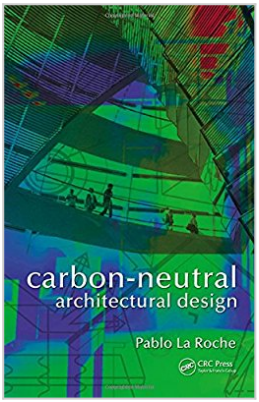

Carbon-Neutral Architectural Design

By Pablo M. La Roche

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The energy used to operate buildings is one of the most significant sources of greenhouse gas emissions. To lessen the human impact on climate, it is necessary to reduce these building-related emissions. New legislation, as well as market and financial pressures, are driving architects and developers to create low-carbon buildings. While it is possible to achieve many of these reductions through appropriate climate-responsive design, many architects are not trained to do this.

Filling an urgent need for a design reference in this emerging field, **Carbon-Neutral Architectural Design** describes how to reduce building-related greenhouse gas emissions through appropriate design techniques. This full-color book presents strategies and methods to achieve CO_2 reductions, with an emphasis on control of energy flows through the building envelope and passive heating and cooling strategies.

Strategies for Designing Buildings with a Smaller Carbon Footprint

Examining climate change and its relationship with buildings, the book begins with a look at the sources of emissions and how these are produced as a result of interactions between buildings and the surrounding environment. It then introduces a carbon-neutral architectural design process (CNDP) and a roadmap that can be adjusted for different types of projects.

Discussing climate analysis and solar geometry, the book explores how understanding the climate where a building is located helps to identify the design strategies that are best suited to that location?whether warm and humid, warm and dry, temperate, or cold. It looks at psychrometrics and how to achieve thermal comfort with minimum emissions. The book also explains how building fabric can be used to control energy flows by conduction, radiation, and convection?helping to reduce overheating and overcooling?and how to incorporate passive cooling and heating systems through appropriate design.

The book includes useful references, equations, and illustrations, as well as a comparison of free carbon counting tools that can be used for residential building design. Drawing on the author's extensive experience in teaching and practice, this is a valuable resource for anyone who wants to reduce the carbon footprint of buildings.

Find more study resources at the American Institute of Architects' Carbon Neutral Design Project web site.

What's next for green building? See what Dr. La Roche has to say in this video on the HMC Architects blog.

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Editorial Review

About the Author

Pablo La Roche is Professor in the Department of Architecture and Adjunct Professor at the Lyle Center for Regenerative Studies at California State Polytechnic University Pomona, where he has coordinated and taught design studios, environmental control systems, advanced electives, and seminars. In 2008 he led an interdisciplinary team of faculty and students that won the National Council of Architectural Registration Boards (NCARB) Grand Prize for the Department of Architecture.

He has a Bachelors in Architecture and a Masters of Science in Architecture from Universidad del Zulia, Venezuela, and a PhD in Architecture from the University of California, Los Angeles. Dr La Roche has extensive international experience in designing passive cooling systems, low-energy sustainable architecture, and affordable housing, and has published more than 120 papers on these topics in conferences and journals in the Americas, Europe, Asia, and Australia. He has also been a technical reviewer for many international scientific conferences in the Americas, Europe, and India. Dr. La Roche is the principal author of *Keeping Cool: Guidelines to Avoid Overheating in Buildings* (2001), the sixth book in a series published by the Passive Low Energy Architecture Association (PLEA).

Dr. La Roche is also the Director of Sustainable Design at HMC Architects, where he leads this California-based architecture firm’s ArchLab group, dedicated to advancing high-performance low-carbon architecture. He is a registered architect in Venezuela and a LEED BD+C accredited professional in the USA. His projects, emphasizing sustainability and affordability, have been published or received awards in Latin America and Europe.

For more information about Dr. La Roche, see Dr. La Roche’s web site at Cal Poly Pomona, Zero Carbon Design, and HMC Architects.

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