design. It presents a challenge to architects and architectural engineers to give shape to the wind and express its influence on architectural form. The wind pushes and pulls on our buildings, infiltrates and exfiltrates through cracks and openings, and lifts roofs during storm events. It can also offer opportunities for resource conservation through natural ventilation or a biophilic connection between indoors and out. This book provides basic concepts in fluid mechanics such as materials, forces, equilibrium, pressure, and hydrostatics; introduces the reader to the concept of airflow; and provides strategies for designing for wind resistance, especially in preventing uplift. Natural ventilation and forced airflow are explored using examples such as Thomas Herzog's Hall 26 in Hanover, RWE Ag building in Essen Germany, and the Kimbell Art Museum in Texas. Finally, issues of wind and airflow measurement are addressed. A reference for students and practitioners of architecture and architectural engineering, this book is richly illustrated and presents complex concepts of aerodynamic engineering in easy-to-understand language. It prepares the architect or architectural engineer to design buildings that are visually expressive of a dialogue between wind and built form.

*Aeroform* Elsevier

In hot dry or warm humid climates, more than half of the urban peak load of energy consumption is used to satisfy air-conditioning demands alone. Since the urbanization rate in developing countries is extreme, the pressure placed on energy resources to satisfy the future requirements of the built environment will be great, unless new, more cost-effective measures can be introduced. *Stay Cool* is an essential guide for planning and design using active design principles and passive means to satisfy human comfort requirements

specifically in these climate zones, based on examples of traditional and modern constructions. The book demonstrates how a design strategy for urban environments and individual buildings, incorporating naturally occurring resources and specific energy-efficient technologies, can create a location, form and structure that promote significant energy-savings. Such strategies can be applied to low cost housing, or indeed to any other buildings, in order to improve comfort with passive means and low energy budgets. Following an outline of climatic issues, characteristics and thermal comfort requirements, the book details the available techniques and technologies that can be used to shape both built and external environments, the building envelope, material selections and natural ventilation and cooling methods to satisfy both human requirements and the need for energy efficiency. It also includes an active design checklist and summary of available design checking tools, a rehabilitation guide for existing urban, building and external environments, and solar charts. Planners, architects, engineers, technicians and building designers will find *Stay Cool* an inspirational guide and an essential reference when working with planning and design of the built environment in hot dry and warm humid climate zones. It will also be of benefit to students, academics and researchers with an interest in sustainable and energy-efficient architecture techniques and practice.

*Integrated Sustainable Design of Buildings* John Wiley & Sons

In this significantly revised third edition, *Designing Zero Carbon Buildings* combines embodied and operational emissions into a structured approach for achieving zero emissions by a specific year with certainty. Simulation and quantitative methods are introduced in parallel with analogue scale models to demonstrate how things work in buildings. Where equations are provided, this is also explained with common analogue objects, pictures, and narratives. A Zero Equation introduced in this book is not only explained as an equation but also as an analogy with a jam jar and spoons, making the book accessible for a range of audiences. Tasks for simple experiments, exercises, discussion questions, and summaries of design principles are provided in closing lines of chapters. This book introduces new case studies, in addition to an updated case study of the Birmingham Zero Carbon House, applying embodied and operational emissions to assess their status using the Zero Equation. The approach introduced brings about a sense of realism into what true zero emissions mean. Written for students,

educators, architects, engineers, modellers, practising designers, sustainability consultants, and others, it is a major positive step towards design thinking that makes achieving zero carbon emissions a reality.

### *Architecture, City, Environment*

Routledge

The Boiled Frog Syndrome presents compelling evidence to show that the source of the majority of the Western diseases of civilisation that have multiplied over the past 100 years, ranging from cancers to debilitating sicknesses and allergies, can be traced to the modern built environment, our increasing exposure to electromagnetic radiation and the indiscriminate use of untested advanced technology. It is also due, in part, to the 20th century's repudiation of perennial wisdom.

### **Guidebook to the LEED Certification Process**

Routledge

This all-inclusive LEED v4 Green Associate exam Study Guide is your path to a new professional credential! GBRI, a USGBC Education Partner, has carefully developed this guide to ensure all topics found on the real exam are thoroughly covered. Our expert instructors have devised an easy-to-navigate guide that comes with complimentary access to supplemental materials online! You will gain access to online on-demand study modules exploring the topics covered in the guide, mock exams structured like the real test, additional practice questions by section, flash cards, memory charts & more. Access your materials 24/7 for your convenience!

### **Building Energy Management Systems**

Routledge

Buildings can breathe naturally, without the use of mechanical systems, if you design the spaces properly. This accessible and thorough guide shows you how in more than 260 color diagrams and photographs illustrating case studies and CFD simulations. You can achieve truly natural ventilation, by considering the building's structure, envelope, energy use, and form, as well as giving the occupants thermal comfort and healthy indoor air. By using scientific and architectural visualization tools included here, you can develop ventilation strategies without an engineering background. Handy sections that summarize the science, explain rules of thumb, and detail the latest research in thermal and fluid dynamics will keep your designs sustainable, energy efficient, and up-to-date.

### **Indoor Air**

Taylor & Francis  
People's desire to understand the environments in which they live is a natural one. People spend most of their time in spaces and structures designed, built, and

managed by humans, and it is estimated that people in developed countries now spend 90 percent of their lives indoors. As people move from homes to workplaces, traveling in cars and on transit systems, microorganisms are continually with and around them. The human-associated microbes that are shed, along with the human behaviors that affect their transport and removal, make significant contributions to the diversity of the indoor microbiome. The characteristics of "healthy" indoor environments cannot yet be defined, nor do microbial, clinical, and building researchers yet understand how to modify features of indoor environments—such as building ventilation systems and the chemistry of building materials—in ways that would have predictable impacts on microbial communities to promote health and prevent disease. The factors that affect the environments within buildings, the ways in which building characteristics influence the composition and function of indoor microbial communities, and the ways in which these microbial communities relate to human health and well-being are extraordinarily complex and can be explored only as a dynamic, interconnected ecosystem by engaging the fields of microbial biology and ecology, chemistry, building science, and human physiology. This report reviews what is known about the intersection of these disciplines, and how new tools may facilitate advances in understanding the ecosystem of built environments, indoor microbiomes, and effects on human health and well-being. It offers a research agenda to generate the information needed so that stakeholders with an interest in understanding the impacts of built environments will be able to make more informed decisions.

### *Stay Cool*

Routledge  
This book presents an in-depth analysis covering climatic and weather conditions, house and building development history, construction methods and technologies, and environmental conditions. It provides relevant house and building information and highlights recent advances in hot and humid regions, as well as developments in other regions that are relevant to hot and humid climates. The countries in hot and humid regions, which include the tropical countries, the Middle Eastern countries around the Mediterranean, and many countries of Central Asia and Africa, are home to some of the most challenging conditions in the world in terms of house and building design and construction, and in terms of maintaining indoor thermal comfort and air quality in an energy-efficient way. The book's respective chapters, prepared by expert contributors, cover essential concepts, designs, and construction methodologies for houses and commercial buildings. As such, the

book offers a valuable resource for undergraduate and graduate students in architecture and engineering, house and building designers, and building sciences researchers. Building contractors, manufacturers and distributors of building equipment and devices, and government policymakers and legislators will also benefit from the information provided in this book.

### CIBSE Guide H: Building Control Systems

Routledge

PLEA is a network of individuals sharing expertise in the arts, sciences, planning and design of the built environment. It serves as an international, interdisciplinary forum to promote discourse on environmental quality in architecture and planning.

This 17th PLEA international conference addresses sustainable design with respect to architecture, city and environment at the turn of the millennium. The central aim of the conference is to explore the interrelationships and integration of architecture, city and environment. The Proceedings will be of interest to all those involved in bioclimatic design and the application of natural and innovative techniques to architecture and planning. The conference is organised by the Martin Centre for Architectural and Urban Studies, University of Cambridge and the Cambridge Programme for Industry, University of Cambridge.

### Building Services Journal

Routledge  
Tall buildings represent one of the most energy-intensive architectural typologies, while at the same time offering the high density work and living conditions that many believe will be an important constituent of future sustainable communities. How, then, can their environmental impact be lessened? This insightful book takes in: an overview of the tall building and its impacts (looking at cityscape, place, mobility, microclimate, energy and economics) design principles and the development of the sustainable tall building global perspectives (covering North and South America, Europe, the Middle East and Asia) detailed, qualitative case studies of buildings in design and operation the future for sustainable tall buildings. Not simply another showcase for future utopian designs and ideals, the information presented here is based on hard research from operating buildings. Highly illustrated and combining analysis with solid detail for practice, this is essential reading for architects, building engineers, design consultants, retrofitters

and urban planners interested in or working with tall buildings, and researchers/students in these disciplines.

Designing Buildings for the Future of Schooling Routledge

Almost half of the total energy produced in the developed world is inefficiently used to heat, cool, ventilate and control humidity in buildings, to meet the increasingly high thermal comfort levels demanded by occupants. The utilisation of advanced materials and passive technologies in buildings would substantially reduce the energy demand and improve the environmental impact and carbon footprint of building stock worldwide. Materials for energy efficiency and thermal comfort in buildings critically reviews the advanced building materials applicable for improving the built environment. Part one reviews both fundamental building physics and occupant comfort in buildings, from heat and mass transport, hygrothermal behaviour, and ventilation, on to thermal comfort and health and safety requirements. Part two details the development of advanced materials and sustainable technologies for application in buildings, beginning with a review of lifecycle assessment and environmental profiling of materials. The section moves on to review thermal insulation materials, materials for heat and moisture control, and heat energy storage and passive cooling technologies. Part two concludes with coverage of modern methods of construction, roofing design and technology, and benchmarking of façades for optimised building thermal performance. Finally, Part three reviews the application of advanced materials, design and technologies in a range of existing and new building types, including domestic, commercial and high-performance buildings, and buildings in hot and tropical climates. This book is of particular use to, mechanical, electrical and HVAC engineers, architects and low-energy building practitioners worldwide, as well as to academics and researchers in the fields of building physics, civil and building engineering, and materials science. - Explores improving energy efficiency and thermal comfort through material selection and sustainable technologies - Documents the development of advanced materials and sustainable technologies for applications in building design and construction - Examines fundamental building physics and occupant comfort in buildings featuring heat and mass transport, hygrothermal behaviour and ventilation

*The Practice of Designing Operable Windows in Office Buildings* Elsevier

Ensuring optimum ventilation performance is a vital part of building design. Prepared by recognized experts from Europe and the US, and published in association with the International Energy Agency's Air Infiltration and Ventilation Centre (AIVC), this authoritative work provides organized, classified and evaluated information on advances in the key areas of building ventilation, relevant to all building types.

Complexities in airflow behaviour, climatic influences, occupancy patterns and pollutant emission characteristics make selecting the most appropriate ventilation strategy especially difficult. Recognizing such complexities, the editors bring together expertise on each key issue. From components to computer tools, this book offers detailed coverage on design, analysis and performance, and is an important and comprehensive publication in this field. Building Ventilation will be an invaluable reference for professionals in the building services industry, architects, researchers (including postgraduate students) studying building service engineering and HVAC, and anyone with a role in energy-efficient building design.

Natural Ventilation in Non-domestic Buildings Taylor & Francis

A plant engineer is responsible for a wide range of industrial activities, and may work in any industry. The Plant Engineer's Reference Book 2nd Edition is a reference work designed to provide a primary source of information for the plant engineer. Subjects include the selection of a suitable site for a factory and provision of basic facilities, including boilers, electrical systems, water, HVAC systems, pumping systems and floors and finishes. Detailed chapters deal with basic issues such as lubrication, corrosion, energy conservation, maintenance and materials handling as well as environmental considerations, insurance matters and financial concerns. The editor, Dennis Snow, has experience of a wide range of operations in the UK, Europe, the USA, and elsewhere in the world. Produced with the backing of the Institution of Plant Engineers, the Plant Engineer's Reference Book, 2nd Edition provides complete coverage of the information needed by plant engineers in any industry worldwide. - Wide range of information will prove to be use to engineers in any industry - Covers all the topics necessary to design and develop an engineering plant - Will help engineers in industry deal with practical problems in a variety of situations

The Architecture of Natural Cooling John Wiley & Sons

In addition to the application of fundamental principles that lead to a structured method for zero carbon design of buildings, this considerably expanded second edition includes new advanced topics on multi-objective optimisation; reverse modelling; reduction of the simulation performance gap; predictive control; nature-inspired emergent simulation leading to sketches that become 'alive'; and an alternative economics for achieving the sustainability paradigm. The book features student design work from a Master's programme run by the author, and their design speculation for a human settlement on Mars. Tasks for simple simulation experiments are available for the majority of topics, providing the material for classroom exercise and giving the reader an easy introduction into the field. Extended new case studies of zero carbon buildings are

featured in the book, including schemes from Japan, China, Germany, Denmark and the UK, and provide the reader with an enhanced design toolbox to stimulate their own design thinking.

**Sustainability in Construction: LEED Green Associate Certification Preparation** Routledge

'Building Control Systems' provides the building services engineer with a comprehensive understanding of modern control systems and relevant information technology. This will ensure that the best form of control systems for the building is specified and that proper provision is made for its installation, commissioning, operation and maintenance. Beginning with an overview of the benefits of the modern building control system, the authors describe the different controls and their applications, and include advice on their set-up and tuning for stable operation. There are chapters on the practical design of control systems, how to work from the hardware components and their inclusion in networks, through to control strategies in Heating, Ventilation and Air Conditioning (HVAC) systems and whole buildings. The relationship between Building, Management Systems (BMS) and information technology systems is discussed, and the building procurement process and the importance of considering control requirements at an early stage in the design process

*Energy: Management, Supply and Conservation* Routledge

Do you need a concise, jargon-free and compact guide to the UK building regulations? Simon Polley boils down the regulations to their basic features, explaining the core principles behind them. Easy to read and light enough to carry around with you, this is the ideal introduction to a vital part of your remit as a building control officer, architect or surveyor. Updated with the extensive 2013 changes, and illustrated with cartoons and diagrams.

Heating and Cooling of Buildings National Academies Press

Follows a strict pedagogical structure and content sequence tested over fifteen years of teaching. Starts by coverings the most up-to-date calculation procedures and standards from ASHRAE and other organizations relevant to building loads, then provides a detailed treatment of primary, traditional secondary and hybrid/emerging secondary equipment and systems. Addresses contemporary issues such as emerging green building design technologies, alternative energy sources, and uncertainties in simulation. Discusses drivers for efficiency such as codes and standards, building rating systems, design guides, and the green building movement Offers a complete Solutions Manual, chapter outcomes, free HCB software download along with associated

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resources, and detailed and tested slides of individual chapters for classroom projection for qualified instructors adopting the text, with access through author's website