Book Review

Tong Yang
Middlesex University, London, UK
t.yang@mdx.ac.uk
http://orcid.org/0000-0002-1254-5628

A whole-system approach to high-performance green buildings, by D. Strong and V. Burrows, Artech House, Norwood, MA, 2017, 281 pp., £111 (hardcover), ISBN-13: 978-1-60807-959-9

This book provides a comprehensive insight and practical guidance on an integrated approach to sustainable design, construction, operation and beyond for high-performance green buildings. Drawing on sound systematic knowledge and decades of experience, David Strong, Victoria Burrows and 22 leading experts summarise the key challenges, drivers and principles for realizing synergistic sustainable development.

Nine case studies (detailed on 50 pages) provide global representations in locations having typical climatic and contextual challenges. These projects are exemplars which represent the lessons learnt and concepts developed, and demonstrate in depth that it is perfectly possible to design, using existing technologies, market-feasible high-performance green buildings today.

Throughout the 281 pages there are some 160 illustrations which provide vivid visual display of information, showcase replicable principles for practitioners and highlight learning points for students on the best practices in latest green building developments.

The first chapter is an illustrated journey of worldwide building environmental assessment schemes from nineteenth century to twenty-first century, together with detailed comparison of most commonly adopted assessment methods, request our attention on 'golden rules' in the incorporation of holistic building design and operation processes. Beyond the main established assessment methods, two methods are specific. The Living Building Challenge certification programme demands biophilic design within the natural 'budget' of the sites, also sets net-zero energy and net-zero water as minimum requirements. The One Planet Living framework includes humancentric factors arranged as 10 sustainability principles to deliver buildings fit for people and the planet. Clearly defined actions under each principle with specific targets and key performance indicators are given for buildings in use over one or more decades.

The following eight chapters explore the opportunities of applying a whole system thinking approach for collaborative interdisciplinary teamwork from design and construction to occupation, demolition and reuse over the whole life cycle as well as step-by-step guides on how to achieve social, economic and environmental sustainability outcomes.

Every building is unique and generally the building sector has been hardly learning from mistakes. As an example, since 1934 over 70 reports have been published on the construction efficiency in the U.K. but have they been heeded? Harmonic fusion of strength, usefulness, beauty and sustainability defines high-quality design and future proofing. Authors in Chapter 3, Martin Cook, Derek Clements-Croome, Kathryn Bourke and Bill Bordass, elaborate the life cycle process of planning, design, construction, commissioning and facilities management including post occupancy evaluation (POE) for intelligent buildings. A suite of measures that incorporate advancing technologies, modelling and analysis tools are proven to enhance the application of passive design strategies optimally for health, comfort, well-being and high productivity. The whole life cycle costing integrating economic, social and environmental arguments are used as a basis for an integrated assessment of sustainability. Future proofing design and operation facilitate building users' interactive connection with Nature instead of relying 'climate-excluding' over-complicated serving systems. The *Soft Landing* initiative enables the construction sector to embrace the effective feedback mechanisms for innovation and performance enhancement, with continuously improved energy and carbon efficiencies of built environment assets besides collecting valuable feedback from the occupants on the environmental performance.

Chapter 4 draws readers' attention to Nature inspired systems. The benefits of building integrated vegetation come with opportunities and risks in design stage linked to operational issues. Planning for green and blue spaces to reconnect punctuated natural habitats for wild life in urban areas requires ecologist's input. In Chapter 5, the whole system/whole building optimisation process is explored through hierarchical steps as consideration of (1) site and orientation, (2) building envelope/ façade, (3) passive solutions, (4) high-efficient active energy systems and (5) on-site renewable energy generation options. Energy-optimising architectural design and engineering tools are well explained to deliver a paradigm shift for allowing design options to be evaluated effectively and common pitfalls avoided. Chapter 6 focuses on achieving water efficient buildings and key principles in realisation of sustainable drainage systems. Construction phase and post-construction management are discussed in Chapters 7 and 8. Impact on environment is minimised by using smart waste management, facilitating circular economy opportunities, implementing continuous commissioning process, and actively making feedback and POE routine

to optimise operational and maintenance practices. Building Information Modelling (BIM) – which originated from object-based parametric modelling applications for mechanical systems design in the 1980s – enables digital forensic tracking of high-quality information to support business outcomes through true collaborative effort amongst all stake holders (clients, designers, contractors, specialists, building occupiers and managers). BIM collaborative processes will significantly improve the efficiency of design, construction and operation, and provide a platform for continuous upskilling for all.

The wide-range of bespoke case studies for many types of buildings all emphasise the importance of clearly defined performance targets, shared vision of integrated and collaborative project teams, commitment to critical testing and continuous commissioning to optimise performance, and willingness to share lessons learned to accelerate the process of high-performance green buildings as a standard industry practice.