Design Energy Simulation For Architects Guide To 3d Graphics

This book is a guide to a sustainable design process that moves from theory, to site and energy use, to building systems, and finally to evaluation and case studies, so you can integrate design and technology for effective sustainable building. Kuppaswamy Iyengar shows you how to get it right the first time, use free energy systems, and utilise technologies that minimize fossil fuel use. Each chapter has a sustainable design overview, technical details and strategies marked by clear sections, a summary, and further resources. Heavily illustrated with charts, tables, drawings, photographs, and case studies, the book shows technologies and concepts integrated into cohesive project types, from small and large office spaces to single and multiuse residences, hospitals, schools, restaurants, and warehouses to demonstrate implementing your designs to meet clients' needs now and for the future. Includes an overview of alternate assessment and evaluation systems such as BREEAM, CASBEE, GBTool, Green Globes alongside LEED, ECOTECT, energy 10, HEED and eQuest simulation programs. The guide reveals the importance of the building envelope—walls, superstructure, insulation, windows, floors, roofs, and building materials—on the environmental impact of a building, and has a section on site systems examining site selection, landscape design, thermal impact, and building placement.

Design Energy Simulation for ArchitectsGuide to 3D Graphics

With the increasing interest in energy efficient building design, whole building energy simulation programs are increasingly employed in the design process to help architects and engineers determine which design alternatives save energy and are cost effective. DOE-2 is one of the most popular programs used by the building energy simulation community. eQUEST is a powerful graphic user interface for the DOE-2 engine. EnergyPlus is the newest generation simulation program under development by the U.S. Department of Energy which adds new modeling features beyond the DOE-2's capability. The new modeling capabilities of EnergyPlus make it possible to model new and complex building technologies which cannot be modeled by other whole building energy simulation programs. On the other hand, EnergyPlus models, especially with a large number of zones, run much slower than those of eQUEST. Both eQUEST and EnergyPlus offer their own set of advantages and disadvantages. The choice of which building simulation program should be used might vary in each case. The purpose of this thesis is to investigate the potential of both the programs to do the whole building energy analysis and compare the results with the actual building energy performance. For this purpose the energy simulation of a fully functional building is done in eQUEST and EnergyPlus and the results were compared with utility data of the building to identify the degree of closeness with which simulation results match with the actual heat and energy flows in building. It was observed in this study that eQUEST is easy to use and quick in producing

results that would especially help in the taking critical decisions during the design phase. On the other hand EnergyPlus aids in modeling complex systems, producing more accurate results, but consumes more time. The choice of simulation program might change depending on the usability and applicability of the program to our need in different phases of a building's lifecycle. Therefore, it makes sense if a common front end is designed for both these simulation programs thereby allowing the user to select either the DOE-2.2 engine or the EnergyPlus engine based upon the need in each particular case.

In the 21st century, architects and engineers are being challenged to produce work that is concurrently sustainable and resilient. Buildings need to mitigate their impact on climate change by minimising their carbon footprint, while also countering the challenging new weather conditions. Globally, severe storms, extreme droughts and rising sea levels are becoming an increasingly reoccurring feature. To respond, a design process is required that seeks to integrate resiliency by building in the capacity to absorb the impacts of these disruptive events and adapt over time to further changes, while simultaneously being part of the solution to the problem itself. This issue of AD is guest-edited by the interdisciplinary team at Stevens Institute of Technology who developed the winning entry for the 2015 US Department of Energy Solar Decathlon competition, the SU+RE House. While particular focus is paid to this student designed and built prototype home, the publication also provides a broader discussion of the value of design-build as a model for tackling the issue of integrating sustainability and resilience, and what changes are required across education, policy, practice and industry for widespread implementation. Contributors include: Bronwyn Barry, Michael Bruno, Alex Carpenter, Adam Cohen, Ann Holtzman, Ken Levenson, Brady Peters, Terri Peters, Karin Stieldorf, Alex Washburn, Claire Weisz, and Graham Wright. Featured architects: 3XN/GXN, FXFOWLE Architects, Local Office Landscape Architecture (LOLA), Lateral Office, Skidmore, Owings & Merrill (SOM), Snohetta, Structures Design Build, and WXY Studio.

Building Energy Modeling with OpenStudio

Final Report

Passive and Low Energy Architecture

A Comparison of EnergyPlus and EQUEST Whole Building Energy Simulation Results for a Medium Sized Office Building

The Basis of Sustainable Design

Sustainable Architectural Design

Discover BIM: A better way to build better buildings Building Information Modeling (BIM) offers a novel approach to design, construction, and facility management in which a

digital representation of the building product and process is used to facilitate the exchange and interoperability of information in digital format. BIM is beginning to change the way buildings look, the way they function, and the ways in which they are designed and built. The BIM Handbook, Third Edition provides an in-depth understanding of BIM technologies, the business and organizational issues associated with its implementation, and the profound advantages that effective use of BIM can provide to all members of a project team. Updates to this edition include: Information on the ways in which professionals should use BIM to gain maximum value New topics such as collaborative working, national and major construction clients, BIM standards and guides A discussion on how various professional roles have expanded through the widespread use and the new avenues of BIM practices and services A wealth of new case studies that clearly illustrate exactly how BIM is applied in a wide variety of conditions Painting a colorful and thorough picture of the state of the art in building information modeling, the BIM Handbook, Third Edition guides readers to successful implementations, helping them to avoid needless frustration and costs and take full advantage of this paradigm-shifting approach to construct better buildings that consume fewer materials and require less time, labor, and capital resources.

Leading architectural firms are now using in-house design simulation to help make more sustainable design decisions. Taking advantage of these new tools requires understanding of what can be done with simulation, how to do it, and how to interpret the results. This software-agnostic book, which is intended for you to use as a professional architect, shows you how to reduce the energy use of all buildings using simulation for shading, daylighting, airflow, and energy modeling. Written by a practicing architect who specializes in design simulation, the book includes 30 case studies of net-zero buildings, as well as of projects with less lofty goals, to demonstrate how energy simulation has helped designers make early decisions. Within each case study, author Kjell Anderson mentions the software used, how the simulation was set up, and how the project team used the simulation to make design decisions. Chapters and case studies are written so that you learn general concepts without being tied to particular software.

Each chapter builds on the theory from previous chapters, includes a summary of concept-level hand calculations (if applicable), and gives comprehensive explanations with graphic examples. Additional topics include simulation basics, comfort, climate analysis, a discussion on how simulation is integrated into some firms, and an overview of some popular design simulation software.

This book focuses on the complex topic of "Energy Transition with Economic Justice" and highlights research presented during the American Solar Energy Society's National Solar Conference (ASES SOLAR 2022) held at the University of New Mexico. This conference brings together a broad base of solar and renewable energy professionals and thought leaders, including researchers, architects, engineers, entrepreneurs, installers, manufacturers, economists, finance professionals, and policy makers, and provides a platform for the exchange of ideas, information and business insights and unbiased perspectives on progress toward greater sustainability. The conference papers explore interests of shared values and identify contentious issues in the transition towards 100% renewable energy in the United States, especially on public lands, within tribal communities, and frontier areas.

An important consideration for energy-efficient buildings is their primary energy requirements over the entire life cycle. How to determine this? What integrative factors influence the performance of a healthy and sustainable building? This, while it may be important for clients and architects to know, is frequently not very transparent. This book has been written to assist with clarifying target criteria and expanding horizons when it comes to ecological buildings. It is meant as a handbook and source of reference for clients, architects, planners and building operators, to provide them with pertinent information about their design, construction and operation: how to do this in the most energy-efficient and economical manner? Also, there is feedback and documentation about prominent buildings like the Hamburg Dockland or the Landesbank Baden-Wuerttemberg in Stuttgart. They provide excellent architectural examples for detailed construction and design solutions. Further, there are insightful interviews with architects and clients about many important buildings, which help turn this book into an integrated source of

reference for sustainable architecture. - A Guideline for Planning, Construction and Operation of sustainable Buildings - A source of reference for clients, architects, planners and building operators - Innovative architectural examples with sustainable concepts and design

Proceedings of the 12th European Conference on Product and Process Modelling (ECPPM 2018), September 12-14, 2018, Copenhagen, Denmark

Proceedings of the American Solar Energy Society National Conference

An Investigation Into the Methods to Facilitate Understanding of the Use of Energy Simulation Program by Architects in the Early Design Stage

Energy Simulation in Building Design

A Guide to Building Information Modeling for Owners, Designers, Engineers, Contractors, and Facility Managers

Energy Modeling in Architectural Design

Energy modeling or simulation is the practice of using computerized simulation programs to model the energy and environmental performance of an entire building or the systems within a building. Researchers concur that architects should use the energy simulation programs as a potential design decision support tool, especially in the early design stages, where the time and budgetary constraints often preclude the objective performance feedback from engineers and energy simulation experts who regularly perform energy simulation and where such objective performance feedback can have substantial influence on the overall energy and environmental performance of the final building. However, user surveys assessing simulation uptake by architects have shown that energy simulation is rarely employed by architects in practice. A literature review of these surveys indicated design process related, software related, and user related issues responsible for their limited uptake. Of these, very limited research is focused on the user related issues: enhancing the level of understanding of energy simulation of architects and the ways to facilitate this understanding. The research presented in this thesis proposes the formulation of a simulation tool independent guide to address the user related issue and gives an overview of the topics to be included in this guide. The topics chosen were based on the analysis of the author's experience of a performed test design and the issues identified through literature review of the user surveys. The topics discussed for inclusion in the guide are: an introduction to simulation; defining the simulation scope; selection of energy simulation programs; defining simulation model and performing simulation; quality assurance and program validation; and data analysis and interpretation. Of these, 'defining the simulation scope' was perceived as one of the important topics influencing the modeling and simulation strategy and the selection of energy simulation programs and hence, was further analyzed. A simulation tool independent framework is proposed and developed to facilitate the

formulation of the simulation scope. The framework is a visual representation of the inter-relationship between the design inquiries in the early design stage, simulation tasks and the related performance parameters to be simulated by energy simulation programs for deriving decision support for the design inquiries.

Now in its third edition, this book provides the ideal and only reference to the physical basis of architectural design. Fully updated and expanded throughout, the book provides the data required for architects to design buildings that will maintain the users comfort in a variety of conditions, with minimal reliance on energy intensive methods like air conditioning. This is not a 'how to' book but answers the question why. It equips the reader with the tools to realize the full potential of the good intentions of sustainable, bioclimatic design. All sections have been revised and updated for this third edition including all the most relevant developments affecting heat, light and sound controls. The book responds to the need of understanding beyond 'rules of thumb'.

eWork and eBusiness in Architecture, Engineering and Construction 2018 collects the papers presented at the 12th European Conference on Product and Process Modelling (ECPPM 2018, Copenhagen, 12-14 September 2018). The contributions cover complementary thematic areas that hold great promise towards the advancement of research and technological development in the modelling of complex engineering systems, encompassing a substantial number of high quality contributions on a large spectrum of topics pertaining to ICT deployment instances in AEC/FM, including: • Information and Knowledge Management • Construction Management • Description Logics and Ontology Application in AEC • Risk Management • 5D/nD Modelling, Simulation and Augmented Reality • Infrastructure Condition Assessment • Standardization of Data Structures • Regulatory and Legal Aspects • Multi-Model and distributed Data Management • System Identification • Industrilized Production, Smart Products and Services • Interoperability • Smart Cities • Sustainable Buildings and Urban Environments • Collaboration and Teamwork • BIM Implementation and Deployment • Building Performance Simulation • Intelligent Catalogues and Services eWork and eBusiness in Architecture, Engineering and Construction 2018 represents a rich and comprehensive resource for academics and researchers working in the interdisciplinary areas of information technology applications in architecture, engineering and construction. In the last two decades, the biennial ECPPM (European Conference on Product and Process Modelling) conference series, as the oldest BIM conference, has provided a unique platform for the presentation and discussion of the most recent advances with regard to the ICT (Information and Communication Technology) applications in the AEC/FM (Architecture, Engineering, Construction and Facilities Management) domains.

The Routledge Companion to Paradigms of Performativity in Design and Architecture focuses on a non-linear, multilateral, ethical way of design thinking, positioning the design process as a journey. It expands on the multiple facets and paradigms of performative design thinking as an emerging trend in design methodology. This edited collection explores the meaning of performativity by examining its relevance in conjunction with three fundamental principles: firmness, commodity and delight. The scope and broader meaning of performativity, performative architecture and performance-based building design are discussed in terms of how they influence today's design thinking. With contributions from 45 expert practitioners, educators and researchers, this volume engages theory, history, technology and the human aspects

of performative design thinking and its implications for the future of design.
eWork and eBusiness in Architecture, Engineering and Construction
Guidebook for Sustainable Architecture
Simple and Rapid Energy Simulation of Early-stage Building Designs
Building Energy Simulation
Design in a Simulation Environment
Conceptual Design Energy Analysis Tool (CDEAT) Research & Development

Simulation tools, when applied early in the design process, can considerably reduce the energy demand of newly constructed buildings. Fo a simulation tool to assist with design, it must be easy to use, provide feedback quickly, and allow rapid comparisons. Most existing tools do not meet these needs, usually because they were intended for modeling finalized building designs. Often there is no user interface, and it can take hours or days to prepare, run, and interpret results. Such tools are too sophisticated for design purposes. In this document the MIT Design Advisor is presented as a simple and rapid building energy simulation tool, developed specifically for architects and building designers. Conceptual building designs can be modeled quickly and without formal training. Results are interpreted graphically and displayed to the user in a simple user interface. Side-by-side comparisons of building designs can be made, allowing users to quickly learn which building components have the biggest impact on energy consumption (heating, cooling, and lighting), indoor daylight levels, and thermal comfort. User-specified building parameters are used together with local weather data to predict monthly and annual energy use. The heat transfer model used to make the energy predictions is explained in detail in this thesis. Calculation methods are given and validated. Agreement with existing models is quite good. The MIT Design Advisor is available at http://designadvisor.mit.edu.

When used appropriately, building performance simulation has the potential to reduce the environmental impact of the built environment, to improve indoor quality and productivity, as well as to facilitate future innovation and technological progress in construction. Since publication of the first edition of Building Performance Simulation for Design and Operation, the discussion has shifted from a focus on software features to a new agenda, which centres on the effectiveness of building performance simulation in building life cycle processes. This new edition provides a unique and comprehensive overview of building performance simulation for the complete building life cycle from conception to demolition, and from a single building to district level. It contains new chapters on building information modelling, occupant behaviour modelling, urban physics modelling, urban building energy modelling and renewable energy systems modelling. This new edition keeps the same chapter structure throughout including learning objectives, chapter summaries and assignments. Moreover, the book: • Provides unique insights into the techniques of building performance modelling and simulation and their application to performance-based design and operation of buildings and the systems which service them. • Provides readers with the essential concepts computational support of performance-based design and operation. • Provides examples of how to use building simulation techniques for practical design, management and operation, their limitations and future direction. It is primarily intended for building and systems designers and operators, and postgraduate architectural, environmental or mechanical engineering students.

This research is meant to facilitate a wider use of energy simulation in urban and schematic building design. The major contribution is the development and validation of software algorithms that can manage, automatically produce and execute building energy models for urban and schematic design. Modeling approaches for building performance simulation engines such as EnergyPlus and TRNSYS have been developed. The first approach introduces an algorithm that automatically converts arbitrary building massing models into multi-zone thermal models following the ASHRAE 90.1 Appendix G prescribed perimeter and core discretization schema. This method yields geometrically resolved multizone models and provides a streamlined workflow for single and multi-building energy evaluation. The second approach dissects an urban massing model that may consist of hundreds of buildings with various architectural programs into a discrete number of "typical room" energy models. It is shown that for standard interior partitions and fully conditioned spaces the method yields results that are comparable to conventional perimeter and core simulations in terms of accuracy as well as temporal and spatial resolution at a fraction of the calculation time. This speed-up facilitates interactive urban level design evaluations. The third approach explores the energetic consequences of using a zoning methodology that goes beyond generic perimeter and core subdivisions. Based on a review and categorization of real floor plan designs it is shown that key characteristics of interior subdivisions have a decisive effect on building energy use and present a largely untapped opportunity for architects to reduce building energy use in schematic design. Each approach is documented and simulation results are compared against conventional modeling workflows for a realworld urban case study. As a proof of concept, the mentioned methods have been implemented as plug-ins for the widely used CAD modeling software Rhinoceros3d (Rhino) an its parametric scripting environment Grasshopper.

The second edition of Building Energy Simulation includes studies of various components and systems of buildings and their effect on energy consumption, with the help of DesignBuilderTM, a front-end for the EnergyPlus simulation engine, supported by examples and exercises. The book employs a "learning by doing" methodology. It explains simulation-input parameters and how-to-do analysis of the simulation output, in the process explaining building physics and energy simulation. Divided into three sections, it covers the fundamentals of energy simulation followed by advanced topics in energy simulation and simulation for compliance with building codes and detailed case studies for comprehensive building energy simulation. Features: Focuses on learning building energy simulation while being interactive through examples and exercises. Explains the building physics and the science behind the energy performance of buildings. Encourages a integrated design approach by explaining the interactions between various building systems and their effect on energy performance of building. Discusses a how-to model for building energy code compliance including three projects to practice whole building simulation. Provides hands-on training of building energy simulation tools: DesignBuilderTM and EnergyPlus. Includes practical projects problems, appendices and CAD files in the e-resources section. Building Energy Simulation is intended for students and researchers in building energy courses, energy simulation professionals, and architects.

Development of an Open Source Hourly Building Energy Modeling Software Tool

Urban Agriculture and City Sustainability

Digital Design Tools for Simulation and Visualisation of Sustainable Architecture

Sustainable + Resilient Design Systems
ASES SOLAR 2022
The Routledge Companion to Paradigms of Performativity in Design and Architecture

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.

This is a design guide for architects, engineers, and contractors concerning the principles and specific applications of building information modeling (BIM). BIM has the potential to revolutionize the building industry, and yet not all architects and construction professionals fully understand what the benefits of BIM are or even the fundamental concepts behind it. As part of the PocketArchitecture Series it includes two parts: fundamentals and applications, which provide a comprehensive overview of all the necessary and essential issues. It also includes case studies from a range of project sizes that illustrate the key concepts clearly and use a wide range of visual aids. Building Information Modeling addresses the key role that BIM is playing in shaping the software tools and office processes in the architecture, engineering, and construction professions. Primarily aimed at professionals, it is also useful for faculty who wish to incorporate this information into their courses on digital design, BIM, and professional practice. As a compact summary of key ideas it is ideal for anyone implementing BIM.

This volume discusses the climate responsiveness of sustainable architecture design and technology in China, Japan, Singapore, and South Korea in recent years, addressing concepts and applications in urban planning, building design, and structural performance evaluation. The four sections of the text cover the theory and implementation of sustainable architecture within various geographic boundaries and contexts, offering an interdisciplinary assessment of the challenges faced in urban areas at different climate zones. The main topics covered are: 1) urban ecological restoration under the influence of climate environment; 2) health and human considerations of building and environment; 3) prototype optimization of sustainable building, and 4) feedback of building performance and design evaluation. The book is intended to be a contribution to the growing body of

knowledge on sustainable architecture for applicable use by practitioners, city planners, field researchers, and building operators in building design, construction, usage, operation, and maintenance.

The second edition of Building Energy Simulation includes studies of various components and systems of buildings and their effect on energy consumption, with the help of DesignBuilderTM, a front-end for the EnergyPlus simulation engine, supported by examples and exercises. The book employs a "learning by doing" methodology. It explains simulation-input parameters and how-to-do analysis of the simulation output, in the process explaining building physics and energy simulation. Divided into three sections, it covers the fundamentals of energy simulation followed by advanced topics in energy simulation and simulation for compliance with building codes and detailed case studies for comprehensive building energy simulation. Features: Focuses on learning building energy simulation while being interactive through examples and exercises. Explains the building physics and the science behind the energy performance of buildings. Encourages an integrated design approach by explaining the interactions between various building systems and their effect on energy performance of building. Discusses a how-to model for building energy code compliance including three projects to practice whole building simulation. Provides hands-on training of building energy simulation tools: DesignBuilderTM and EnergyPlus. Building Energy Simulation is intended for students and researchers in building energy courses, energy simulation professionals, and architects.

A Workbook Using DesignBuilderTM

The Integration of Architectural Design and Energy Modelling Software

A BIM-based Workflow Concurrently Generating Quantitative and Qualitative Output

Design Energy Simulation for Architects

BIM in Small-Scale Sustainable Design

The perspective of China, Japan, Singapore and Thailand

eWork and eBusiness in Architecture, Engineering and Construction 2016 collects the papers presented at the 11th European Conference on Product & Process Modelling (ECPPM 2016, Cyprus, 7-9 September 2016), The contributions cover complementary thematic areas that hold great promise for the advancement of research and technological development in the modelling of complex engineering systems, encompassing a substantial number of high quality contributions on a large spectrum of topics pertaining to ICT deployment instances in AEC/FM, including: • Information and Knowledge Management • Construction Management • Description Logics and Ontology Application in AEC • Risk Management • 5D/nD Modelling, Simulation and Augmented Reality • Infrastructure Condition Assessment • Standardization of Data Structures • Regulatory and Legal

Aspects • Multi-Model and distributed Data Management • System Identification • Industrialized Production, Smart Products and Services • Interoperability • Smart Cities • Sustainable Buildings and Urban Environments • Collaboration and Teamwork • BIM Implementation and Deployment • Building Performance Simulation • Intelligent Catalogues and Services

Since the appearance of the first edition of 'Energy Simulation in Building Design', the use of computer-based appraisal tools to solve energy design problems within buildings has grown rapidly. A leading figure in this field, Professor Joseph Clarke has updated his book throughout to reflect these latest developments. The book now includes material on combined thermal/lighting and CFD simulation, advanced glazings, indoor air quality and photovoltaic components. This thorough revision means that the book remains the key text on simulation for architects, building engineering consultants and students of building engineering and environmental design of buildings. The book's purpose is to help architects, mechanical & environmental engineers and energy & facility managers to understand and apply the emerging computer methods for options appraisal at the individual building, estate, city, region and national levels. This is achieved by interspersing theoretical derivations relating to simulation within an evolving description of the built environment as a complex system. The premise is that the effective application of any simulation tool requires a thorough understanding of the domain it addresses.

Passive and Low Energy Architecture contains the proceedings of the Second International PLEA Conference held in Crete, Greece, on June 28 to July 1, 1983. The book is organized into four parts as the topics of the conference. The first part brings together papers dealing with case studies of individual buildings or groups of buildings, completed or to be built, and of community planning. The case studies cover examples from 13 countries in Europe, North and Latin America, North Africa, the Middle East, and Asia. The second part contains papers on experimental work and technical developments with passive and low energy systems and components. The third section focuses on the ill-defined but crucial to designers, area of design aids. The fourth section centers on implementation and management of these energy systems, including topics of international programs, education, and training of design professionals. The book will be useful to energy conscious designers, architects, engineers, and planners in this field of interest.

A comprehensive summary of the vocabulary used across the building industry, from the preparation of an architectural brief, through creative and technical design, to construction technology and facilities management. The latest edition has several substantially revised entries as well as many new additions, including new illustrations and terms. Covering a range of disciplines across architecture and building and including both SI metric and Imperial units, this dictionary and reference work will enable students and professionals to use and understand vocabulary from other areas of expertise, and contribute to better communication.

Dictionary of Architectural and Building Technology

Building Information Modeling
Assessing the Performance of Passive Houses in Mediterranean Climate Regions
eWork and eBusiness in Architecture, Engineering and Construction: ECPPM 2016
A Tool for Design Decision Making
Introduction to Architectural Science

The integration of quantitative building energy performance simulation with qualitative architecture representational 3D data can facilitate performance-based decision making in the early phase of building design process. However, there are some problems that delay decision making until the late stages of design.Many interrelated parameters can affect building energy performance. Unlike design options conventionally created based on offered values of ASHRAE 90.1 or NECB, design alternatives with lower energy consumption can be suggested through the configuration of various parameters. A systematic strategy is needed to support performance-based quantitative evaluation. Due to the complexity of integration of interrelated energy simulation parameters with qualitative architecture representations, this approach is not being adequately accomplished in current architecture/energy-performance practices. There is a lack of an effective integrated workflow between architects and engineers to simultaneously represent visual qualitative 3D data related to quantitative energy performance-based data of each design alternative.In addition, exchanging data between the architectural model and the energy model in large-scale evaluations is a time-consuming and error-prone process. Collaborative platforms are not sufficiently being used in current practices to facilitate geometric and physical data-sharing through a single environment. In this regard, there is no clear integrated design workflow between architectural needs and engineering needs.The objective of this research is to propose a workflow to facilitate decision-making at the early design phase by automatically generating the quantitative energy performance data and qualitative visual representations of each design alternative, in order that architects and engineers can collaborate within a common platform of communication. This proposed workflow will be implemented through the utilization of a case study, within the collaborative platform of Building Information Modeling (BIM).Numbers of 1296 quantitative energy-performance results and their related qualitative 3D designs have been generated automatically through the BIM platform. These results support architects and engineers with a variety of 2best performance-based design solutions,3 while involving them simultaneously in the design process from the early phase

without needing to perform the error-prone and time-consuming process of energy model data re-entry. "Energy modeling calculations for urban, complex buildings are most effective during the early design phase. And most analysis takes only four to sixteen hours to get results you can use. This software-agnostic book, which is intended for you to use as a professional architect, shows you how to reduce the energy use of all buildings. Written by a practicing architect who specializes in energy modeling, the book includes case studies of net-zero buildings, of Living Building Challenge-certified buildings, as well as of projects with less lofty goals to demonstrate how energy simulation has helped designers make early decisions. Within each case study, author Kjell Anderson mentions the software used and other software that could have been used to get similar results so that you learn general concepts without being tied to particular programs. Each chapter builds on the theory from previous chapters, includes a summary of concept-level hand calculations (if applicable), and gives comprehensive explanations with examples. Topics covered include comfort, design energy simulation, climate analysis, master planning, conceptual design, design development, and existing buildings so that you can create more responsive designs quicker"--

Papers presented at the 1st International Conference on Urban Agriculture and City Sustainability are contained in this book. The research reviews ways in which urban agriculture can contribute to achieve sustainable cities and considers ways of reducing the impact in terms of use of natural resources, waste production and climate change.

This book results from a Special Issue related to the latest progress in the thermodynamics of machines systems and processes since the premonitory work of Carnot. Carnot invented his famous cycle and generalized the efficiency concept for thermo-mechanical engines. Since that time, research progressed from the equilibrium approach to the irreversible situation that represents the general case. This book illustrates the present state-of-the-art advances after one or two centuries of consideration regarding applications and fundamental aspects. The research is moving fast in the direction of economic and environmental aspects. This will probably continue during the coming years. This book mainly highlights the recent focus on the maximum power of engines, as well as the corresponding first law efficiency upper bounds.

Zero Energy Residential Buildings in Hot Humid Climates

Proceedings of the Second International PLEA Conference, Crete, Greece, 28 June-1 July 1983

A Practical Guide for Students and Professionals
Green Building
Design and Technological Applications in Sustainable Architecture
Procedures for Automated Building Energy Model Production for Urban and Early Design

Computing the Environment presents practical workflows and guidance for designers to get feedback on their design using digital design tools on environmental performance. Starting with an extensive state-of-the-art survey of what top international offices are currently using in their design projects, this book presents detailed descriptions of the tools, algorithms, and workflows used and discusses the theories that underlie these methods. Project examples from Transsolar Klimaengineering, Buro Happold ?s SMART Group, Behnish Behnisch Architects, Thomas Herzog, Autodesk Research are contextualized with quotes and references to key thinkers in this field such as Eric Winsberg, Andrew Marsh, Michelle Addington and Ali Malkawi.

When designing a building, the architect has typically relied on the input of outside experts to determine the performance of building systems. When done properly this collaboration can yield highly effective designs, but typically this reliance has left the architect outside of the loop on performance based decisions and impeded the development of innovative solutions. With the availability of powerful building simulation tools, designers can have direct access to building performance attributes and use them to qualify the environmental impact of design-decisions. With knowledge of fundamental principles in building performance and computer modeling, a designer can effectively harness the power of these tools from the beginning of the design process. While this does not eliminate the need for expert opinion, it allows the designer to further develop and have more control over the solution through collaboration. By working effectively in this digital design environment, the practice of architecture can meet its responsibility to reduce the impact of buildings on the physical environment. To test this statement, a brief overview of the integration of analysis tools in two projects that represent the current state of the art for digital performance simulation describes the need for multiple tools to achieve effective results. Based on this experience, a

study was done to explore the capabilities of four representative simulation tools to support a design process that is entirely digital. The software evaluated was Energy-10, eQUEST, Sketch-Up with Demeter (a recently released plug-in for energy analysis) and ECOTECT. These tools were chosen because they have been targeted toward architects and claim to be easy to use. The results of this investigation were used to determine an appropriate tool set to develop a design for submission to the Leading Edge Competition, chosen because one of the requirements is that entrants perform energy analyses on their schemes to show how design decisions led to improved performance, making it a good vehicle to explore the process of designing in a simulation environment.

This thesis investigates the use of building performance simulation tools as a method of informing the design decision of Net Zero Energy Buildings (NZEBs).

"Any architect doing small or medium scaled projects who is alsovested in sustainable design but is not yet doing BIM will enjoythis book's overall focus."–Architosh.com This work is the leading guide to architectural design within abuilding information modeling (BIM) workflow, giving thepractitioner a clear procedure when designing climate-loaddominated buildings. The book incorporates new information relatedto BIM, integrated practice, and sustainable design, as wellinformation on how designers can incorporate the latesttechnological tools. Each chapter addresses specific topics, suchas natural ventilation for cooling, passive solar heating,rainwater harvesting and building hydrology, optimizing materialuse and reducing construction waste, and collaborating withconsultants or other building professionals such as engineers andenergy modelers.

SU+RE

A Focus on Energy Performance and Architectural Representation

A Technical Design Guide

Using Time to Craft an Enduring, Resilient and Relevant Architecture

Energy and Environment in Architecture

Guide to 3D Graphics

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.

This textbook teaches the fundamentals of building energy modeling and analysis using open source example applications built with the US DOE's OpenStudio modeling platform and EnergyPlus simulation engine. Designed by researchers at US National Laboratories to support a new generation of high performance buildings, EnergyPlus and OpenStudio are revolutionizing how building energy modeling is taught in universities and applied by professional architects and engineers around the world. The authors, all researchers at National Renewable Energy Laboratory and members of the OpenStudio software development team, present modeling concepts using open source software that may be generally applied using a variety of software tools commonly used by design professionals. The book also discusses modeling process automation in the context of OpenStudio Measures—small self-contained scripts that can transform energy models and their data—to save time and effort. They illustrate key concepts through a sophisticated example problem that evolves in complexity throughout the book. The text also examines advanced topics including daylighting, parametric analysis, uncertainty analysis, design optimization, and model calibration. Building Energy Modeling with OpenStudio teaches students to become sophisticated modelers rather than simply proficient software users. It supports undergraduate and graduate building energy courses in Architecture, and in Mechanical, Civil, Architectural, and Sustainability Engineering.

Building-Integrated Photovoltaic Designs for Commercial and Institutional Structures: A Sourcebook for Architects

Building Performance Simulation for Design and Operation

The MIT Design Advisor

An Interface Model for Building Energy Performance Simulation in an Integrated Computer-aided Design Environment

Proceedings of the 11th European Conference on Product and Process Modelling (ECPPM 2016), Limassol, Cyprus, 7-9 September 2016

An Overview