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Development of a regenerative design model for building retrofits

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Abstract

Current building retrofits are predominantly focused on energy and cost efficiency at an individual building or building component scale. Whilst the aspirations of these retrofits are crucial to the sustainable development of our built environment, we can and need to do better. Many argue that we need a shift in worldview from mechanistic to regenerative, and in order to do so we must engage with the living world by (re)aligning human and natural systems. This paper proposes a 'proactive' retrofit approach which seeks to integrate net-positive, restorative and regenerative design concepts into building retrofits. A regenerative design model that explores the key interactions between physical, human and natural systems is developed to achieve these proactive outcomes. A set of regenerative design principles for building retrofits are proposed to emphasise the positive interactions an existing building can have with its surrounding environment. More specifically, this paper will explore how an energy efficient building retrofit can improve occupant health and wellbeing, and restore and enhance local ecosystems. A detailed example will then be used to demonstrate the principles as a means of shifting the way designers and decision makers view the building retrofit design process.

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1. Introduction

Current sustainable or green approaches to building retrofits are a result of a technological driven mindset that reduces a building to its components to achieve a greater cost or energy efficiency. This mechanistic approach to

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achieving certain sustainability standards or ratings leads to a fixation on reducing the 'negative' impacts a building can have. Although these aspirations are crucial to the development of sustainable, green or high performing buildings, we can and need to do better than this. Many believe that in order to do so we require a fundamental shift in worldviews towards a regenerative one [1,2,3,4,5,6]. This requires moving away from a fear-based approach focused on scarcity of resources, uncertainty and sacrifice towards a positive model which aligns humanity within a larger community of life [5].

This shift towards regeneration is manifested in *BNIM's* (Berkebile Nelson Immenschuh McDowell) REGEN tool [7] and *CLEAR's* (Centre for Living Environments and Regeneration) LENSES framework [8], alongside existing frameworks such as One Planet Living and the Living Building Challenge. As a result there are very promising examples of buildings designed within this regenerative worldview. While most, if not all of these frameworks can be applied to building retrofits, the majority of these buildings seem to be new developments in unique or favourable locations. Considering that in developed countries the majority of buildings which will exist in 2050 have already been built [9], it is essential that building retrofits start to make this shift towards regeneration. Interventions should therefore be seen as an opportunity to produce and regenerate rather than just damage control. However these opportunities cannot be realised solely at a building scale. A single building retrofit must go beyond its site boundaries and positively interact with its surrounding human and natural systems in order to shift to this regenerative paradigm.

This paper will explore how the concept of regeneration can start to be applied specifically to building retrofits. A 'proactive' retrofit approach is proposed which seeks to integrate net-positive, restorative and regenerative design concepts into building retrofits. A regenerative design model that considers the key interactions between physical, human and natural systems within the built environment is developed to achieve these proactive retrofit outcomes. This involves the development of regenerative design principles for building retrofits that emphasise the positive interactions a building can have with its surroundings. By promoting these positive interactions, the focus of building retrofits can now be to support, maintain and enhance a co-partnered relationship between human and natural systems.

2. Regenerative design and development

If we do not make this fundamental transition towards regeneration it will be impossible to go beyond simply slowing the rate of depletion and degradation [3]. In order to do so we must engage with the living world by (re)aligning human and natural systems. Pamela Mang and Bill Reed support this by defining regenerative design as the "reconnection of human aspirations and activities with the evolution of natural systems – essentially co-evolution [3]." Chrisna du Plessis suggests that the two underlying questions of this regenerative worldview are, 'how can we learn to live in harmony with nature' and 'how can our efforts make the world a healthy and life-enhancing place [2]'?

The first step towards regenerative design and development is not a change of techniques but a change of mind [3]. This is emphasised through the development of a regenerative methodology by Regenesis which provides a set of guiding principles and concepts grounded in this regenerative worldview. This approach has three phases, understanding the right relationship to place, designing for harmony and co-evolution. An understanding of place highlights the importance of a shared connection to place and belonging, designing for harmony presents the vision of what could be, and co-evolution ensures the ongoing mutually beneficial integration of human and natural systems [5].

Janis Birkeland also explores this paradigm shift with her Positive Development which suggests that the natural life support systems must grow in proportion to increases in population, poverty, pollution and biodiversity losses [1]. Positive Development actively seeks opportunities to create net-positive outcomes so as to expand both the ecological base (natural life supporting system) and the public estate (access to means of survival) beyond pre-settlement conditions [5]. Birkeland suggests that to support current human systems, "cities must be retrofitted to increase indigenous ecosystems and eco-services [1]."