Architecture and Systems Ecology: Thermodynamic Principles of Environmental Building Design, in three parts

William Braham, University of Pennsylvania

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“In a context in which energy efficiency inexplicably and erroneously remains the sole architectural consideration of energy, Architecture and Systems Ecology is a superb, and necessary, contribution towards advancing the design and discourse of energy systems in architecture. From salient principles to their application, Braham provides a cogent explication of the latent power of the thermodynamics of building. These principles have yet to transform our collective modes of reasoning and imagination for energy systems, but soon will.” – Kiel Moe, Harvard University Graduate School of Design, USA

“Comprehensive and accessible, Architecture and Systems Ecology presents environmental building design as a technical and a social challenge. With solid scientific foundations in thermodynamics and ecology, and understanding buildings as physical shelters, life settings and urban sites, this important book goes beyond energy efficiency to propose principles of sustainable construction for contemporary cities. Vitruvius established firmite, utilitas and venustas as the basis of sound architecture. Braham offers a new triad for the twenty-first century: shelter, setting and site.” – Luis Fernández-Galiano, Int FRIBA, Professor of Architecture, Universidad Politécnica de Madrid, Spain

Modern buildings are both wasteful machines that can be made more efficient and instruments of the massive, metropolitan system engendered by the power of high-quality fuels. A comprehensive method of environmental design must reconcile the techniques of efficient building design with the radical urban and economic reorganization that we face. Over the coming century, we will be challenged to return to the renewable resource base of the eighteenth-century city with the knowledge, technologies, and expectations of the twenty-first-century metropolis.

This book explores the architectural implications of systems ecology, which extends the principles of thermodynamics from the nineteenth-century focus on more efficient machinery to the contemporary concern with the resilient self-organization of ecosystems.

Written with enough technical material to explain the methods, it does not include in-text equations or calculations, relying instead on the energy system diagrams to convey the argument. Architecture and Systems Ecology has minimal technical jargon and an emphasis on intelligible design conclusions, making it suitable for architecture students and professionals who are engaged with the fundamental issues faced by sustainable design.

The energy systems language provides a holistic context for the many kinds of performance already evaluated in architecture—from energy use to material selection and even the choice of building style. It establishes the foundation for environmental principles of design that embrace the full complexity of our current situation. Architecture succeeds best when it helps shape, accommodate, and represent new ways of living together.

William W. Braham FAIA is a Professor of Architecture at the University of Pennsylvania, where he is Director of the Master of Environmental Building Design. He received an engineering degree from Princeton University and an M. Arch and Ph.D. Arch. from the University of Pennsylvania. Braham is the director of the TC Chan Center, a faculty research unit on energy and environment in the built environment. Recent projects include the Sustainability Plan, Carbon Footprint, and Carbon Reduction Action Plan for the university. His publications include Rethinking Technology (2006), Energy and Architecture (2013), and Energy Accounts (2016).

SUSTAINABLE ARCHITECTURE

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Architecture and Systems Ecology

Thermodynamic principles of environmental building design, in three parts

William W. Braham
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