# A Brief Introduction to the GREEN BUILDINGS DESIGN MANUAL

July 14, 2011

Green Buildings Council Committee
Institute of Architects, Pakistan

## Energy & the Environment

The issues of the Environment, Climate Change and the earth's rapidly depleting resources need no introduction here. Across the globe, societies are coming to terms with this enormous challenge, and are taking very significant and serious steps and measures to modify and improve "living as we know it" so that the very existence of humankind on Planet Earth can be sustained into the eternal future, and we can leave behind a better environment for our successors.

The people of Pakistan are currently enduring the crippling adversity of a debilitating energy crunch. Excessive, unbridled consumption in a scenario of a complete absence of control and management has led to a situation where there are more hours in a day without electricity than with it. Natural gas, an energy resource once thought to be limitless has now also been severely curtailed by deficits. Drastic measures need to be taken and taken now, so any form of sustainability can be countenanced.

As is believed all over the world, buildings of human habitation are the single largest consumers of power and energy. To make structures which require reduced energy to exist is the imperative of the day. The time has come for architects and engineers to make exerted efforts to make their buildings leaner and more efficient in the operation of the systems required to make them habitable.

Where the world makes concerted efforts to develop and harness renewable energy sources to run the various activities of human existence and the architectural facilities to house them, equally strident efforts are also being made to *reduce* the requirements and, hence, *consumption* of energy.

## The First Step

**Better energy efficiency, and greater environmental friendliness starts with *better design.* This is the aim and objective of this exercise presented here.**

## The Pakistan Green Buildings Council

In October, 2010, the **Institute of Architects, Pakistan** set up a team of architects to work towards the preparation of a set of guidelines and recommendations that would assist architects towards a better understanding of "green" concepts and goals, enabling the design of a built environment less heavy on energy, and more sustainable.

Simultaneously, the **IAP** also met with representatives of allied institutions such as the Pakistan Engineering Council, the ASHRAE Society of Pakistan, The Institution of Engineers Pakistan, in addition to private individuals intent upon forming a body that would strive towards the greening of the construction and building industry in Pakistan. While administrative efforts are underway and the establishment of the Pakistan Green Buildings Council is well under way, including registration with the World Green Buildings Council, the **IAP**'s team is working exclusively on the Design Manual.

## The Green Buildings Manual – Energy Requirement

From the outset, the **IAP** team adopted a bias in their approach to this task. It was decided that in order to have as comprehensive a study as possible, it was necessary to "go back to the basics", and to keep it as simple as possible. Several approaches were studied, LEED and GREEN manuals form various countries were studied, and a position was adopted:

> In the absence of the existence of any formalized Green, Sustainable or LEED standards, this Manual would limit itself to the collection and rationalization of "Better by Design" Standards. The move towards LEED Certification and institutionalizing green standards by way of enabling and empowering the Pakistan Green Buildings Council to introduce green measures as legislative acts would be a consequent step.

The team also chose to look at many examples of historical precedence, as well as several published works on the subject of designing for Climate. Several excellent works done by many researchers in the past were consulted and studied, with particular reference to "Design With Climate" by Olgyay & Olgyay. The development of this Manual is modeled along the same lines, but with the advantage of contemporary technology, knowledge and resources.

## The Green Buildings Manual – The Environment & Sustainability

In its two-pronged approach, the Manual also proposes strategies for design interventions that are environmentally conscious and reduce the adverse impact of the development.

# The Green Buildings Manual – Outline

The Manual has been laid out in a sequential manner as below:

## Chapter One: BioClimatic Chart – Comfort Zone

Most works on designing for climate use that tried and tested machine – **The Bioclimatic Chart – Comfort Zone** – to determine optimum climatic conditions for human comfort. This Manual uses the same parameters to develop and suggest guidelines for better design interventions. Climatic Data is fed in to the chart's matrix, and interventions required studied and analyzed accordingly.

## Chapter Two: Site Selection – Site Development

Having set down desirable characteristics of climatic conditions, this Chapter suggests recommendations of judicious selection of Sites for development, both from the point of view of:

- working with climatic conditions by protecting from the adverse, and encouraging the desirable, features of the climatic conditions of a particular geographical location
- development standards that reduce the negative impacts on the Site and its surroundings

## Chapter Three: Architecture & Structure

Working in close collaboration with the findings of the overlay of climatic data on the bioclimatic chart, this chapter suggests various techniques and strategies to better interact with nature towards a comfortable indoor environment for buildings. The chapter deals in detail with:

**Building**
Building Orientation
Building Form/Mass
Buildings Shading Buildings
Courtyards
Heat Sink Principle

**Solar Radiation**
Solar Paths
Shading Devices

**Natural Ventilation**
Wind Direction
Wind Characteristics
Design of Openings

**Daylighting**
Direct Light
Reflected Light
Diffused Light
Sky Vault

**Insulation**
Design
Materials
Earth and Green roofs

**Materials**
Environmental Impact
Sourcing
Sustainability
Recycling
Wastage

**Colours & Surfaces**
Heat absorption and Reduction

**Structure & Construction**
Structural Systems
Pre Fabrication
Water Conservation
Energy Conservation
Maintenance & Sustainability

**Landscaping**
Native Plants
Efficient Irrigation
Captured Rainwater
Recycled Wastewater

## Engineering

This volume will deal mainly with the elements listed here. Much work has been done in the field of engineering and technological development, and it is proposed that this manual will combine with other works as added volumes that deal with:

**Electrical**
**Heating Ventilating and Airconditioning**
**Existing Energy Sources**
**Renewable Energy**
**Wastewater Technologies**
**Solid Waste Management**

**It is envisaged that this Manual will be completed in October, 2011.**

**THIS IS A WORK IN PROGRESS**

**The Green Buildings Council Committee of the IAP**
Shahab Ghani Khan, President
Institute of Architects, Pakistan

Syed Akeel Bilgrami
Shahid Khan
Ahmed Mian
Moyena Niazi
Sobia Kapadia
Husnain Lotia

July 15, 2011

Presented by
Ar. Jahangir Khan of IAP
at the 32nd ARCASIA Council Meeting
DaNang, VIETNAM