

# THE FUTURE OF THE EUROPEAN BUILT ENVIRONMENT

What will the European built environment look like in 2050? It is shaped by the effects of climate change, resource scarcity, changes in population, urbanisation, and focus on health and wellbeing. Buildings integrate a vast amount of technology that connect buildings to information management and sharing platforms. Buildings have evolved into temporary storage of circular materials and products and have become data hubs that support optimal resource efficiency and wellbeing.



## CLIMATE RESILIENT

Buildings are entirely climate resilient, green, energy neutral buildings that are designed to withstand floods and heat stress, and that are part of climate resilient zones and urban areas.



## FLEXIBLE BUILDINGS

Buildings will facilitate flexibility. They are adapted for changes in use on the short-term, while being constructed for the long-term. Smaller and flexible units will provide living spaces for the growing urban population.



## COGNITIVE BUILDINGS

Buildings will be able to autonomously manage its internal climate (light, temperature, air) and efficiently adjust e.g. energy use by themselves. Cognitive buildings are connected to smart grids and are part of the net.



## BUILDINGS FOCUS ON PERFORMANCE

The sustainability, performance, energy performance, and other performance are central drivers for comfortable living and working, and also determine the value of a building.



## ENABLING WORKING AND LIVING IN A 24-HOUR ECONOMY

In our 24-hour global economy buildings will provide continued working and living space. Libraries, sports, shops and other amenities are combined in buildings that provide 24-hour connectivity.



## CIRCULAR BUILDINGS

Buildings are circular built with reused materials and/or recycled materials, are modular and decomposable. They have become a temporary storage of materials and products.



## ENERGY POSITIVE

Buildings create energy through photovoltaic solutions and are highly energy efficient and independent of fossil fuels. Buildings are connected to a smart grid to share and store electricity and heat.



## SUPPORT A HEALTHY LIFESTYLE

Buildings provide a healthy environment: healthy noise management, optimal temperature management, clean air and daylight. The design fully supports the wellbeing of its users.



# Smart And Sustainable Built Environments

**SA Adler**



## **Smart And Sustainable Built Environments:**

**Smart and Sustainable Built Environments** Jay Yang, Peter S. Brandon, Anthony C. Sidwell, 2008-04-15 This book brings together a group of international specialists to explore the current state of the art and future potential for encouraging developing and implementing smart and sustainable built environment strategies. It covers a broad spectrum of issues ranging from technological advancement through the assessment of past experiences to communication and education requirements and future strategies. It provides a snapshot of current methods and technologies for developing smart and sustainable built environment strategies over 30 fully refereed chapters from international experts. It addresses the particular requirements and problems of different areas and climatic regions. Smart and Sustainable Built Environments, 2007

Sustainable development is rapidly becoming a global phenomenon the remit of which encompasses a wide range of professions and societal interest groups. This collection of papers from the CIBT ask Group 55 smart and sustainable built environments presents key findings to date on a wide range of current research and practice in this emerging field in order to promote awareness, understanding and synergy. The first five papers in this e-book focus directly on sustainability while the final three papers identify cross-cutting themes as associated with tools, processes and culture. Smart and Sustainable Cities and Buildings Rob Roggema, Anouk Roggema, 2020-05-11 This book brings together the papers presented at the Smart and Sustainable Built Environments Conference 2018 SASBE. This latest research falls into two tracks: smart and sustainable design and planning cities and the technicalities of smart and sustainable buildings. The growth of smart cities is evident but not always linked to sustainability. This book gives an overview of the latest academic developments in increasing the smartness and sustainability of our cities and buildings. Aspects such as inclusivity, smart cities, place and space, the resilient city, urbanity and urban ecology are prominently featured in the design and planning part of the book while energy, educational buildings, comfort, building design, construction and performance form the sub-themes of the technical part of the book. This book will appeal to urban designers, architects, urban planners, smart city designers and sustainable building experts.

**Proceedings of the International Conference on Smart and Sustainable Built Environment (SASBE 2024)** Ali Ghaffarianhoseini, Amirhosein Ghaffarianhoseini, Farzad Rahimian, Mahesh Babu Purushothaman, 2025-04-19 This book presents peer-reviewed articles from the International Conference of Sustainable Development and Smart Built Environments SDSBE2024 held from 6-8 Nov at Auckland, New Zealand. It encapsulates cutting-edge research in Sustainable Development and Smart Built Environments featuring global scholars. Encompassing diverse themes, the book explores sustainable urban development, governance and policy, emphasizing urban greening and climate resilience. It delves into innovative approaches for sustainable transport, intelligent infrastructure and community well-being. The integration of Data Science, AI and IoT for optimizing built environments is a focal point alongside advancements in digital twins and OpenBIM. Social aspects including equity and indigenous perspectives are explored along with health considerations in urban settings.

The proceedings serve as a comprehensive resource reflecting the multifaceted advancements driving sustainable and smart urban futures *Sustainable Built Environment and Urban Growth Management* Wann-Ming Wey, 2020-02-21 Nowadays the sustainable built environment planning in most cities has come to a turning point as the growth in traffic and population has become a serious concern and put tremendous pressure on both the environment and people in these cities It is therefore important to find new ways or lifestyles such as compact city transit oriented development TOD formulations that are more flexible inclusive and sustainable Furthermore for the sustainable built environment and urban growth management not only should the growth management principles which include smart growth sustainable growth and inclusive growth be taken into account but innovative smart planning strategies such as mixed use design green transport and new urbanism are also utilized in planning sustainable built environments in order to prevent the urban sprawl development that has occurred

*Sustainable Built Environment for People and Society*, 2025-07-30 The pursuit of sustainable built environments has become a strategic global priority in addressing the complex interplay of social economic environmental and human development challenges outlined in the United Nations Sustainable Development Goals SDGs Accelerating urbanization climate risks and widening inequality are placing unprecedented strain on cities and communities demanding a fundamental shift in how we design deliver and manage the built environment Sustainable built environments are central to achieving key Sustainable Development Goals SDGs particularly SDG 11 Sustainable Cities and Communities SDG 3 Good Health and Wellbeing SDG 7 Affordable and Clean Energy and SDG 13 Climate Action Built infrastructure must minimize environmental impact maximize energy efficiency and enhance the quality of life while placing people at the center ensuring inclusivity resilience and adaptability to future needs A leading example of this approach is the Zero Energy Mass Custom Home ZEMCH initiative ZEMCH promotes the delivery of affordable high performance housing that meets both individual and community needs By combining mass customization with energy efficient design and renewable energy technologies ZEMCH homes aim to achieve net zero energy consumption reduce their carbon footprint and enhance occupant wellbeing Equity and accessibility must also be embedded in the built environment ensuring that all individuals regardless of income age or ability can access safe functional and dignified spaces Ultimately sustainable development is not only about constructing greener buildings but also about shaping environments that foster social cohesion environmental stewardship and long term wellbeing Achieving this requires cross sector collaboration meaningful community engagement and the integration of sustainability principles throughout the entire lifecycle of the built environment transforming it into a catalyst for positive change for both people and society *Sustainable Futures in the Built Environment to 2050* Tim Dixon, John Connaughton, Stuart Green, 2018-01-09 Brings together leading thinking on issues of new professional practice and on the future of a sustainable built environment This book focuses on both construction and development issues and examines how we can transition to a sustainable future by the year 2050 bringing together leading research and practice at building

neighbourhood and city levels It deftly analyses how emerging socio economic technological and environmental trends will influence the built environment of the future The book covers a broad spectrum of interests across the scales of buildings communities and cities including how professional practice will need to adapt to these trends The broader context is provided by an analysis of emergent business models and the changing requirements for expert advice from clients Sustainable Futures in the Built Environment to 2050 A Foresight Approach to Construction and Development features chapters covering data and trends including historical data and UK and international case studies policies and practice related to the field current state of scientific understanding key challenges key technological advances including disruptive and systemic technological innovations change issues and critical uncertainties and future visions It provides A strong conceptual framework based on a Foresight approach Discussion of the key data and trends that underpin each chapter Coverage of both construction and property development Specially commissioned chapters by academics and practitioners A synthesis of the main findings in the book and key insights for the future to 2050 Sustainable Futures in the Built Environment to 2050 A Foresight Approach to Construction and Development is an important book for postgraduate students and researchers construction real estate and property development specialists engineers planners architects foresight and futures studies specialists and anyone involved in sustainable buildings

*Sustainable Built Environments* Vivian Loftness,2020-09-23 This volume in the Encyclopedia of Sustainability Science and Technology Second Edition describes the breadth of science and engineering knowledge critical to advancing sustainable built environments from architecture and design mechanical engineering lighting and materials to water and energy public policy and economics Covering both building landscape and green infrastructure design and management detailed consideration is given to how the building sector the biggest player in the energy use equation can minimize energy demand while providing measurable gains for productivity health and the environment With a focus on the environmental context the reader will understand how sustainable design merges the natural minimum resource conditioning solutions of the past daylight solar heat and natural ventilation with the innovative technologies including nature based solutions of the present The desired result is an integrated intelligent and as socially just as possible system that supports individual control with expert negotiation for resource consciousness

**The Elgar Companion to the Built Environment and the Sustainable Development Goals** Alex Opoku,2024-02-12 Exploring the link between Sustainable Development Goals SDGs and the built environment this erudite Companion provides a comprehensive overview and critical examination of key topics and complex research issues Structured around the 5Ps of the SDGs people planet prosperity peace and partnerships the Companion suggests potential routes for the future direction of research within this multidisciplinary field of study

**Cognitive Digital Twins for Smart Lifecycle Management of Built Environment and Infrastructure** Ibrahim Yitmen,2023-07-17 This book provides knowledge into Cognitive Digital Twins for smart lifecycle management of built environment and infrastructure focusing on challenges and opportunities It

focuses on the challenges and opportunities of data driven cognitive systems by integrating the heterogeneous data from multiple resources that can easily be used in a machine learning model and adjust the algorithms. It comprises Digital Twins incorporating cognitive features that will enable sensing complex and unpredicted behavior and reason about dynamic strategies for process optimization to support decision making in lifecycle management of the built environment and infrastructure. The book introduces the Knowledge Graph KG centric framework for Cognitive Digital Twins involving process modeling and simulation ontology based Knowledge Graph analytics for process optimizations and interfaces for data operability. It offers contributions of Cognitive Digital Twins for the integration of IoT Big data AI smart sensors machine learning and communication technologies all connected to a novel paradigm of self learning hybrid models with proactive cognitive capabilities. The book presents the topologies of models described for autonomous real time interpretation and decision making support of complex system development based on Cognitive Digital Twins with applications in critical domains such as maintenance of complex engineering assets in built environment and infrastructure. It offers the essential material to enlighten pertinent research communities of the state of the art research and the latest development in the area of Cognitive Digital Twins as well as a valuable reference for planners designers developers and ICT experts who are working towards the development and implementation of autonomous Cognitive IoT based on big data analytics and context aware computing.

*Proceedings of the International Conference on Sustainable Development and Smart Built Environments* Ali GhaffarianHoseini, Amirhosein G. haffarianHoseini, Farzad Rahimian, Mahesh Babu Purushothaman, 2025-04-12. This book presents peer reviewed articles from the International Conference of Sustainable Development and Smart Built Environments SDSBE2024 held from 6-8 Nov at Auckland New Zealand. It encapsulates cutting edge research in Sustainable Development and Smart Built Environments featuring global scholars. Encompassing diverse themes the book explores sustainable urban development governance and policy emphasizing urban greening and climate resilience. It delves into innovative approaches for sustainable transport intelligent infrastructure and community well being. The integration of Data Science AI and IoT for optimizing built environments is a focal point alongside advancements in digital twins and OpenBIM. Social aspects including equity and indigenous perspectives are explored along with health considerations in urban settings. The proceedings serve as a comprehensive resource reflecting the multifaceted advancements driving sustainable and smart urban futures.

Smart Technologies and Design For Healthy Built Environments Ming Hu, 2020-09-10. Smart Technologies and Design for Healthy Built Environment connects smart technology to a healthy built environment that builds upon the sustainable building movement. It provides an overall summary of the state of the art technologies that are applied in the built environment. The book covers a broad spectrum of smart technology categories ranging from dynamic operability energy efficiency self regulating and self learning systems and responsive systems. The foreseeable challenges that are associated with smart technologies are discussed and outlined in the book. Firstly this book provides a snapshot of state of the art smart

technologies being applied in the built environment. It covers a broad spectrum of smart technology categories ranging from dynamic operability, energy efficiency, self-regulating and self-learning systems to responsive systems. Secondly, this book provides in-depth analysis of the four primary components of health: biological, physical, physiological, and psychological; their effects on wellbeing and cognitive performance are introduced as well. Thirdly, it connects smart technologies to those health-influencing factors by reviewing three completed smart building projects. This book can also serve as a basis for education and discussion among professionals and students of diverse backgrounds who are interested in smart technologies, smart building, and healthy building. *Smart Technologies and Design for Healthy Built Environment* serves as the basis for education and discussions among professionals and students who are interested in smart technologies, smart building, and healthy building as it bridges the gap between smart technologies and a healthy built environment. The book also provides a foundation for anyone who is interested in the impact of smart technology on the health of built environment. **Integrated**

**Building Intelligence** Hamidreza Alavi, Soheila Kookalani, Farzad Rahimian, N ria Forcada, 2024-09-01. This book integrates Building Information Modeling (BIM) and Decision Support Systems (DSS) in the field of building design, construction, and maintenance. The book explores how BIM and DSS technologies can be synergistically utilized to enhance performance, comfort, and maintenance efficiency in buildings. With an emphasis on practical applications, the book provides a comprehensive overview of the latest advancements in BIM and DSS, including real-world case studies and implementation guidelines. The book features illustrations, tables, and examples that aid in understanding complex concepts and demonstrate the practical application of BIM and DSS in building projects. Readers will gain a deep understanding of how BIM and DSS can be integrated to optimize building design, streamline construction processes, and improve facility management and maintenance. The main benefit of reading this book is that it provides a valuable resource for professionals in the architecture, engineering, and construction industries who want to leverage the power of BIM and DSS to enhance their building projects. Additionally, the book explores how BIM and DSS can contribute to energy efficiency. **BIM-enabled Cognitive**

**Computing for Smart Built Environment** Ibrahim Yitmen, 2021-06-17. The book provides knowledge in the Building Information Model (BIM)-enabled cognitive computing methods for smart built environment, involving cognitive network capabilities for smart buildings, integrating Augmented Reality (AR) and Mixed Reality (MR) in cognitive building concepts, cognitive Internet of Things (CIoT) for smart cities, Artificial Intelligence (AI) applications for cognitive cities, and cognitive smart cities using big data and machine learning. It focuses on the potential requirements and implementation of CIoT paradigm to buildings, Artificial Intelligence techniques, reasoning, and Augmented Reality (AR) and Mixed Reality (MR) in cognitive building concepts, the concept of cognitive smart cities in its complexity, heterogeneity, and scope, and the challenge of utilizing the big data generated by smart cities from a machine learning perspective. The book comprises BIM-based and data analytic research on cognitive IoT for smart buildings and cognitive cities using big data and machine learning as complex and dynamic systems. It presents

applied theoretical contributions fostering a better understanding of such systems and the synergistic relationships between the motivating physical and informational settings It reviews ongoing development of BIM based and data science technologies for the processing analysis management modeling and simulation of big and context data and the associated applicability to cognitive systems that will advance different aspects of future cognitive cities The book also analyses the required material to inform pertinent research communities of the state of the art research and the latest development in the area of cognitive smart cities development as well as a valuable reference for planners designers strategists and ICT experts who are working towards the development and implementation of CIoT based on big data analytics and context aware computing *Proceedings of the 15th International Conference on Sustainable Built Environment* Ranjith

Dissanayake,Priyan Mendis,Sudhira De Silva,Shiromal Fernando,Upul Attanayake,Pradeep Gajanayake,2025-07-29 This book highlights the latest knowledge and innovations in the fields of civil engineering and construction industry striving for a sustainable built environment This book consists of high quality innovative research findings selected from the proceedings of the 15th International Conference on Sustainable Built Environment ICSBE 2024 under the themes of sustainable construction urban green infrastructure and planning rainwater harvesting and water conservation high performance concrete indoor environmental quality and indoor plants wind and hydro power energy waste and wastewater management for enhanced sustainability impacts of climate change carbon footprint global climate model and landscaping material flows and industrial ecology sustainable materials etc **Routledge Handbook of Smart Built Environment** Weisheng

Lu,Chimay J. Anumba,2025-03-20 The primary aim of this edited volume is to document the current theories best practices and technological advancements in the move towards a Smart Built Environment SBE The needs to accelerate towards the SBE are numerous and include Increasing complexities and the need for interconnectivity within the built environment e g mega infrastructure projects Data driven decision making resulting in higher demand from clients e g smart design construction operation and end of life EOL High requirements from stakeholders e g system efficiency environmental performance green procurement Fast paced technological advancement and integration Natural disaster resilience of the built environment e g prediction smart control of building component Sustainability issues around the built environment In this book the interrelationships among the various lifecycle stages design construction operation and EOL the collective benefit of synergy at building level multi infrastructure level and city level as well as the ultimate goals in relation to the deployment of smart technologies in the industry are addressed Part I covers smart design and construction Part II smart living and operation and Part III broadens the scope to the whole smart city Chapters examine How smart technologies can improve the effectiveness productivity and efficiency of the built environment An overview of theories and practices that are enabled by innovations and technologies for developing the SBE The basis for new research agenda new concepts and frameworks for future development This handbook documents the current theories practices and technologies and develops a



holistic approach for research and practice by adopting a multidimensional outlook for the SBE It is an essential reference work for all built environment stakeholders from academia through to the professions      **Sustainable Built Environment** Deepak Bajaj,Thayaparan Gajendran,Sanjay Patil,2024-02-22 This book presents the select proceedings of International Conference on Sustainable Built Environment ICSBE 2023 It discusses the issues of sustainability and resilience in all types of building projects construction projects operational building and infrastructure projects within urban regions of the world The key themes covered in this book are sustainable urban planning sustainable construction real estate housing net zero built environment climate change policy legal framework climate finance technology and innovation toward decarbonization of the built environment This book is useful for researchers and professionals working in the fields of construction management built environment and allied fields      **CONVR 2023 - Proceedings of the 23rd International Conference on Construction Applications of Virtual Reality** Pietro Capone,Vito Getuli ,Farzad Pour Rahimian,Nashwan Dawood ,Alessandro Bruttini,Tommaso Sorbi,2023 Within the overarching theme of Managing the Digital Transformation of Construction Industry the 23rd International Conference on Construction Applications of Virtual Reality CONVR 2023 presented 123 high quality contributions on the topics of Virtual and Augmented Reality VR AR Building Information Modeling BIM Simulation and Automation Computer Vision Data Science Artificial Intelligence Linked Data Semantic Web Blockchain Digital Twins Health Safety and Construction site management Green buildings Occupant centric design and operation Internet of Everything The editors trust that this publication can stimulate and inspire academics scholars and industry experts in the field driving innovation growth and global collaboration among researchers and stakeholders      **Design and Management of Sustainable Built Environments** Runming Yao,2013-03-12 Climate change is believed to be a great challenge to built environment professionals in design and management An integrated approach in delivering a sustainable built environment is desired by the built environment professional institutions The aim of this book is to provide an advanced understanding of the key subjects required for the design and management of modern built environments to meet carbon emission reduction targets In Design and Management of Sustainable Built Environments an international group of experts provide comprehensive and the most up to date knowledge covering sustainable urban and building design management and assessment The best practice case studies of the implementation of sustainable technology and management from the BRE Innovation Park are included Design and Management of Sustainable Built Environments will be of interest to urban and building designers environmental engineers and building performance assessors It will be particularly useful as a reference book for undergraduate and postgraduate students in the built environment field      **Sustainable Built Environment and Urban Growth Management** Wann-Ming Wey,2020 Nowadays the sustainable built environment planning in most cities has come to a turning point as the growth in traffic and population has become a serious concern and put tremendous pressure on both the environment and people in these cities It is therefore important to find new ways or lifestyles such as compact

city transit oriented development TOD formulations that are more flexible inclusive and sustainable Furthermore for the sustainable built environment and urban growth management not only should the growth management principles which include smart growth sustainable growth and inclusive growth be taken into account but innovative smart planning strategies such as mixed use design green transport and new urbanism are also utilized in planning sustainable built environments in order to prevent the urban sprawl development that has occurred

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