Designing Spaces For Natural Ventilation An Architects Guide

This guideline defines ventilation and then natural ventilation. It explores the design requirements for natural ventilation in the context of infection control, describing the basic principles of design, construction, operation and maintenance for an effective natural ventilation system to control infection in health-care settings.
Overheating in buildings is commonplace. This book describes how we can keep cool without conventional air-conditioning: improving comfort and productivity while reducing energy costs and carbon emissions. It provides architects, engineers and policy makers with a ‘how-to’ guide to the application of natural cooling in new and existing buildings. It demonstrates, through reference to numerous examples, that natural cooling is viable in most climates around the world. This completely revised and expanded second edition includes: An overview of natural cooling past and present. Guidance on the principles and strategies that can be adopted. A review of the applicability of different strategies. Explanation of simplified tools for performance assessment. A review of components and controls. A detailed evaluation of case studies from the USA, Europe, India and China. This book is not just for the technical specialist, as it also provides a general grounding in how to avoid or minimise air-conditioning. Importantly, it demonstrates that understanding our environment, rather than fighting it, will help us to live sustainably in our rapidly warming world.
The building industry is influenced by many factors and trends reflecting the current situation and developments in social, economic, technical, and scientific fields. One of the most important trends seeks to minimize the energy demand. This can be achieved by promoting the construction of buildings with better thermal insulating capabilities of their envelopes and better efficiency in heating, ventilation, and air conditioning systems. Any credible assessment of building energy performance includes the identification and simulation of heat and mass transfer phenomena in both the building envelope and the interior of the building. As the interaction between design elements, climate change, user behavior, heating effectiveness, ventilation, air conditioning systems, and lighting is not straightforward, the assessment procedure can present a complex and challenging task. The simulations should then involve all factors affecting the energy performance of the building in questions. However, the appropriate choice of physical model of heat and mass transfer for different building elements is not the only factor affecting the output of building energy simulations. The accuracy of the material parameters applied in the models as input data is another potential source of uncertainty. For instance, neglecting the dependence of hygric and thermal parameters on moisture content may affect the energy assessment in a significant way. Boundary conditions in the form of weather data sets represent yet another crucial factor determining the uncertainty of the outputs. In light of recent trends in climate change, this topic is vitally important. This Special Issue aims at providing recent developments in laboratory analyses, computational modeling, and in situ measurements related to the assessment of building energy performance based on the proper identification of heat and mass transfer processes in building structures. Potential topics include but are not limited to the following: -Development, calibration, and validation of advanced mathematical models for the description of heat and mass transfer in building materials and structures -Computational modeling of heat and mass transfer in building materials and structures aimed at energy performance assessment Boundary conditions for building energy performance simulations in light of climate change trends -Advanced experimental techniques for the determination of heat and mass transport and the storage properties of building materials -On site monitoring and verification of building energy performance -Research and development of new materials with high potential to improve the energy performance of buildings
The air distribution in occupied spaces is a major issue of public concern. It is widely recognized that the quality of air and the nature of airflow can affect the health of occupants and the energy consumed in buildings and transport vehicles. ROOMVENT is the principal international conference in the field of air distribution. It was first initiated in 1987 by SCANVAC, the Scandinavian Federation of Heating, Ventilating and Sanitary Engineering Associations in Denmark, Finland, Iceland, Norway and Sweden. The aim of the Conference is to bring together researchers from universities and research institutes, engineers from industry and government officials and policy makers, with the goal of experiencing the latest techniques for measuring and analyzing indoor air flow, the visualization of indoor air flow patterns, the evaluation of ventilation parameters and the most recent developments in computer simulation techniques of room airflow. It is hoped that the theme of ROOMVENT 2000 "Ventilation for Health and Sustainable Environment" will set the scene for room air distribution research and development for the new millennium.
Design Thinking for a Different Future
Building in Hot and Humid Regions
Building for the senses, the economy and society
The Recovery of Natural Environments in Architecture
Guide To Natural Ventilation in High Rise Office Buildings
Strategies for Energy Efficient Architecture
The Integration of Engineering and Architecture
Designing Spaces for Natural VentilationAn Architect's GuideRoutledge
In the context of urbanization and compact urban living, conventional experience-based planning and design often cannot adequately address the serious environmental issues, such as thermal comfort and air quality. The ultimate goal of this book is to facilitate a paradigm shift from the conventional experience-based ways to a more scientific, evidence-based process of decision making in both urban planning and architectural design stage. This book introduces novel yet practical modelling and mapping methods, and provides scientific understandings of the urban typologies and wind environment from the urban to building scale through real examples and case studies. The tools provided in this book aid a systematic

implementation of environmental information from urban planning to building design by making wind information more accessible to both urban planners and architects, and significantly increasing the impact of urban climate information on the practical urban planning and design. This book is a useful reference book to architectural postgraduates, design practitioners and planners, urban climate researchers, as well as policy makers for developing future livable and sustainable cities.

Wind Issues in the Design of Buildings explains the ways that structural designers accommodate the impact of extreme wind events on the built environment. By studying the flow and pressure fields around buildings, architects and engineers can identify and select the best strategies for ensuring that a building will resist the loads due to high winds, maintaining pleasant conditions in outdoor spaces, assessing natural ventilation potential, and seeing that any exhaust fumes are dispersed adequately. This volume identifies wind characteristics and describes the effects of winds generated by hurricanes, tornadoes, and thunderstorms. It explains the internal and external pressures on a building's cladding (skin) and the effects of wind-borne debris. A building's response to the structural loads caused by wind is outlined, along with techniques for resisting wind. A chapter is devoted to wind tunnels and physical modeling to predict structural loads, cladding response, pedestrian experience, topographic effects, and snow deposition. A section of frequently asked questions, a glossary, and recommended reading make this material in this volume accessible to students and nontechnical members of project teams. Structural engineers and architects will find this book a useful aide in explaining wind-related issues to clients, builders, building officials, and owners. Students in structural and architectural engineering will welcome the clear, concise presentation of an important component of structural design.

This blistering novel—from the bestselling, Pulitzer Prize–winning author of The Road—returns to the Texas-Mexico border, setting of the famed Border Trilogy. The time is our own, when rustlers have given way to drug-runners and small towns have become free-fire zones. One day, a good old boy named Llewellyn Moss finds a pickup truck surrounded by a bodyguard of dead men. A load of heroin and two million dollars in cash are still in the back. When Moss takes the money, he sets off a chain reaction of catastrophic violence that not even the law–in the person of aging, disillusioned Sheriff Bell–can contain. As Moss tries to evade his pursuers–in particular a mysterious mastermind who flips coins for human lives–McCarthy simultaneously strips down the American crime novel and broadens its concerns to encompass themes as ancient as the Bible and as bloodily contemporary as this morning’s headlines. No Country for Old Men is a triumph.

David Boswell Reid and Disruptive Environmentalism

Rebuilding the Houses of Parliament

Bioclimatic Approach to Architectural Regionalism - New and expanded Edition

Simplified Design of HVAC Systems

The Path to Net Zero

Heat and Mass Transfer in Building Energy Performance Assessment

Historical Perspective and Technological Advances

The Recovery of Natural Environments in Architecture challenges the modern practice of sealing up and mechanically cooling public scaled buildings in whichever climate and environment they are located. This book unravels the extremely complex history of understanding and perception of air, bad air, miasmas, airborne pathogens, beneficial thermal conditions, ideal climates and climate determinism. It uncovers inventive and entirely viable attempts to design large buildings, hospitals, theatres and academic buildings through the 19th and early 20th centuries, which use the configuration of the building itself and a shrewd understanding of the natural physics of airflow and fluid dynamics to make good, comfortable interior spaces. In exhuming these ideas and reinforcing them with contemporary scientific insight, the book proposes a recovery of the lost art and science of making naturally conditioned buildings.

Architects today incorporate principles of sustainable design as a matter of necessity. But the challenge of unifying climate control and building functionality, of securing a managed environment within a natural setting—and combating the harsh forces of wind, water, and sun—presented a new set of obstacles to architects and engineers in the mid-twentieth century. First published in 1963, Design with Climate was one of the most pioneering books in the field and remains an important reference for practitioners, teachers, and students, over fifty years later. In this book, Victor Olgyay explores the impact of climate on shelter design, identifying four distinct climatic regions and explaining the effect of each on orientation, air movement, site, and materials. He derives principles from biology, engineering, meteorology, and physics, and demonstrates how an analytical approach to climate management can merge into a harmonious and aesthetically sound design concept. This updated edition contains four new essays that provide unique insights on issues of climate design, showing how Olgyay's concepts work in contemporary practice. Ken Yeang, John Reynolds, Victor W. Olgyay, and Donlyn Lyndon explore bioclimatic design, eco design, and rational regionalism, while paying homage to Olgyay’s impressive groundwork and contributions to the field of architecture.

Compact living is sustainable living. High-density cities can support closer amenities, encourage reduced trip lengths and the use of public transport and therefore reduce transport energy costs and carbon emissions. High-density planning also helps to control the spread of

urban suburbs into open lands, improves efficiency in urban infrastructure and services, and results in environmental improvements that support higher quality of life in cities. Encouraging, even requiring, higher density urban development is a major policy and a central principle of growth management programmes used by planners around the world. However, such density creates design challenges and problems. A collection of experts in each of the related architectural and planning areas examines these environmental and social issues, and argues that high-density cities are a sustainable solution. It will be essential reading for anyone with an interest in sustainable urban development.

Natural ventilation is an efficient design strategy for thermal comfort in hot and humid climates. The building forms can generate different pressures and temperatures to induce natural ventilation. This thesis develops a methodology that uses a computational fluid dynamics (CFD) program. The purpose of the CFD program is to assist architects to design optimum building form for natural ventilation. The design of a cottage in Miami, Florida demonstrates the application of this methodology. The first phase of this methodology is to create an input file for the CFD program. The input file uses wind velocity, wind direction, and air temperature of the site to simulate the weather. Different weather conditions can be generated through modification of the first input file. The second phase of this methodology is to develop building forms. The CFD programs can simulate airflow in different building forms by changing the building geometry in the input files. The program calculates the airflow pattern, velocity, and temperature for different forms. The printouts of the simulations allow architects to understand the airflow behavior in spaces with different forms. This thesis also uses the CFD program to study variance between the proposed and the actual results of a design. As demonstrated in a sports museum in Washington, DC, this case study clearly displays a difference between the intentions of the architect and the results of CFD calculation. Some problems appear in developing CFD models. However, when the input files are correctly defined, and the calculations converge, very few computational problems appear in developing building forms. Therefore, architects can easily use the CFD programs to develop building form after the input files are correctly defined.

Ventilation for Health and Sustainable Environment

Urban Wind Environment

Evaluating and Enhancing Design for Natural Ventilation in Walk-up Public Housing Blocks in the Egyptian Desert Climatic Design Region

A Design Guide

Wind Issues in the Design of Buildings

Minimum Design Standards for Rehabilitation for Residential Properties

Guide to Natural Ventilation in High Rise Office Buildings

A practical overview of what to consider when designing a building's heating, cooling, ventilating and humidifying systems along with their space, power, control and other requirements. Includes the latest concepts, applications, basic design problems and their solutions. Packed with examples to facilitate understanding.

Hazim Awbi's Ventilation of Buildings has become established as the definitive text on the subject. This new, thoroughly revised, edition builds on the basic principles of the original text drawing in the results of considerable new research in the field. A new chapter on natural ventilation is also added and recent developments in ventilation concepts and room air distribution are also considered. The text is intended for the practitioner in the building services industry, the architect, the postgraduate student undertaking courses or research in HVAC, building services engineering, or building environmental engineering, and the undergraduate studying building services as a major subject. Readers are assumed to be familiar with the basic principles of fluid flow and heat transfer and some of the material requires more advanced knowledge of partial differential equations which describe the turbulent flow and heat transfer processes of fluids. The book is both a presentation of the practical issues that are needed for modern ventilation system design and a survey of recent developments in the subject

This book describes in depth the fundamental effects of buoyancy, a key force in driving air and transporting heat and pollutants around the interior of a building. This book is essential reading for anyone involved in the design and operation of modern sustainable, energy-efficient buildings, whether a student, researcher or practitioner. The book presents new principles in natural ventilation design and addresses surprising, little-known natural ventilation phenomena that are seldom taught in architecture or engineering schools. Despite its scientific and applied mathematics subject, the book is written in simple language and contains no demanding mathematics, while still covering both qualitative and quantitative aspects of ventilation flow analysis. It is therefore suitable for both non-expert readers who just want to develop intuition of natural ventilation design and control (such as architects and students) and for those possessing more expertise whose work involves quantifying flows (such as engineers and building scientists).

AIOLOS is a computational tool for the calculation of the airflow rates in naturally ventilated buildings.

Air, Comfort and Climate
Designing Spaces for Natural Ventilation
A Design Handbook
Natural Ventilation of Buildings
Air Distribution in Rooms
Naturally Ventilated Buildings
A Perspective on Natural Ventilation for the New San Francisco Federal Building

New thinking is essential if we are to design and occupy buildings that can keep us safe with unpredictable economies, climates, energy systems and resource challenges. For too long designers have relied on mechanical solutions for heating, cooling and ventilating buildings. The 21st century dream has to be of a better architecture that enables buildings to be run for as much of a day or year as possible on local, clean, reliable, affordable natural energy. Examples are included from different climates where the fundamental building design is right, its orientation, opening sizes, mass and its natural ventilation systems and pathways. Many modern buildings are poorly designed for climate as manifested by growing incidences of overheating experienced indoor, explored here. The inability of many rating systems to record and improve the climatic design of buildings raises questions about how they deal with issues of basic building performance. This books points the way towards how we can understand such problems, and move forward from over-mechanised poorly designed buildings to a new generation of adaptable buildings designed and refurbished to run largely on natural energy and capable of evolving over time to keep their occupants safe and comfortable, even in a warming world. The chapters were originally published in Architectural Science Review.

Rebuilding the Houses of Parliament explores the history of the UK Houses of Parliament in Westminster from an environmental design perspective, and the role David Boswell Reid played in the development of the original ventilation and climate control system in parliament. This book retraces and critically examines the evolution of the environmental principles underlying the design of the Houses of Parliament, engaging with fundamental questions about air quality, energy efficiency and thermal comfort. This yields insights into the historic methods of environmental design that were characterised by physical experimentation and post-occupancy evaluation. Rebuilding the Houses of Parliament examines the history of the buildings' operation, studying the practical reality of its performance in use and offers the opportunity to reflect on current challenges faced by architects and engineers adapting to the realities of climate change. This book is an ideal read for academics, politicians and practitioners with an interest in architectural history and heritage, theory, engineering and conservation.

As one of the largest consumers of energy, the housing sector and its unconscious occupants' activities negatively affect the environment. Architects and engineers have a major role in resolving the associated problems while maintaining comfort for occupants. Also very important are environmental education and awareness of appropriate environmental development in designing activity and selecting building materials and products. There are different architectural strategies that are aimed to achieve a low-energy built environment. Determining the needed strategy according to function, economy, and occupant comfort and affordability is the crucial step. This book helps the reader to achieve a sustainable development without destruction of the resources while maintaining a growing universal awareness of protecting the living and non-living environment.

Energy Modeling in Architectural Design demonstrates how design elements can lead to energy savings, to help you reduce the energy footprint of your buildings. In addition to identifying climate opportunities, you'll also learn fundamental passive design elements for software-agnostic energy modeling of your projects from conception. Using parametric models and testing each element during design will lead you to create beautiful and high-performance buildings. Illustrated with more than 100 color images, this book also includes a pattern guide for high-performance buildings, discusses energy and daylighting optimization, and has a glossary for easy reference.

Buoyancy Effects on Natural Ventilation
Natural Ventilation in Buildings
Passive Solar Architecture
Modern Architecture and Climate
Passive House in Different Climates
Design Before Air Conditioning

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.

A unique and revolutionary text which explains the principles behind the LT Method (2.1), a manual design tool developed in Cambridge by the BRE. The LT Method is a unique way of estimating the combined energy usage of lighting, heating, cooling and ventilation systems, to enable the designer to make comparisons between options at an early, strategic stage. In addition,Energy and Environment in Architecture the book deals with other environmental issues such as noise, thermal comfort and natural ventilation design. A variety of case studies provide a critique of real buildings and highlight good practice. These topics include thermal comfort, noise and natural ventilation.

Offers an up-to-date and comprehensive account of the theory and measurement of natural ventilation and how this relates to design. Etheridge relates theoretical and experimental methods to fundamental principles and design practice, describing the assumptions, approximations and limitations involved.

In Building Reuse: Sustainability, Preservation, and the Value of Design, Kathryn Rogers Merlino makes an impassioned case that truly sustainable design requires reusing and reimagining existing buildings. The construction and operation of buildings is responsible for 41 percent of all primary energy use and 48 percent of all carbon emissions. The impact of the demolition and removal of an older building can greatly diminish the advantages of adding green technologies to new construction. Reusing existing buildings can be challenging to accomplish, but changing the way we think about environmentally conscious architecture has the potential to significantly reduce carbon emissions. Additionally, Merlino calls for a more expansive view of historic preservation that goes beyond keeping only the most distinctive structures and requiring that they remain fundamentally unchanged to embracing the creative reuse of even unremarkable buildings. In support of these points, Building Reuse includes a compelling range of case studiesfrom an eighteen-story office building to a private homeall located in the Pacific Northwest, a region with a long history of sustainable design and urban growth policies that have made reuse projects feasible.

No Country for Old Men
Ventilation of Buildings
A Design Guide for the Built Environment in Hot Climates
Different Strategies of Housing Design
Design with Climate
Energy and Environment in Architecture
Ecohouse

Presents seven strategies for energy efficient architectural design in Hawaii -- orientation and building form, solar control, daylighting, natural ventilation, landscaping, building systems and material selection and equipment efficiency. Provides architects with practical design guidelines to serve as a basis for decision making during the conceptual and schematic stages of a project. Drawings, graphs and photos.

A description of the in-progress design of a new Federal Office Building for San Francisco is used to illustrate a number of issues arising in the design of large, naturally ventilated office buildings. These issues include the need for an integrated approach to design involving the architects, mechanical and structural engineers, lighting designers and specialist simulation modelers. In particular, the use of natural ventilation, and the avoidance of air-conditioning, depends on the high degree of exposed thermal mass made possible by the structural scheme and by the minimization of solar heat gains while maintaining the good daylighting that results from optimization of the fagade. Another issue was the need for a radical change in interior space planning in order to enhance the natural ventilation; all the individual enclosed offices are located along the central spine of each floorplate rather than at the perimeter. The role of integration in deterring the undermining of the design through value engineering is discussed. The comfort criteria for the building were established based on the recent extension to the ASHRAE comfort standard based on the adaptive model for naturally ventilated buildings. The building energy simulation program EnergyPlus was used to compare the performance of different natural ventilation strategies. The results indicate that, in the San Francisco climate, wind-driven ventilation provides sufficient nocturnal cooling to maintain comfortable conditions and that external chimneys do not provide significant additional ventilation at times when it when it would be beneficial.

Passive House in Different Climates introduces the seven Passive House principles, to help you create super-insulated, airtight buildings that require minimal energy use to heat, cool, dehumidify, and ventilate, with superior indoor air quality and year-round comfort. Seventeen case studies in four climate zones---marine, cold and very cold, mixed-dry and hot-dry, and mixed-humid and hot-humid---and in ten countries, show you how to achieve net-zero energy regardless of where you're building or what type of building is required. Includes more than 150 color illustrations.

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.

Heating, Cooling, Ventilation, Daylighting and More Using Natural Flows

Building Reuse

Architectural Concepts, Consequences, Possibilities

Running Buildings on Natural Energy

Energy Modeling in Architectural Design

Natural Ventilation Generates Building Form

Stay Cool

Tall buildings are not the only solution for achieving sustainability through increased density in cities but, given the scale of current population shifts, the vertical city is increasingly being s the most viable solution for many urban centers. However, the full implications of concentrating more people on smaller plots of land by building vertically - whether for work, residential o leisure functions - needs to be better researched and understood. It is generally accepted that we need to reduce the energy equation – in both operating and embodied terms – of every and system in the building as an essential element in making it more sustainable. Mechanical HVAC systems (Heating, Ventilation and Air-Conditioning) in tall office buildings typically ac for 30-40 percent of overall building energy consumption. The increased efficiency (or possibly even elimination) of these mechanical systems – through the provision of natural ventilatio could thus be argued to be the most important single step we could make in making tall buildings more sustainable. This guide sets out recommendations for every phase of the planning construction and operation of natural ventilation systems in these buildings, including local climatic factors that need to be taken into account, how to plan for seasonal variations in weath the risks in adopting different implementation strategies. All of the recommendations are based on analysis of the research findings from richly-illustrated international case studies. Tried tested solutions to real-life problems make this an essential guide for anyone working on the design and operation of tall buildings anywhere in the world. This is the first technical guide fr Council on Tall Buildings and Urban Habitat's Tall Buildings & Sustainability Working Group looking in depth at a key element in the creation of tall buildings with a much-reduced environmental impact, while taking the industry closer to an appreciation of what constitutes a sustainable tall building, and what factors affect the sustainability threshold for tall.

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While there are many historical examples of successful naturally ventilated buildings, standards for indoor climate have tended to emphasise active, mechanical airflow systems rather tha passive natural systems. Despite its importance, knowledge about the performance of naturally ventilated buildings has remained comparatively sparse. With ten key research papers this seeks to address this lack of information.

As the need to slow climate change becomes increasingly urgent, growing numbers of people are looking to dramatically reduce the carbon footprint of their own buildings by using more

ecologically sound techniques. Ecohouse provides design information about the latest low-impact materials and technologies, showcasing the newest and best 'green' solutions with inter
case studies demonstrating sustainable design in action around the world. This edition has been expanded to include advice on powering ecohouses using renewable energy - including
micro hydro and heat pumps - and an introduction to low-impact building materials such as lime, earth and hemp. New case studies from across the globe have been added to inspire rea
real-life examples of how to make an ecohouse work.

An Architect's Guide

Hawaiian Design

Natural Ventilation for Infection Control in Health-care Settings

Sustainability, Preservation, and the Value of Design

The Architecture of Natural Cooling

Designing for Wind and Air Movement

Aeroform

This work is concerned with evaluating and studying the possibilities of enhancing natural ventilation performance and its use as a passive cooling strategy in walk-up public housing blocks within the Egyptian desert climatic region. This research attempts to maximize the benefits from the vast investments made in housing projects in Egypt through providing thermally comfortable housing prototypes that could use by contrast less energy for cooling purposes. This is considered essential in the light of the current concerns about energy all over the world. Egypt was devided to seven different climatic regions by the Egyptian organization for energy conservation and planning. The Egyptian desert climatic region, which was chosen as the research context, is the largest climatic region of Egypt. Most of the Egyptian new cities that accommodate the majority of the recent public housing projects are located within this desert climatic region that represents the typical hot arid climate characteristics. Nationally, the problem of the misuse of the housing prototyping was spotted. According to previous researchers, the same basic prototypical designs are being built all over the country without giving enough consideration to the actual effects of different climates and the diversity in the residents social needs. Regionally, within the Egyptian desert climatic region, the harsh climatic conditions rate the problem of achieving thermal comfort within these housing prototypes as the most urgent problem that needs to be examined in depth. A pilot study that used observation and monitoring methods was conducted in the New Al-Minya city (The representative city of the desert climatic design region) in order to closely investigate this problem and identify its dimensions. The results confirmed thermal discomfort conditions of the housing prototypes built there, especially during the hot summer period. The passive design strategies analysis of the climatic context indicated that night purge ventilation is the most effective passive strategy that could enhance thermal comfort. These results go along with the rule of natural ventilation in reducing the used energy for cooling and the actually massive national income spent on these housing prototypes encourage this work so to concentrate on natural ventilation. Different studies using multi-approaches research techniques were employed in order to achieve the main aim of the research. These techniques included; literature review, monitoring, questionnaire and computer simulation. A critical literature review was conducted including; the physical science of natural ventilation, its strategic design as well as the design measures that control natural ventilation and the airflow in; the macro, intermediate and micro design levels. The results of the investigations were discussed and interpreted in the light of this review. A representative case study was chosen for the study. The natural ventilation performance in the case study was quantitatively and qualitatively evaluated through conducting field objective and subjective assessment respectively. In evaluation study, the thermal performance of the case study under different ventilation scenarios was monitored, the airflow inside it was simulated using CFD (computational fluid dynamics) software "FloVent" and a sample of residents were questioned. This study identified many problems associated natural ventilation uses and indicated its poor performance within the case study. A number of design measures were formulated based on the literature review and considering the evaluation study results along with the research context nature. The proposed natural ventilation design measures were applied to the case studies and their effectiveness in terms of enhancing the natural ventilation performance was quantified using "FloVent". Results reported that the proposed natural ventilation design measures could significantly enhance the natural ventilation performance inside the case study quantitatively and qualitatively. This in turn maximizes the potential

of providing thermal comfort by using both natural ventilation strategies; comfort ventilation and night purge ventilation. However, all the applied measures could not achieve neither an acceptable airspeed at any of the case study spaces nor a good airflow circulation at some of its spaces. It can be concluded that the current design of the case study can not achieve quality airflow without the use of the mechanical assisted ventilation. In general, it seems very difficult to optimize the air velocity within all spaces in a very dense multi-space design like this case study. A new design that considers natural ventilation and its drivers has to be introduced.

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.

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.

How climate influenced the design strategies of modernist architects Modern Architecture and Climate explores how leading architects of the twentieth century incorporated climate-mediating strategies into their designs, and shows how regional approaches to climate adaptability were essential to the development of modern architecture. Focusing on the period surrounding World War II—before fossil-fuel powered air-conditioning became widely available—Daniel Barber brings to light a vibrant and dynamic architectural discussion involving design, materials, and shading systems as means of interior climate control. He looks at projects by well-known architects such as Richard Neutra, Le Corbusier, Lúcio Costa, Mies van der Rohe, and Skidmore, Owings, and Merrill, and the work of climate-focused architects such as MMM Roberto, Olgyay and Olgyay, and Cliff May. Drawing on the editorial projects of James Marston Fitch, Elizabeth Gordon, and others, he demonstrates how images and diagrams produced by architects helped conceptualize climate knowledge, alongside the work of meteorologists, physicists, engineers, and social scientists. Barber describes how this novel type of environmental media catalyzed new ways of thinking about climate and architectural design. Extensively illustrated with archival material, Modern Architecture and Climate provides global perspectives on modern architecture and its evolving relationship with a changing climate, showcasing designs from Latin America, Europe, the United States, the Middle East, and Africa. This timely and important book reconciles the cultural dynamism of architecture with the material realities of ever-increasing carbon emissions from the mechanical cooling systems of buildings, and offers a historical foundation for today's zero-carbon design.

A Technical Design Guide

Designing High-density Cities for Social and Environmental Sustainability

The Practice of Designing Operable Windows in Office Buildings

Integrated Climate-Sensitive Planning and Design

Theory, Measurement and Design

New buildings can be designed to be solar oriented, naturally heated and cooled, naturally lit and ventilated, and made with renewable, sustainable materials—no matter the location or climate. In this comprehensive overview of passive solar design, two of America's solar pioneers give homeowners, architects, designers, and builders the keys to successfully harnessing the sun and maximizing climate resources for heating, cooling, ventilation, and daylighting. Bainbridge and Haggard draw upon examples from their own experiences, as well as those of others, of more than three decades to offer both overarching principles as well as the details and formulas needed to successfully design a more comfortable, healthy, and secure place in which to live, laugh, dance, and be comfortable. Even if the power goes off. Passive Solar Architecture also discusses "greener" and more-sustainable building materials and how to use them, and explores the historical roots of green design that have made possible buildings that produce more energy and other resources than they use.