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The Price of Comfort: A Cost-Benefit Analysis and Case Study of How Landscape and Architectural Design Can Reduce Human Dependence on Climate Control

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In the development of modern sustainable construction, there has been a focus on technological solutions. One of the most effective ways to diminish one's carbon footprint is through reducing residential energy consumption. A simple component of residential energy reduction neglected in the literature is to better acclimate people to their local environments.

Since the advent of engineered climate control in the mid-20th Century, humans have "forgotten" how to live with their local climate conditions. This study examines from both quantitative and qualitative perspectives how acclimation via landscape and architecture design interventions can reduce residential energy use. Examining a variety of climates in California, it conducts a cost-benefit analysis of reducing the square footage of enclosed residential space to quantify the savings in construction costs, energy infrastructure, and reduced energy costs. Those monies could be then spent on ecologically appropriate outdoor rooms that mimic the functional and spatial requirements of the home, requiring little to no extra energy costs. Case studies show a variety of options for the design of the outdoor spaces including a) multiple spaces around the building for movement with the sun and wind; b) moveable controls within a single space such as umbrellas, retractable overhead shade structures, and opening louvered fences for wind; and c) additive devices like fire pits to warm and water features to cool-—all of which would also have aesthetic design qualities.

The value of the study highlights not only energy reduction through moving people to comfortable outdoor "rooms," but considers the possibility that outdoor spaces that match the spatial and functional needs of indoor rooms could be accounted for in affordable housing requirements. Additionally, this way of thinking about design improves quality of life for the homeowner as they would spend more time outside. It weaves together a story of successful design solutions in all climates for true sustainable design.

References:

Brown, R.D. and Gillespie, T.J., 1995. Microclimatic Landscape Design- Creating Thermal Comfort and Energy Efficiency. Wiley and Sons, New York.

Eliasson, I., 2000. The use of climate knowledge in urban planning, Landscape and Urban Planning 48: 31-44.

Katzschner, L. 2006. Behaviour of People in Open Spaces in Dependence of Thermal Comfort Conditions. PLEA 2006 - The 23rd Conference on Passive and Low Energy Architecture. Geneva, Switzerland.

Lee, B. (August, 2010). Quantifying Greenhouse Gas Mitigation Measures. In CAPCOA. Retrieved September 11, 2012, from http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf.

Lenzholzer, S. 2010. Research and Design for Climate Adaptation in Landscape Architecture Education. 2010 CELAConference, Maastrict, Netherlands.

Moffat, A. and Schiler, M., 1981. Landscape Design that Saves Energy. William Morrow and Company, New York.

Mouzon, S. 2010. The Original Green: Unlocking the Mystery of True Sustainability. The Guild Foundation Press, Miami.

Robinette, G.O. and McClennon, C., 1983. Landscape Planning for Energy Conservation, Van Nostrand Reinhold, New York.

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