Green Building Technologies

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EXECUTIVE SUMMARY

Buildings are responsible for 40% of global energy use and produce over a third of global greenhouse gas emissions. These impacts are being acknowledged and addressed in specialist building design techniques and technologies that aim to reduce the environmental impacts of buildings. These techniques and technologies can be referred to collectively as green building technologies. This chapter describes green building technologies and shows why they are vital in addressing climate change and reducing the negative environmental impacts associated with built environments. A structured approach is presented which can be applied to identify and integrate green building technologies into new and existing buildings. By combining global implications with technical detail, the chapter provides a valuable guide to green building technologies and their role in supporting a transition to a more sustainable future.

INTRODUCTION

Green building technologies describe technologies and techniques used in built environments to minimize environmental impacts, such as climate change while ensuring that buildings are able to accommodate the functions they have been designed for, and are comfortable and productive to live and work in.

Given the onset of climate change, green building technologies must also now ensure that built environments can continue to support their required functions and maintain comfortable conditions under projected future climatic conditions

Therefore, in order to understand green technologies in buildings, it important to understand the relationship between built environments and the natural environment. In particular, it is important to ascertain the role that technology plays in this relationship, as this has the potential to increase impacts and environmental damage or to avoid damage and create beneficial impacts.

This understanding can be used to identify and develop, 'green technologies' which can be applied in built environments to reduce environmental impacts. It is also important in understanding how these technologies can be adopted and integrated within a larger built environment scheme and processes.

As the application and integration of these technologies in built environments can be complex, it is also valuable to define structured processes which can be used to integrate technologies effectively into the planning, design, construction and management of built environments.

This chapter on green building technologies therefore is structured in the following parts:

- **Climate Change:** This describes climate change and the role green building technologies play in both climate change mitigation and adaptation.
- **Occupant Comfort and Productivity:** This describes the nature of occupant comfort and productivity and how green building technologies can be used to enhance this in buildings.
- **Green Building Technologies:** This describes technologies and techniques in buildings which can be applied to achieve occupant comfort and productivity in buildings while minimizing environmental impacts. It focusses on energy efficient technologies and passive design techniques related to occupant comfort and productivity.
- **Integrating green building technologies**: This section describes a structured approach that can be used to support the integration of green technologies in buildings. It focusses methodologies that support the selection and application of technologies that is responsive not only to global environmental concerns but also to local environmental, social and economic issues.

CLIMATE CHANGE

Climate change has been identified as one of the most significant global issues (Hamin and Gurran, 2009). Climate change describes changes to the climate associated with human activity (Intergovernmental Panel on Climate Change, 2015). These changes are also referred to as global warming and are caused by the accumulation of greenhouse gasses in the upper atmosphere. Gases such as carbon